Airline Ticket Booking Software Requirements Specification

Version 1.0

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1. Executive Summary

1.1. Project Overview

This project involves the development of a comprehensive airline ticket booking software designed to streamline the flight booking process for passengers and provide robust management tools for airline administrators, finance departments, flight planners, and operators. The software integrates multiple functionalities to ensure efficient booking, secure payment processing, detailed reporting, and effective communication.

Intended Audience

The intended audience for this software includes:

Passengers: Individuals who need to search for flights, book tickets, manage their bookings, and provide feedback on their flight experiences.

Administrators: Airline staff responsible for managing user accounts, including account creation, modification, deletion, password resets, and role/permission management.

Finance Department: Team members who require access to detailed revenue performance reports, with the ability to visualize data through charts, graphs, and tables.

Flight Planners: Air control department personnel who manage flight schedules, including creating, modifying, and deleting flights, as well as updating flight details.

Managers: Airline management personnel overseeing user accounts, system performance, and operational efficiency. They are also responsible for authorizing modifications, conducting performance reviews, and generating analytical reports.

Operators: Staff providing assistance to passengers through various communication channels, including phone, email, and live chat, and handling notifications for booking confirmations, changes, and cancellations.

1.2. Purpose and Scope of this Specification

Purpose

The purpose of this specification is to detail the functional and technical requirements for the development of our airline ticket booking software. This document aims to provide a clear and comprehensive guide for everyone involved in the project, ensuring that all parties understand the scope and limitations of the project.

Scope

In Scope

This document addresses requirements related to the development of the airline ticket booking software, specifically:

Passenger Services:

- Account creation and login.
- Flight search, booking, and management.
- Payment processing and feedback system.

User Registration and Authentication:

- Secure account management for passengers.
- Administrative controls for managing user accounts.

Finance Department:

- Access to revenue performance reports.
- Data visualization tools for revenue analysis.

Flight Planning:

- Creation, modification, and deletion of flights.

- Management of flight details including coordinates, aircraft information, and routes.

Management and Reporting:

- Oversight of user accounts and system performance.
- Generation of reports and analytics for flight bookings.

Customer Support and Communication:

- Provision of customer support via multiple channels.
- Notifications for booking confirmations, changes, and cancellations.

Out of Scope

The following items are outside the scope of these specifications:

Future Phases of Development:

- Any enhancements or modifications planned for future phases of the project, beyond the initial deployment.
- Requirements related to the integration with third-party systems or services that are not part of the current phase.
- Modifications related to future legislative mandates not covered in the current phase.

These out-of-scope items will be considered in the planning of future phases, but their requirements will be documented separately and addressed in subsequent development cycles.

2. Product/Service Description

Background Information

The airline ticket booking software is designed to address the evolving needs of the airline industry and its customers. As the travel industry becomes increasingly digitized, there is a growing demand for efficient, user-friendly, and secure booking solutions. This software aims to enhance the travel

experience for passengers while providing robust management tools for airline staff and departments. The following factors influence the product and its requirements:

A. User Experience:

a. **Ease of Use**: Passengers expect a seamless and intuitive booking process. A user-friendly interface that simplifies flight searches, bookings, and payments is essential to meet customer expectations and enhance satisfaction.

b. **Accessibility**: The software must be accessible across various devices, including desktops, tablets, and smartphones, to cater to a broad audience.

B. **Security**:

a. **Data Protection**: With the increasing risk of cyber threats, safeguarding personal and payment information is crucial. The software must implement robust security measures to protect user data and ensure compliance with data protection regulations.

b. **Authentication**: Secure user authentication processes are necessary to prevent unauthorized access and ensure the integrity of user accounts.

C. **Real-Time Information**:

a. **Flight Availability and Pricing**: Providing real-time data on flight availability, pricing, and seat options is vital for passengers to make informed decisions. This requires integration with airline databases and real-time data feeds.

b. **Dynamic Updates**: The software should handle dynamic updates, such as changes in flight schedules or prices, to ensure users have the most current information.

D. **Operational Efficiency**:

a. **Administrative Control**: Airline staff need effective tools to manage user accounts, reservations, and flight details. This includes functionalities for creating, modifying, and deleting accounts and flights, as well as handling special requests and changes.

b. **Financial Reporting**: The finance department requires detailed revenue reports and data visualization tools to monitor and analyze financial performance. This helps in making informed business decisions and identifying trends.

E. **Regulatory Compliance**:

a. **Legislative Requirements**: The software must comply with industry regulations and standards, such as data protection laws and aviation regulations. This ensures the system operates within legal frameworks and avoids penalties.

b. **Accessibility Standards**: Compliance with accessibility standards ensures the software is usable by people with disabilities, broadening its user base and adhering to legal requirements.

F. **Customer Support**:

a. **Multi-Channel Support**: Providing customer support through various channels, including phone, email, and live chat, is essential for addressing passenger inquiries and issues promptly.

b. **Notification System**: Automated notifications for booking confirmations, changes, and cancellations help keep passengers informed and reduce the likelihood of miscommunication.

Reasons for Specific Requirements

The aforementioned factors directly influence the specific requirements detailed later in the specification. For instance, the need for a user-friendly interface drives the requirement for comprehensive search and booking functionalities. Security considerations necessitate robust authentication mechanisms and data protection measures. Real-time information requirements lead to the integration of dynamic data feeds and updates. Operational efficiency and regulatory compliance shape the administrative and reporting features, while customer support needs influence the communication tools and notification systems.

By understanding these general factors, stakeholders can appreciate the rationale behind each requirement, ensuring the final product aligns with industry demands and user expectations.

2.1 Product Context

Independence and Self-Contained Nature

The airline ticket booking software can function as an independent, self-contained system with its primary purpose being to facilitate the booking of airline tickets for passengers.

Interfacing with Related Systems

While the core functionality of the software is self-contained, it often needs to interface with a variety of related systems to provide a comprehensive service. These relationships include:

1. Airline Reservation Systems (Global Distribution Systems - GDS)

- **Description:** The booking software needs to connect with GDSs such as Amadeus, Sabre, or Travelport to access real-time flight data from multiple airlines.
- **Function:** This integration allows users to search for and book flights from various airlines in one place.

2. Payment Gateways

- **Description:** Integration with payment processing services like PayPal, Stripe, or direct credit card processors.
- **Function:** Enables secure and efficient handling of payments, supporting multiple currencies and payment methods.

3. Customer Relationship Management (CRM) Systems

- **Description:** Linking with CRM systems to manage customer data, preferences, and communication.
- **Function:** Helps in personalizing the booking experience, managing customer inquiries, and marketing activities.

4. Travel Management Systems

- **Description:** Some users, especially business travelers, may use travel management systems like Concur or Egencia.
- **Function:** Integrates booking details with expense management and corporate travel policies, ensuring compliance and streamlining reporting.

5. Alert Systems

- **Description:** Integration with alert systems for communication.
- **Function:** Sends alerts for booking confirmations, flight status updates, and check-in reminders.

6. Security and Compliance Systems

- **Description:** Connecting with systems for data security, fraud detection, and regulatory compliance.
- **Function:** Ensures the software adheres to industry standards and protects user data.

Summary of Relationships

- Independent Functionality: The core functionalities (searching flights, booking, and payment processing) can operate independently, making the software useful on its own.
- Interdependent Functionality: The software enhances user experience and operational efficiency by interfacing with GDS, payment gateways, CRM systems, travel management systems, alert systems, and security systems.

By integrating with these related systems, the airline ticket booking software can provide a seamless, comprehensive, and efficient service to its users, enhancing the overall travel booking experience while maintaining the capability to operate independently if needed.

2.2 User Characteristics

1. Staff (Corporate Employees)

- Experience:
  - Moderate experience with booking flights, typically for business travel.
  - Familiar with corporate travel policies and budget constraints.
- Technical Expertise:
  - Comfortable with using computers and mobile devices for booking travel.
  - Generally prefer user-friendly interfaces with some support for complex bookings.
- Other General Characteristics:
  - Interested in cost-effective options.
  - Value clear policies on changes and cancellations.
  - Require detailed invoicing and receipts for reimbursement purposes.
  - Often need assistance with group bookings and coordination for team travel.

2. Leisure Travelers

- Experience:
  - Wide range of experience, from occasional travelers to frequent vacationers.
  - Typically book flights for vacations, family visits, and personal trips.
- Technical Expertise:

- Varies from novice to proficient with online booking platforms.
- Comfortable with using both websites and mobile apps.

- Other General Characteristics:
  - Budget-conscious, looking for deals and special offers.
  - Flexible with travel dates to find better deals.
  - Prefer easy-to-navigate interfaces and straightforward booking processes.

3. Business Travelers (Non-Staff)

- Experience:
  - High experience with frequent travel for business purposes.
  - Focus on efficiency and convenience in booking travel.
- Technical Expertise:
  - Proficient with using technology for booking flights and managing itineraries.
  - Often use travel management apps and software.
- Other General Characteristics:
  - Prioritize efficiency, reliability, and convenience.
  - Interested in options that offer flexibility and ease of booking.
  - Require flexible booking policies and easy management of bookings.
  - Value quick support for changes and cancellations.

2.3 Assumptions

Assumptions Affecting Requirements

1. Equipment Availability

- **Assumption:** Users have access to modern computers, tablets, or smartphones.
- **Impact:** The system must be compatible with multiple device types and screen sizes.
- **Change Needed if Unavailable:** The system would need a simplified version for older or less capable devices.

2. Operating System

- **Assumption:** Users are using up-to-date versions of major operating systems (Windows, macOS, iOS, Android).
- **Impact:** The software should be compatible with the latest and several previous versions of these operating systems.
- **Change Needed if Unavailable:** Broader compatibility testing and support for older operating system versions would be required.

3. Internet Access

- **Assumption:** Users have reliable internet access.
- **Impact:** The system can be primarily web-based, requiring constant internet connectivity.
- **Change Needed if Unavailable:** Offline capabilities or downloadable versions of the system might need to be developed.

4. Browser Compatibility

- **Assumption:** Users have access to and use modern web browsers (Chrome, Firefox, Safari, Edge).
- **Impact:** The system should be tested and optimized for these browsers.
- **Change Needed if Unavailable:** Additional support for older or less common browsers would be required.

5. Technical Expertise

- **Assumption:** Users have a basic level of technical expertise and can navigate web applications.
- **Impact:** The user interface should be intuitive and user-friendly, but it can assume a baseline understanding of web usage.
- **Change Needed if Unavailable:** Additional user training resources, tutorials, or a simplified interface would be necessary.

6. Payment Methods

- **Assumption:** Users have access to common online payment methods (credit/debit cards, digital wallets like PayPal).
- **Impact:** The system can integrate standard payment gateways.
- **Change Needed if Unavailable:** Support for alternative payment methods or manual payment processes would be required.

7. Airline Reservation System Integration

- **Assumption:** The system can access and integrate with major Global Distribution Systems (GDS) like Amadeus, Sabre, or Travelport.
- **Impact:** Ensures a wide range of flight options and real-time availability.
- **Change Needed if Unavailable:** Direct partnerships with individual airlines or alternative flight data sources would be necessary.

8. Security Standards

- **Assumption:** The system will comply with standard security protocols (SSL/TLS, PCI-DSS for payments).
- **Impact:** Ensures user data protection and secure transactions.
- **Change Needed if Unavailable:** Development of custom security measures or additional compliance checks.

9. Regulatory Compliance

- **Assumption:** The system adheres to relevant aviation and data protection regulations (GDPR, CCPA, etc.).
- **Impact:** Ensures legal compliance and user trust.
- **Change Needed if Unavailable:** Significant modifications to data handling, storage, and user consent processes.

Summary

These assumptions shape the requirements for the airline ticket booking system, impacting its design, functionality, and user experience. If any of these assumptions do not hold true, the system's requirements specification would need to be adjusted accordingly to ensure the software remains functional and user-friendly under the new conditions.

2.4 Constraints

Design Constraints

1. Parallel Operation with an Old System

- **Description:** The new system may need to operate alongside the existing system during the transition period.
- **Impact:**
  - Data Synchronization: Ensures consistency between the old and new systems.
  - Compatibility: The new system must be compatible with the old system’s data formats and protocols.
  - User Training: Users may need to learn to navigate both systems temporarily, so the interfaces should be somewhat similar to reduce confusion.

2. Audit Functions (Audit Trail, Log Files, etc.)

- **Description:** The system must include robust audit functions to track user actions and system events, ensuring accountability and transparency in the management of flight plans.
- Impact:
  - **Data Logging:** The system will maintain a comprehensive audit trail that captures all significant actions performed on flight plans. This includes the creation, modification, and deletion of flight plans that must be logged with detailed information, including timestamps and user identification.
  - **Security:** Logs must be secure and tamper-proof to ensure data integrity. Access to logs should be restricted to administrators only, and any attempts to alter the logs must be detected and reported.

- **Performance:** The logging mechanism will be designed for efficiency, ensuring that the system can log actions quickly without affecting the performance of other system functions. This includes the ability to handle high volumes of logging activity during peak operational times.
- **Compliance:** The system will comply with all relevant regulatory requirements for data retention and auditability. This includes maintaining logs for the required period, ensuring they are complete and accessible for audits, and implementing any necessary controls to meet industry standards.

3. Access, Management, and Security

- **Description:** The system must have strong security measures to protect sensitive data and manage user access.
- **Impact:**
  - **User Authentication:** Implementation of secure authentication methods (e.g., multi-factor authentication).
  - **Role-Based Access Control:** Different access levels based on user roles (e.g., admin, user, support).
  - **Encryption:** Data, both in transit and at rest, must be encrypted.
  - **Monitoring:** Continuous monitoring for unauthorized access and potential security breaches.
  - **Compliance:** Must comply with relevant data protection regulations (e.g., GDPR, CCPA).

4. Criticality of the Application

- **Description:** The system is critical as it directly affects airline operations and customer satisfaction.
- Impact:
  - **High Availability:** The system must be highly available with minimal downtime (e.g., through redundant servers and failover mechanisms).
  - **Performance:** The system must handle peak loads efficiently without performance degradation.

- **Backup and Recovery:** Regular backups and a robust disaster recovery plan are essential to prevent data loss and ensure quick recovery.

5. System Resource Constraints

- Description: There may be limitations on available disk space, memory, processing power, or other hardware resources.
- Impact:
  - **Optimization:** The software must be optimized to use resources efficiently, avoiding unnecessary consumption.
  - **Scalability:** Ability to scale up resources as demand grows.
  - **Hardware Compatibility:** Ensure the system is compatible with existing hardware infrastructure.

6. Other Design Constraints

- **Design or Other Standards:**
  - **Programming Language or Framework:** The system might need to be developed using specific programming languages (e.g., Java, Python) or frameworks (e.g., Spring, Django) as per organizational standards.
  - **Development Standards:** Adherence to coding standards, best practices, and industry guidelines.
  - **User Interface Guidelines:** Compliance with usability and accessibility standards (e.g., WCAG for accessibility).
  - **Integration Standards:** Standards for integrating with other systems and APIs.

Summary

These constraints will influence the design options for the airline ticket booking system. They encompass the need for parallel operation with the old system, the necessity of comprehensive audit functions, stringent access management and security requirements, the criticality of the application, system resource limitations, and adherence to specific design and development standards. Addressing these constraints is essential to ensure the system's functionality, security, and user satisfaction.

2.5 Dependencies

Key Dependencies Affecting Requirements

1. Integration with Global Distribution Systems (GDS)

- **Dependency:** The system requires real-time data from GDS such as Amadeus, Sabre, or Travelport.
- Impact:
  - **API Access:** Ensure reliable API access to GDS.
  - **Data Synchronization:** Real-time synchronization of flight data.
  - **Compliance:** Adhere to GDS integration guidelines and standards.

2. Payment Gateway Integration

- **Dependency:** Integration with payment processing services like PayPal, Stripe, or direct credit card processors.
- Impact:
  - **Security and Compliance:** Must meet PCI-DSS compliance requirements.
  - **Testing:** Thorough testing of payment workflows.
  - **User Experience:** Seamless user experience for payment processing.

3. Regulatory Compliance

- **Dependency:** Compliance with data protection regulations (e.g., GDPR, CCPA).
- Impact:
  - **Data Handling:** Secure data handling and storage practices.
  - **User Consent:** Mechanisms for obtaining and managing user consent.
  - **Audit Trails:** Maintain logs as per regulatory requirements.

4. Existing System Compatibility

- **Dependency:** The new system must operate alongside or replace an existing system.
- Impact:
  - **Data Migration:** Efficient data migration from the old system.

- **Parallel Operation:** Ensure compatibility and synchronization during the transition period.
- **User Training:** Training for users to adapt to the new system.

3. Requirements

3.1. Functional Requirements

Req#	*Requirement*	*Comments*	*Priority*	*Date Rvwd*	*SME Reviewed / Approved*
ABS_RQ1_1	*The system shall provide an easy access way to see transaction history*	*Ensures users can review past transactions easily.*	*1*	*22/05/2024*	*Melis Derveni*
ABS_RQ1_2	*The system shall allow the user to search for different flights*	*Facilitates flight search functionality for users.*	*1*	*22/05/2024*	*Melis Derveni*
ABS_RQ1_3	*The system shall allow the user to search for different flights*	*Allows users to book flights they have selected.*	*1*	*22/05/2024*	*Melis Derveni*
ABS_RQ1_4	*The system shall allow users to cancel already booked flights*	*Users can cancel their bookings as needed.*	*1*	*22/05/2024*	*Melis Derveni*
ABS_RQ_2_1	*The system shall enable users (Passengers) to initiate the creation of new accounts.*	*Supports new user account creation.*	*1*	*22/05/2024*	*Regi Loshi*
ABS_RQ_2_2	*The system shall provide users (every level) with the ability to securely authenticate and access their accounts.*	*Ensures secure login and access for all users.*	*1*	*22/05/2024*	*Regi Loshi*
ABS_RQ_2_3	*The system shall grant administrators the capability to create new specialized permission accounts, edit permissions, delete or reset password for users.*	*Empowers admins with user and permission management capabilities.*	*1*	*22/05/2024*	*Regi Loshi*
ABS_RQ_3_1	*The system shall provide users with options to choose from multiple payment methods including credit/debit cards, digital wallets, and bank transfers and shall securely process payments made by users through the selected payment method, ensuring accuracy and reliability of transaction data.*	*Offers multiple payment methods, ensuring secure and reliable transactions.*	*1*	*22/05/2024*	*Alvin Kollcaku*
ABS_RQ_3_2	*After successful booking passengers can view and manage their booked flights*	*Passengers can manage their bookings post-purchase.*	*1*	*22/05/2024*	*Alvin Kollcaku*

Req#	*Requirement*	*Comments*	*Priority*	*Date Rvwd*	*SME Reviewed / Approved*
ABS_RQ_3_3	*The finance department accesses revenue performance reports through the booking software's reporting module.*	*Finance department can access important financial reports.*	*1*	*22/05/2024*	*Alvin Kollcaku*
ABS_RQ_4_1	*The system shall provide secure user authentication mechanisms.*	*Ensures secure user authentication.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_4_2	*The system shall validate user inputs to ensure data integrity and consistency.*	*Maintains data integrity through input validation.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_4_3	*The system shall support real-time collaboration features for multiple users.*	*Enables multiple users to collaborate in real-time.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_4_4	*The system shall perform regular backups for flight plan data.*	*Ensures regular data backups for safety.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_4_5	*The system shall maintain an audit trail of all actions performed on flight plans.*	*Keeps a record of all actions for accountability.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_4_6	*The system shall be capable of integrating with external airline systems.*	*Allows integration with other airline systems.*	*1*	*22/05/2024*	*Maida Daulle*
ABS_RQ_5_1	*The system shall allow managers to monitor user accounts and permissions, excluding admins, ensuring effective security measures and resource allocation.*	*Managers can oversee user accounts and permissions.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_2	*The system shall generate a unique code for operator-requested modifications, requiring manager confirmation for validation and authorization.*	*Adds an approval layer for operator-requested changes.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_3	*The system shall enable managers to monitor overall system performance and usage statistics, providing valuable insights for informed decision-making and resource allocation.*	*Provides insights into system performance for managers.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_4	*The system shall facilitate annual performance management for operators.*	*Supports annual performance reviews for operators.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_5	*The system shall grant managers access to comprehensive analytics, aiding informed decision-making.*	*Gives managers access to detailed analytics for better decisions.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_6	*The system shall incorporate client feedback for evaluating flight booking process performance.*	*Uses client feedback to improve booking process.*	*1*	*22/05/2024*	*Tea Meraj*

Req#	*Requirement*	*Comments*	*Priority*	*Date Rvwd*	*SME Reviewed / Approved*
ABS_RQ_5_7	*The system shall analyze flight frequency data in reports to enhance booking pattern understanding over time.*	*Analyzes flight frequency data to understand booking trends.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_8	*The system shall produce monthly statistical reports covering the entire flight booking process, incorporating insights from client reviews and flight frequency data.*	*Generates comprehensive monthly reports on the booking process.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_5_9	*The system shall allow managers to access financial reports.*	*Provides financial reports access to managers.*	*1*	*22/05/2024*	*Tea Meraj*
ABS_RQ_6_1	*The system shall allow the passengers to communicate with customer service operators through live chat.*	*Enables live chat communication with customer service.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_2	*The system shall provide updates in real-time to passengers regarding booking confirmations, changes and cancellations.*	*Keeps passengers informed with real-time updates.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_3	*The system shall allow operators to create new bookings for passengers.*	*Operators can create bookings for passengers.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_4	*The system shall allow the operator to modify the passenger's personal information with the manager's permission.*	*Operators can modify passenger info with approval.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_5	*The system shall allow the operator to rebook an existing booking as per the passenger's request.*	*Supports rebooking of flights by operators.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_6	*The system shall allow the operator to cancel an existing booking as per the passenger's request.*	*Operators can cancel bookings on behalf of passengers.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_7	*The system shall allow the operator to add/modify additional services (such as seat assignment, pet, special meal, extra baggage, etc.) to an existing booking as per passenger request.*	*Facilitates modifications of additional services to bookings.*	*1*	*22/05/2024*	*Klaudia Tamburi*
ABS_RQ_6_8	*The system shall allow the operator to upgrade the passenger(s).*	*Operators can upgrade passenger bookings.*	*1*	*22/05/2024*	*Klaudia Tamburi*

3.2 Non-Functional Requirements

3.2.1 Product Requirements

3.2.1.1 User Interface Requirements:

1. **Screen Formats/Organization:**
    - The interface should provide clear and organized screens for passengers to search for and view detailed flight information, book and manage tickets, and provide feedback and ratings for their flight experiences.
    - Admins should have a user-friendly interface for managing user accounts, including creating, modifying, and deleting accounts, as well as managing user roles and permissions.
2. **Report Layouts:**
    - The reporting module should present revenue performance reports in charts, graphs, and tables that visualize revenue data over time and by route for the finance department.
3. **Menu Structures:**
    - The menu structure should be intuitive, providing easy access to different features and functionalities for passengers, admins, and managers.
4. **Error and Other Messages:**
    - Error messages should be descriptive and provide guidance on resolving issues, especially during account registration, authentication, and transaction management.
5. **Function Keys:**
    - Function keys or shortcuts should be available for common tasks such as searching for flights, managing accounts, and accessing reports.

3.2.1.2 Usability:

- **Learnability:**
    - The system should be easy to learn for passengers, admins, managers, and operators, with clear instructions and context-sensitive help.
    - User documentation should be comprehensive, covering all aspects of system functionality and usage.

3.2.1.3 Efficiency:

3.2.1.1.1 Performance Requirements:

1. The system should support 10 000 concurrent users, transactions, and data processing tasks efficiently.
2. Response times for critical operations such as flight search, ticket booking, and report generation should meet specified performance thresholds.

3.2.1.1.2 Space Requirements:

1. **Storage Capacity:** The system should have sufficient storage capacity to accommodate future growth and data expansion. Allocate a minimum of 1 TB of storage space for storing transactional data, logs, and system backups.
2. **Database Size:** The database size should be optimized to minimize storage requirements while ensuring efficient data retrieval and manipulation. Aim for a maximum database size of 500 GB to maintain optimal performance.
3. **File System Usage:** Utilize disk space efficiently by implementing file compression, archiving, and purging mechanisms. Maintain adequate free disk space (at least 20% of total disk capacity) to prevent performance degradation due to disk space constraints.
4. **Backup Storage:** Allocate dedicated storage space for system backups and disaster recovery purposes. Ensure that backups are stored in a secure and easily accessible location to facilitate quick restoration in case of data loss or system failure.

3.2.1.4 Dependability:

- **Availability:**
  - The system should be available during specified hours of operation, with minimal downtime for scheduled maintenance.
  - The impact of downtime on users and business operations should be minimized, with effective communication procedures for maintenance activities.
- **Reliability:**

- The system should have high reliability, with a low mean time between failures (MTBF) and a limited number of failures per hour.

- **Monitoring:**
  - Health monitoring of the system, failure detection, and error logging mechanisms should be in place to ensure system reliability and availability.
- **Maintenance:**
  - The system should be designed for ease of maintenance, with modular components and clear interface design to facilitate updates and enhancements.

3.2.1.5 Security

1. Encryption

- **Description:** All sensitive data, including user information, payment details, and communication between system components, should be encrypted using industry-standard encryption algorithms (e.g., AES).
- **Impact:** Prevents unauthorized access to sensitive information, even if intercepted.

2. Activity Logging and Audit Trail

- **Description:** Implement robust activity logging to record all user actions, system events, and data accesses. Maintain an audit trail for accountability and forensic analysis.
- **Impact:** Facilitates monitoring, detection, and investigation of unauthorized activities or security breaches.

3. Access Control

- **Description:** Enforce strict access control mechanisms, including role-based access control (RBAC) and least privilege principles, to limit user access to only necessary functions and data.
- **Impact:** Prevents unauthorized users from accessing sensitive information or performing critical actions.

4. Data Integrity Checks

- **Description:** Implement data integrity checks, such as checksums or digital signatures, to ensure that data remains unchanged and uncorrupted during transmission and storage.

- **Impact:** Protects against data tampering or corruption.

5. Firewalls and Intrusion Detection/Prevention Systems (IDS/IPS)

- **Description:** Deploy firewalls to monitor and control network traffic, and IDS/IPS to detect and block suspicious activities or known attack patterns.
- **Impact:** Adds an additional layer of defense against unauthorized access and malicious attacks.

3.2.1.6 Authorization and Authentication Factors

1. Authentication

- **Description:** Implement strong authentication mechanisms, such as multi-factor authentication (MFA) or biometric authentication, to verify the identity of users before granting access.
- **Impact:** Ensures only authorized users can access the system, reducing the risk of unauthorized access.

2. Authorization

- **Description:** Define granular authorization policies based on user roles and permissions to control access to system resources and functionalities.
- **Impact:** Limits the actions users can perform within the system, reducing the risk of unauthorized modifications or misuse.

3. Use of Standard Tools like PubCookie

- **Description:** Utilize standard authentication and authorization tools like PubCookie, which provides secure single sign-on (SSO) capabilities for web applications.
- **Impact:** Streamlines user authentication processes while maintaining security and compliance with industry standards.

4. Session Management

- **Description:** Implement secure session management techniques to prevent session hijacking or fixation attacks, including session timeouts, secure session tokens, and HTTPS protocol.
- **Impact:** Protects user sessions from unauthorized access or manipulation.

5. Regular Security Audits and Penetration Testing

- **Description:** Conduct regular security audits and penetration testing to identify vulnerabilities and weaknesses in the system, and promptly address any security issues.
- **Impact:** Proactively identifies and mitigates potential security risks, strengthening the overall security posture of the system.

3.2.2 Organizational Requirements

1. Process Standards Compliance

- **Requirement:** Ensure that the system adheres to organizational process standards and guidelines for software development, including documentation, testing, and deployment processes.
- **Rationale:** Compliance with process standards ensures consistency, quality, and traceability throughout the software development lifecycle.

2. Security Policy Compliance

- **Requirement:** Align the system's security features and controls with organizational security policies and procedures, including data protection, access control, and incident response protocols.
- **Rationale:** Adherence to security policies minimizes the risk of data breaches, unauthorized access, and compliance violations.

3. Regulatory Compliance

- **Requirement:** Ensure that the system complies with relevant regulatory requirements and industry standards, such as GDPR, CCPA, PCI-DSS, and aviation regulations.
- **Rationale:** Compliance with regulations and standards mitigates legal risks, ensures customer trust, and avoids penalties or fines.

4. Documentation Standards

- **Requirement:** Follow organizational documentation standards for system requirements, design specifications, user manuals, and training materials.
- **Rationale:** Consistent and well-documented system documentation facilitates communication, maintenance, and knowledge transfer among stakeholders.

5. Implementation Requirements

- **Requirement:** Adhere to organizational guidelines and procedures for system implementation, including software configuration, installation, and integration with existing infrastructure.
- **Rationale:** Proper implementation practices minimize deployment risks, ensure system compatibility, and facilitate seamless integration with other systems.

6. Change Management

- **Requirement:** Implement change management processes and procedures to manage system updates, patches, and configuration changes in accordance with organizational change control policies.
- **Rationale:** Formalized change management practices minimize disruption, maintain system stability, and ensure that changes are properly authorized and documented.

7. Quality Assurance and Testing

- **Requirement:** Conduct thorough quality assurance and testing activities based on organizational testing policies and procedures, including unit testing, integration testing, and user acceptance testing.
- **Rationale:** Rigorous testing ensures system reliability, functionality, and performance, reducing the likelihood of defects and errors in production.

8. Training and User Adoption

- **Requirement:** Develop training programs and materials in alignment with organizational training policies to ensure user proficiency and adoption of the system.
- **Rationale:** Effective training promotes user productivity, minimizes user errors, and maximizes the benefits derived from the system.

3.2.2.1 Environmental Requirements

1. Infrastructure

- **Requirement:** The system must be hosted on reliable and scalable infrastructure, including servers, databases, and networking components.
- **Rationale:** A robust infrastructure ensures high availability, performance, and scalability to accommodate varying levels of user traffic and system load.

2. Network Connectivity

- **Requirement:** The system requires stable and high-speed internet connectivity to interact with external systems, such as Global Distribution Systems (GDS), payment gateways, and customer databases.
- **Rationale:** Reliable network connectivity is essential for real-time data exchange, transaction processing, and seamless user experience.

3. Data Center Requirements

- **Requirement:** The system's hosting environment, whether on-premises or cloud-based, must meet industry standards for data center security, reliability, and compliance.
- **Rationale:** Compliance with data center standards ensures physical and environmental safeguards for data protection, disaster recovery, and business continuity.

4. Software Dependencies

- **Requirement:** The system's software stack, including operating systems, web servers, databases, and third-party libraries, must be compatible, up-to-date, and supported by vendors.
- **Rationale:** Compatibility and currency of software dependencies prevent compatibility issues, security vulnerabilities, and performance degradation.

5. Geographical Considerations

- **Requirement:** The system must consider geographical factors, such as time zones, languages, currencies, and regulatory requirements, to support users and operations across different regions.

- **Rationale:** Adapting to geographical considerations enhances user experience, ensures legal compliance, and facilitates international operations.

6. Power and Environmental Controls

- **Requirement:** The system's hosting environment must have adequate power backup systems (e.g., uninterruptible power supply - UPS) and environmental controls (e.g., temperature, humidity) to safeguard against power outages and environmental hazards.
- **Rationale:** Power and environmental controls minimize the risk of service disruptions, hardware failures, and data loss due to unforeseen events.

7. Scalability and Resource Allocation

- **Requirement:** The system should be designed to scale horizontally and vertically to accommodate growth in user demand, transaction volume, and data storage requirements.
- **Rationale:** Scalability ensures that the system can handle increased workload and resource demands without compromising performance or availability.

8. Disaster Recovery and Backup

- **Requirement:** Implement robust disaster recovery and backup procedures to mitigate the impact of system failures, data corruption, or natural disasters.
- **Rationale:** Disaster recovery and backup mechanisms minimize downtime, data loss, and business disruption, ensuring continuity of operations and data integrity.

9. Environmental Sustainability

- **Requirement:** Consider environmental sustainability principles in system design, operation, and procurement decisions, such as energy efficiency, resource optimization, and carbon footprint reduction.
- **Rationale:** Environmental sustainability initiatives align with corporate social responsibility goals, reduce operational costs, and minimize environmental impact.

3.2.2.2 Operational Requirements

Hours of Operation: *The system should be operational 24/7 to accommodate users from different time zones and ensure accessibility at all times.*

Level of Availability: *The system should aim for high availability, with downtime limited to scheduled maintenance periods. The target availability should be specified, such as 99.9% uptime.*

Coverage for Geographic Areas: *The system should be accessible from various geographic locations to serve a global user base effectively.*

Impact of Downtime: *Downtime should be minimized to avoid disruption to users and business operations. The impact of downtime, including financial losses and user inconvenience, should be quantified.*

Scheduled Maintenance: *The system should have scheduled maintenance windows during off-peak hours to perform updates, patches, and upgrades without affecting regular operations. Communication procedures for scheduled maintenance should be established to inform users in advance.*

Unscheduled Maintenance: *Procedures for handling unscheduled maintenance, including incident response and resolution, should be defined. Rapid response times and effective communication with users during unscheduled downtime are essential.*

Reliability Requirements: *Specify reliability metrics such as mean time between failures (MTBF) and mean time to repair (MTTR) to ensure the system meets reliability targets and can quickly recover from failures.*

Monitoring and Reporting: *Implement health monitoring, failure detection, and error logging mechanisms to ensure system reliability and availability. Regular reporting on system performance, uptime, and maintenance activities should be provided to stakeholders.*

3.2.2.3 Development Requirements

Software Development Methodology: Define the software development methodology to be used, whether it's agile, waterfall, or a hybrid approach. Specify the phases, activities, and deliverables for each development cycle.

Technology Stack: Identify the technology stack required for development, including programming languages, frameworks, libraries, databases, and third-party services. Ensure compatibility, scalability, and security of the chosen technologies.

Development Environment: Set up development environments, including development, testing, staging, and production environments. Define access controls, version control practices, and deployment procedures for each environment.

Coding Standards: Establish coding standards and best practices to ensure consistency, readability, and maintainability of the codebase. Use linting tools, code reviews, and automated testing to enforce coding standards.

Documentation: Create comprehensive documentation for the system architecture, design, APIs, modules, and workflows. Documentation should be kept up-to-date and accessible to developers, testers, and other stakeholders.

Testing Strategy: Define a testing strategy that includes unit testing, integration testing, regression testing, and user acceptance testing. Develop test cases, test scripts, and test data to validate system functionality, performance, and reliability.

Security Measures: Implement security measures throughout the development process to protect against vulnerabilities, threats, and attacks. Conduct regular security audits, code scans, and penetration testing to identify and mitigate security risks.

Scalability and Performance: Design the system for scalability and performance to accommodate growth in user base, data volume, and transactional load. Use techniques such as load balancing, caching, and database optimization to optimize performance.

Compliance Requirements: Ensure compliance with regulatory standards, industry guidelines, and organizational policies relevant to the system. Address requirements related to data privacy, accessibility, and intellectual property rights.

Training and Knowledge Transfer: Provide training and knowledge transfer sessions for developers, testers, and support staff to familiarize them with the system architecture, technologies, and development practices. *Encourage continuous learning and skill development within the team.*

3.2.3 External Requirements

3.2.3.1 Regulatory Requirements

1. Data Protection Compliance

- **Requirement:** Ensure compliance with data protection regulations such as GDPR, CCPA, and other applicable laws governing the collection, processing, and storage of personal data.

- **Rationale:** Compliance with data protection regulations safeguards user privacy, prevents unauthorized access or misuse of personal information, and avoids potential fines or legal penalties.

2. Payment Card Industry Compliance

- **Requirement:** Implement security measures in accordance with the Payment Card Industry Data Security Standard (PCI-DSS) to protect payment card data during processing, transmission, and storage.
- **Rationale:** PCI-DSS compliance reduces the risk of data breaches, fraud, and financial losses associated with unauthorized access to payment card information.

3. Aviation Regulation Compliance

- **Requirement:** Adhere to aviation regulations established by relevant authorities such as FAA, ICAO, and other regulatory bodies governing airline operations, safety standards, and passenger rights.
- **Rationale:** Compliance with aviation regulations ensures the safety, security, and efficiency of airline operations, fostering trust among passengers, regulatory agencies, and industry stakeholders.

4. Record Keeping and Audit Trails

Requirement: Maintain comprehensive records and audit trails of system activities, transactions, and user interactions to comply with regulatory requirements for data retention, reporting, and auditability.

Rationale: Record keeping and audit trails support regulatory compliance, facilitate forensic analysis, and demonstrate accountability in the event of regulatory audits, investigations, or legal disputes.

5. Regulatory Compliance: Data Security Standards (Aircraft Tracking System)

- **Requirement:** Implement security measures that meet industry standards (e.g., NIST, ISO 27001) to protect tracking data from unauthorized access and cyber threats.
- **Rationale:** Implementing security measures that meet industry standards such as NIST and ISO 27001 protects tracking data from unauthorized access and cyber threats. Compliance with data

security standards safeguards sensitive information, maintains the integrity of tracking systems, and mitigates the risk of data breaches and regulatory penalties.

6.Regulatory Compliance: Aviation Regulations (GIS)

- **Requirement:** The system must adhere to regulations established by reputable aviation authorities such as the Federal Aviation Administration (FAA) in the United States or the European Union Aviation Safety Agency (EASA) in Europe regarding the utilization of Geographic Information System (GIS) data in flight planning and navigation processes.
- **Rationale**: Regulations set forth by aviation authorities like the FAA (Federal Aviation Administration) or EASA (European Union Aviation Safety Agency) regarding the utilization of GIS data in flight planning and navigation is essential. Compliance ensures that the system operates within the legal framework established by these authorities, promoting flight safety and facilitating seamless integration of GIS data into flight operations.

3.2.3.2 Ethical Requirements

1. Privacy Protection

- **Requirement:** The system must prioritize user privacy and confidentiality, ensuring that personal information, including names, contact details, and payment data, is securely stored and handled.
- **Rationale:** Protecting user privacy fosters trust, maintains confidentiality, and prevents unauthorized access or misuse of sensitive information.

2. Transparency and Consent

- **Requirement:** Provide clear and transparent information to users about how their data will be collected, stored, and used. Obtain explicit consent from users before processing their personal information.

- **Rationale:** Transparency and informed consent empower users to make informed decisions about sharing their data and promote ethical data handling practices.

3. Fair Pricing and Transparency

- **Requirement:** Ensure fair and transparent pricing practices, disclosing all relevant fees, charges, and terms associated with bookings. Avoid deceptive pricing tactics or hidden costs.
- **Rationale:** Fair pricing practices build trust with customers, prevent exploitation, and uphold ethical standards in business transactions.

4. Non-Discrimination

- **Requirement:** The system must not discriminate against users based on factors such as race, ethnicity, gender, religion, nationality, or disability. Ensure equal access to services and fair treatment for all users.
- **Rationale:** Non-discrimination promotes fairness, equality, and inclusivity, aligning with ethical principles and legal requirements.

5. Accessibility

- **Requirement:** Ensure that the system is accessible to users with disabilities, complying with accessibility standards such as WCAG (Web Content Accessibility Guidelines). Provide alternative means of access for users with visual, auditory, or motor impairments.
- **Rationale:** Accessibility promotes inclusivity, enables equal access to services for all users, and demonstrates a commitment to social responsibility.

6. Data Accuracy and Integrity

- **Requirement:** Maintain the accuracy and integrity of data stored in the system, ensuring that information presented to users, such as flight schedules, availability, and pricing, is reliable and up-to-date.

- **Rationale:** Providing accurate and reliable information prevents misinformation, confusion, and potential harm to users.

7. Security and Fraud Prevention

- **Requirement:** Implement robust security measures to protect the system from cyber threats, unauthorized access, and fraudulent activities. Detects and prevents fraudulent transactions, account takeovers, and identity theft.
- **Rationale:** Protecting user data and financial transactions safeguards users from harm, preserves trust in the system, and upholds ethical standards in data security.

8. Environmental Responsibility

- **Requirement:** Consider environmental impact in system design, operation, and procurement decisions, aiming to minimize energy consumption, carbon emissions, and electronic waste generation.
- **Rationale:** Environmental responsibility aligns with ethical principles of sustainability, conservation, and stewardship of natural resources.

9. Corporate Social Responsibility

- **Requirement:** Engage in corporate social responsibility initiatives, such as philanthropy, community engagement, and ethical business practices, to contribute positively to society and mitigate negative impacts of business operations.

- **Rationale:** Corporate social responsibility demonstrates ethical leadership, fosters trust with stakeholders, and contributes to the well-being of communities and society at large.

3.2.3.3 Legislative Requirements

1. Data Protection Regulations (e.g., GDPR, CCPA)

- **Requirement:** The system must comply with data protection regulations, such as the General Data Protection Regulation (GDPR) in the European Union and the California Consumer Privacy Act (CCPA) in California.
- **Rationale:** Compliance with data protection regulations ensures the lawful and ethical handling of personal data, including user consent, data access controls, data breach notification, and the right to erasure.

2. Payment Card Industry Data Security Standard (PCI-DSS)

- **Requirement:** Implement security controls and practices in accordance with the Payment Card Industry Data Security Standard (PCI-DSS) to protect payment card data.
- **Rationale:** Compliance with PCI-DSS ensures the secure processing, transmission, and storage of payment card information, reducing the risk of data breaches and fraud.

3. Aviation Regulations (e.g., FAA, ICAO)

- **Requirement:** The system must adhere to aviation regulations established by relevant authorities, such as the Federal Aviation Administration (FAA) in the United States and the International Civil Aviation Organization (ICAO) globally.
- **Rationale:** Compliance with aviation regulations ensures the safety, security, and efficiency of airline operations, including aircraft maintenance, crew training, passenger screening, and air traffic management.

4. Consumer Protection Laws

- **Requirement:** The system must comply with consumer protection laws, such as regulations governing advertising, pricing transparency, consumer rights, and dispute resolution.

- **Rationale:** Compliance with consumer protection laws protects consumers from unfair or deceptive practices, ensures transparency in business transactions, and promotes trust in the marketplace.

5. Accessibility Standards (e.g., WCAG)

- **Requirement:** Ensure accessibility features and compliance with accessibility standards, such as the Web Content Accessibility Guidelines (WCAG), to provide equal access to individuals with disabilities.
- **Rationale:** Compliance with accessibility standards promotes inclusivity, ensures equal access to services for all users, and reduces the risk of discrimination or legal liability.

6. Record Keeping and Audit Trails

- **Requirement:** Maintain detailed records and audit trails of system activities, transactions, and user interactions, including changes to booking records, payments, and security-related events.
- **Rationale:** Record keeping and audit trails support compliance with regulatory requirements, facilitate forensic analysis and investigation, and demonstrate accountability in the event of disputes or legal proceedings.

7. Regulatory Reporting

- **Requirement:** Generate and submit regulatory reports as required by relevant authorities, such as aviation authorities, transportation agencies, or financial regulators.
- **Rationale:** Compliance with regulatory reporting requirements ensures transparency, regulatory oversight, and accountability in the airline industry, covering areas such as safety, security, financial performance, and consumer protection.

8. Language and Currency Requirements

Requirement: Support multiple languages and currencies to accommodate international travelers and comply with regulatory requirements for language accessibility and currency conversion.

Rationale: Multilingual and multi-currency support enhances user experience, expands market reach, and ensures compliance with regulatory requirements in diverse regions and markets.

9. Aviation Safety Regulations:

- **Requirement:** Adherence to safety regulations imposed by international aviation bodies like ICAO (International Civil Aviation Organization), ensuring that tracking data contributes to the overall safety of flight operations.
- **Rationale:** Compliance with international aviation safety regulations, particularly those established by ICAO, ensures that flight operations maintain the highest standards of safety. By adhering to these regulations, the system contributes to the prevention of accidents, supports efficient incident response, and fosters stakeholder confidence in the safety of air travel.

10. Weather API: Data Usage Rights:

- **Requirement**:Comply with licensing agreements and usage restrictions imposed by weather data providers and regulatory bodies.
- **Rationale:** Compliance with licensing agreements and usage restrictions imposed by weather data providers and regulatory bodies is essential for legally and ethically using weather data obtained through APIs within the system. Adhering to these requirements ensures that the system operates within the boundaries set by data providers and regulatory authorities, minimizing the risk of legal consequences and ensuring the continued availability of reliable weather data for operational purposes.

3.2.3.3.1 Accounting Requirements

1. Revenue Recognition

- **Requirement:** Implement accounting practices to accurately recognize and record revenue from ticket sales at the time of booking or upon completion of the flight.
- **Rationale:** Proper revenue recognition ensures compliance with accounting standards (e.g., IFRS 15, ASC 606), provides transparency in financial reporting, and facilitates accurate financial analysis.

2. Expense Allocation

- **Requirement:** Allocate expenses associated with ticket sales, including transaction fees, distribution costs, and commissions, to the appropriate accounting periods and cost centers.
- **Rationale:** Expense allocation enables accurate cost management, profitability analysis, and financial decision-making for airline operations.

3. Cash Management

- **Requirement:** Maintain accurate records of cash inflows and outflows related to ticket sales, refunds, and payment processing activities, reconciling bank statements and accounting records regularly.
- **Rationale:** Effective cash management ensures liquidity, financial stability, and compliance with regulatory requirements for fund management and reporting.

4. Tax Compliance

- **Requirement:** Calculate, collect, and remit applicable taxes, such as value-added tax (VAT), sales tax, and passenger taxes, in accordance with tax laws and regulations governing airline ticket sales.
- **Rationale:** Tax compliance minimizes the risk of penalties, fines, and legal disputes related to tax evasion or non-compliance with tax regulations.

5. Financial Reporting

- **Requirement:** Prepare and submit financial reports, including income statements, balance sheets, and cash flow statements, in compliance with accounting standards (e.g., IFRS, GAAP) and regulatory requirements.
- **Rationale:** Accurate and timely financial reporting provides stakeholders, including investors, regulators, and management, with valuable insights into the financial performance and health of the airline business.

3.2.3.3.2 Security Requirements

1. Authentication and Authorization

- Multi-Factor Authentication (MFA): Implement MFA for all users, especially admins, operators, managers, finance department personnel, and air control department staff.

- Role-Based Access Control (RBAC): Define roles with specific permissions. Ensure that users can only access data and functions relevant to their roles.
- Single Sign-On (SSO): Integrate SSO for ease of access and improved security management.

2. Data Protection

- Encryption:
  - Encrypt sensitive data at rest and in transit using industry-standard protocols (e.g., AES-256 for data at rest and TLS for data in transit).
- Data Masking:
  - Mask sensitive data such as credit card numbers, social security numbers, and personal details in non-production environments and in logs.
- Tokenization:
  - Use tokenization for sensitive data elements to minimize the risk of exposure.

3. Network Security

- Firewalls:
  - Implement firewalls to protect the internal network from unauthorized access.
  - Intrusion Detection and Prevention Systems (IDPS):
  - Deploy IDPS to monitor and block suspicious activities.
- VPN:
  - Use VPNs for secure remote access to the system by authorized personnel.

4. System and Application Security

- Secure Coding Practices:
  - Follow secure coding standards to prevent vulnerabilities such as SQL injection, cross-site scripting (XSS), and cross-site request forgery (CSRF).
  - Regular Security Audits and Penetration Testing:
  - Conduct regular security audits and penetration tests to identify and remediate vulnerabilities.
- Patch Management:
  - Implement a robust patch management process to keep all systems and applications up to date with security patches.

5. User Activity Monitoring and Audit Trails

- Comprehensive Logging:

  - Log all user activities, especially those involving access to sensitive data or system configuration changes.

- Audit Trails:

  - Maintain detailed audit trails that record user actions, including login/logout times, data access, and changes to system configurations.

- Anomaly Detection:

  - Implement systems to detect and alert on anomalous user behavior.

6. Integrated Systems Security

- Weather API:

  - Secure connections to the weather API using strong encryption and API keys.

- Aircraft Tracking System:

  - Ensure secure integration with the aircraft tracking system, using secure protocols and validating data integrity.

- Geographic Information System (GIS):

  - Secure GIS data exchanges and access controls to prevent unauthorized access and tampering.

7. Data Privacy and Compliance

- Compliance with Regulations:

  - Ensure the system complies with relevant regulations such as GDPR, PCI-DSS, and other applicable data protection laws.

- Data Retention and Deletion Policies:

  - Implement policies for data retention and secure deletion of data that is no longer needed.

8. Incident Response and Recovery

- Incident Response Plan:

  - Develop and maintain an incident response plan to quickly address security breaches.

- Disaster Recovery and Business Continuity:

  - Implement disaster recovery and business continuity plans to ensure system availability and data integrity in case of an incident.

9. User Training and Awareness

- Security Training:

  - Provide regular security training for all users to ensure they are aware of potential threats and best practices for protecting sensitive information.

- Phishing Awareness:

  - Conduct phishing simulations and awareness campaigns to educate users on recognizing and responding to phishing attempts.

10. Third-Party Risk Management

- Vendor Security Assessments:

  - Conduct security assessments of third-party vendors and integrated systems to ensure they meet security standards.

- Contractual Security Requirements:

  - Include security requirements and data protection clauses in contracts with third-party providers.

3.3 Domain Requirements

1. Flight Information

- **Requirement:** The system must integrate with external sources or databases to retrieve and display accurate and up-to-date flight information, including schedules, availability, routes, airlines, and aircraft types.
- **Rationale:** Access to comprehensive flight information enables users to make informed decisions when searching and booking flights, enhancing user experience and satisfaction.

2. Seat Selection

- **Requirement:** Provide functionality for users to view seat maps and select preferred seats during the booking process, considering factors such as seat availability, seat layout, seat pitch, and additional amenities.
- **Rationale:** Seat selection options cater to user preferences, comfort requirements, and special needs, improving customer satisfaction and loyalty.

3. Fare Calculation

- **Requirement:** Implement algorithms or business rules to calculate fares dynamically based on factors such as route distance, class of service, booking class, fare rules, demand, and supply.
- **Rationale:** Accurate fare calculation ensures competitiveness, revenue optimization, and compliance with pricing policies and regulatory requirements.

4. Booking Management

- **Requirement:** Enable users to manage their bookings, including itinerary changes, seat upgrades, cancellations, refunds, and ancillary service purchases (e.g., extra baggage, meals).
- **Rationale:** Booking management functionalities empower users to modify their travel plans flexibly, improving customer satisfaction and retention.

5. Payment Processing

- **Requirement:** Integrate with payment gateways to support secure and seamless payment processing, accepting various payment methods (e.g., credit/debit cards, digital wallets, bank transfers) and currencies.
- **Rationale:** Smooth payment processing facilitates transaction completion, reduces payment failures, and enhances user trust and confidence in the booking system.

6. Check-in and Boarding

- **Requirement:** Provide options for users to check-in online, receive digital boarding passes, and access boarding information, facilitating a smooth and efficient boarding process at the airport.
- **Rationale:** Online check-in streamlines airport procedures, reduces queuing time, and enhances operational efficiency for airlines.

7. Customer Relationship Management (CRM)

- **Requirement:** Integrate CRM functionalities to manage customer interactions, preferences, feedback, and loyalty programs, enabling personalized services and targeted marketing campaigns.
- **Rationale:** Effective CRM enhances customer engagement, retention, and lifetime value, driving business growth and competitive advantage in the airline industry.

8. Regulatory Compliance

- **Requirement:** Ensure compliance with regulatory requirements specific to the airline industry, such as aviation regulations, safety standards, passenger rights, and environmental sustainability initiatives.
- **Rationale:** Compliance with regulatory requirements mitigates legal risks, ensures operational safety, and enhances reputation and trust in the airline brand.

9. Internationalization and Localization

- **Requirement**: Support internationalization and localization features, including multilingual interfaces, currency conversion, date and time formats, and cultural considerations, to accommodate users from diverse regions and markets.
- **Rationale**: Internationalization and localization enhance usability, accessibility, and market reach, enabling the booking system to cater to a global audience effectively.

4. User Scenarios/Use Cases

Major Functions:

1. **Account Management and Authorization:**

- **Registration and Login**: Users can create accounts and log in securely.
- **Profile Management:** Users can change account details and manage payment methods.

2. **Passenger Services and Feedback:**

- **Flight Search and Booking**: Passengers can search for flights, view detailed flight information, and book tickets. They can manage their bookings (cancel , rebook) and pay via various payment methods.
- **Feedback and Ratings**: Passengers can provide feedback and rate their flight experiences through the system.

3. **Financial Transaction Management:**

- **Revenue Performance Reports**: The finance department can access revenue performance reports through the booking software's reporting module. They can view charts, graphs, and tables visualizing revenue data over time, by route, and other relevant metrics.

4. **Flight Management by Air Control:**

- **Flight Planning and Management**: Users in the air control department can create flight plans, add new flights, or delete existing ones. They can add and modify details for each flight, including departure and arrival coordinates, aircraft details, routes, and estimated time of arrival.

5. **Operator and Report Management by Managers:**

- **User Account Oversight**: Managers need oversight of user accounts (excluding Admins) for security and resource management. They use unique codes for authorizing modifications requested by Operators.
- **Performance Monitoring and Reporting**: Managers monitor system performance, conduct annual performance reviews for Operators, access reports and analytics, consider feedback and flight frequency data, and generate monthly reports for flight bookings.

6. **Customer Support by Operators:**

- **Customer Support Information**: The system provides passengers with contact information for customer support via phone, email, or live chat.
- **Notifications**: Booking confirmations, changes, and cancellations are sent to passengers via email or SMS.

Use cases:

1. **Passenger Services and Feedback:**

The system shall provide an easy access way to see transaction history

UC Name	***Transaction History*** ***UC-101***
Summary	***The system must offer a straightforward and user-friendly method for users to access their transaction history. This ensures that users can conveniently review past transactions, including purchases, payments, and bookings, within the airline software. Easy access to transaction history enhances user experience and facilitates transparency in financial activities.***
Dependency	***Secure Payment Transactions*** ***User Authentication and Authorization***
Actors	***Primary Actor: Passengers***
Preconditions	***Before accessing the transaction history, users must authenticate themselves securely within the system. This ensures that only authorized users have access to their transaction records, maintaining privacy and security.***

Description of the Main Sequence	**Step 1:** ***User Login*** ***Users log into their account within the airline software.*** **Step 2:** ***Access Transaction History*** ***Users navigate to the designated section for transaction history.*** **Step 3:** ***View Transactions*** ***The system displays past transactions with details like date, description, and amount.*** **Step 4:** ***Sort and Filter*** ***Users can sort and filter transactions based on different parameters.*** **Step 5:** ***Interact with Transactions*** ***Users have options to view details, download records, or take action on transactions.*** **Step 6:** ***Maintain Security*** ***Throughout the process, the system ensures data security and privacy.*** **Step 7:** ***Logout or Navigate*** ***After reviewing, users can logout or continue to other features within the software.***
Description of the Alternative Sequence	
Non functional requirements	**Performance:** ***Ensure fast loading times.*** **Usability:** ***Maintain an intuitive interface.*** **Accessibility:** ***Comply with accessibility standards.*** **Reliability*****: Provide accurate transaction records.*** **Scalability:** ***Handle increasing user and transaction volumes.*** **Security:** ***Securely authenticate and protect user data.***
Postconditions	***After accessing transaction history, users are provided with the option to logout or seamlessly navigate to other features within the airline software.***

The system shall allow the user to search for different flights

UC Name	***Filter Flights*** ***UC-102***
Summary	***The system must enable users to search for different flights efficiently. This feature allows users to specify their travel preferences and find relevant flight options based on criteria such as origin, destination, departure date, price, and class. By providing robust flight search functionality, the system enhances user experience and facilitates seamless flight booking.***
Dependency	***User Authentication and Authorization***
Actors	***Primary Actor: Passengers***
Preconditions	***Before utilizing the flight search functionality, users must be authenticated and logged into their account within the airline software, ensuring that only authorized users can access and utilize the search feature.***

Description of the Main Sequence	**Step 1:** ***User Input*** ***Users input their flight preferences, such as departure city, destination, travel dates, price, and class, into the search interface.*** **Step 2:** ***Query Submission*** ***Upon inputting preferences, users submit their search query by clicking a search button or similar action.*** **Step 3:** ***Search Processing*** ***The system processes the search query, analyzing the user's input criteria to retrieve relevant flight options from the database.*** **Step 4:** ***Flight Retrieval*** ***Based on the search criteria, the system retrieves available flight options that match the user's preferences, including flight schedules, fares, and availability.*** **Step 5:** ***Display Results*** ***The system displays the retrieved flight options in a clear and organized manner, presenting essential details such as departure times, arrival times, airlines, and ticket prices.*** **Step 6:** ***Refinement Options*** ***Users may have options to refine their search results further, such as filtering by airline, price range, departure time, or number of stops.*** **Step 7*: Selection*** ***Users review the displayed flight options and select the one that best fits their preferences and requirements.*** **Step 8:** ***View Details*** ***Upon selecting a flight, users may have the option to view additional details, such as seat availability, aircraft type, in-flight amenities, and fare conditions.*** **Step 9:** ***Return to Search*** ***Users have the option to return to the flight search interface to perform additional searches or explore alternative flight options if needed.***

Description of the Alternative Sequence	**Step 1:** ***User Input*** ***Users input their flight preferences, such as departure city, destination, travel dates, and class, into the search interface.*** **Step 2:** ***Query Submission*** ***Upon inputting preferences, users submit their search query by clicking a search button or similar action.*** **Step 3:** ***Search Processing*** ***The system processes the search query, analyzing the user's input criteria to retrieve relevant flight options from the database.*** **Step 4:** ***Flight Retrieval*** ***The system checks the database for available flight options that match the user's preferences.*** **Step 5:** ***No Matching Flights Found*** ***If there are no flights that match the user's input criteria, the system informs the user that no matching flights were found.*** **Step 6:** ***Error Handling*** ***The system may provide suggestions to the user, such as adjusting the search criteria, selecting alternative travel dates, or considering nearby airports.*** **Step 7*: Return to Search*** ***Users have the option to return to the flight search interface to modify their search criteria and perform a new search.***
Nonfunctional requirements	**Performance:** ***Ensure fast response times.*** **Usability*: Maintain an intuitive user interface.*** **Accessibility:** ***Comply with accessibility standards.*** **Reliability:** ***Provide accurate and reliable search results.*** **Scalability:** ***Handle increasing user load without performance degradation.*** **Security:** ***Protect user data during search queries.***

Postconditions	***After selecting a flight, users are seamlessly guided through the booking process, where they can confirm their flight selection, provide necessary passenger information, and complete the reservation. Upon successful booking, users receive a confirmation of their flight reservation along with relevant booking details.***

The system shall allow the user to book a selected flight

UC Name	***Book Flight*** ***UC-103***
Summary	***The system must enable users to book a selected flight seamlessly. This feature allows users to confirm their flight selection, provide passenger details, and complete the reservation process efficiently within the airline software. By providing robust flight booking functionality, the system enhances user experience and facilitates hassle-free flight reservations.***
Dependency	***Filter Flights*** ***User Authentication and Authorization*** ***Secure Payment Transactions***
Actors	***Primary Actor: Passenger***
Preconditions	***Passenger has searched the particular flight and selected to see the details for that flight***

Description of the Main Sequence	**Step 1:** ***Flight Selection*** ***After searching for and selecting a desired flight, users proceed to book the chosen flight.*** **Step 2:** ***Flight Details Review*** ***Users review the details of the selected flight, including departure and arrival times, fares, and other relevant information.*** **Step 3:** ***Passenger Information*** ***Users provide necessary passenger details such as names, contact information, and any special requirements.*** **Step 4:** ***Seat Selection (if applicable)*** ***If seat selection is available, users may choose their preferred seats or seating options for the flight.*** **Step 5:** ***Additional Services (if applicable)*** ***Users may have the option to select additional services such as baggage allowance, meal preferences, or seat upgrades.*** **Step 6:** ***Payment*** ***Users proceed to the payment step, where they provide payment details and confirm the booking.*** **Step 7:** ***Confirmation*** ***Upon successful payment processing, users receive a confirmation of their flight booking, along with relevant booking details and instructions for further steps.*** **Step 8:** ***Ticket Issuance*** ***The system generates and issues electronic tickets or booking references, which users can use for check-in and boarding.*** **Step 9:** ***Email Notification (optional)*** ***Optionally, users may receive an email confirmation of their booking for their records.***

Description of the Alternative Sequence	**Step 1:** ***Flight Selection*** ***After selecting a desired flight, users proceed to book the chosen flight.*** **Step 2:** ***Flight Details Review*** ***Users review the details of the selected flight, including departure and arrival times, fares, and other relevant information.*** **Step 3:** ***Passenger Information*** ***Users provide necessary passenger details such as names, contact information, and any special requirements.*** **Step 4:** ***Seat Selection (if applicable)*** ***If seat selection is available, users may choose their preferred seats or seating options for the flight.*** **Step 5:** ***Additional Services (if applicable)*** ***Users may have the option to select additional services such as baggage allowance, meal preferences, or seat upgrades.*** **Step 6:** ***Payment Processing*** ***Upon attempting to proceed with payment, the system encounters an error or the payment is declined due to insufficient funds or other issues.*** **Step 7:** ***Error Notification*** ***The system notifies the user that the booking process was unsuccessful due to payment failure or other reasons.*** **Step 8:** ***Retry or Contact Support*** ***Users may have the option to retry the payment process with corrected details or contact customer support for assistance in resolving the issue.***

Nonfunctional requirements	**Performance:** ***Ensure fast response times during the booking process.*** **Usability:** ***Maintain an intuitive and user-friendly interface for seamless booking.*** **Accessibility:** ***Comply with accessibility standards to accommodate users with disabilities.*** **Reliability:** ***Provide reliable booking functionality with minimal downtime.*** **Scalability:** ***Handle concurrent booking requests from multiple users without performance degradation.*** **Security:** ***Safeguard user payment and personal information during the booking process.*** **Error Handling:** ***Effectively handle errors and edge cases during booking to ensure a smooth user experience.*** **Availability:** ***Ensure the booking system is available 24/7 to accommodate users from different time zones.***
Postconditions	***After successfully completing the booking process, users receive a confirmation of their flight reservation along with relevant booking details. The system generates electronic tickets or booking references, which users can use for check-in and boarding. Optionally, users may receive an email confirmation of their booking for their records.***

The system shall allow users to cancel already booked flights

UC Name	***Cancel Flight*** ***UC-104***
Summary	***The system must allow users to cancel already booked flights seamlessly. This feature enables users to cancel their flight reservations within the airline software efficiently. By providing robust flight cancellation functionality, the system enhances user experience and facilitates hassle-free flight management.***
Dependency	***User Authentication and Authorization***
Actors	***Primary Actor: Passenger***
Preconditions	***Before users can cancel already booked flights, they must be authenticated and logged into their account within the airline software. This ensures that only authorized users can access and utilize the flight cancellation functionality. Additionally, the flight to be canceled must be within the permissible cancellation window defined by the airline's policies and regulations.***

Description of the Main Sequence	**Step 1:** ***User Authentication*** ***Users log into their account within the airline software.*** **Step 2:** ***Access Booking Management*** ***Users navigate to the section or feature within the software specifically designated for managing booked flights.*** **Step 3:** ***Select Flight to Cancel*** ***Users locate and select the flight reservation they wish to cancel from their booking history.*** **Step 4:** ***Cancellation Confirmation*** ***The system prompts users to confirm their decision to cancel the selected flight.*** **Step 5:** ***Cancellation Processing*** ***Upon confirmation, the system processes the cancellation request for the selected flight.*** **Step 6:** ***Refund Calculation (if applicable)*** ***If the cancellation is eligible for a refund according to the airline's policies, the system calculates the refund amount based on the cancellation terms and conditions.*** **Step 7:** ***Cancellation Confirmation***

	The system provides users with a confirmation of the flight cancellation, including details of any applicable refunds or penalties. **Step 8:** ***Update Booking Status*** ***The system updates the booking status for the canceled flight in the user's booking history, marking it as canceled.*** **Step 9*: Email Notification (optional)*** ***Optionally, users may receive an email confirmation of the flight cancellation for their records.***

Description of the Alternative Sequence	**Step 1:** ***User Authentication*** ***Users log into their account within the airline software.*** **Step 2:** ***Access Booking Management*** ***Users navigate to the section or feature within the software specifically designated for managing booked flights.*** **Step 3:** ***Select Flight to Cancel*** ***Users locate and select the flight reservation they wish to cancel from their booking history.*** **Step 4:** ***Cancellation Confirmation*** ***The system prompts users to confirm their decision to cancel the selected flight.*** **Step 5:** ***Cancellation Processing*** ***Upon confirmation, the system attempts to process the cancellation request for the selected flight.*** **Step 6:** ***Error Handling*** ***If an error occurs during the cancellation process (e.g., system error, connectivity issues), the system notifies the user that the cancellation request could not be processed at the moment.*** **Step 7:** ***Retry or Contact Support***

	Users may have the option to retry the cancellation process later or contact customer support for assistance in resolving the issue.
Non functional requirements	**Performance:** ***Ensure fast response times during the cancellation process.*** **Usability:** ***Maintain an intuitive and user-friendly interface for seamless cancellation.*** **Accessibility:** ***Comply with accessibility standards to accommodate users with disabilities during cancellation.*** **Reliability:** ***Provide reliable cancellation functionality with minimal downtime.*** **Scalability:** ***Handle concurrent cancellation requests from multiple users without performance degradation.*** **Security:** ***Safeguard user information and prevent unauthorized cancellation attempts.*** **Error Handling:** ***Effectively handle errors and edge cases during cancellation to ensure a smooth user experience.*** **Audit Trail:** ***Maintain an audit trail of cancellation actions for accountability and record-keeping purposes.*** **Notification:** ***Notify users promptly of successful cancellations and any refund or penalty information.*** **Regulatory Compliance:** ***Ensure compliance with airline policies and regulations regarding cancellation terms and conditions.***
Postconditions	***After successfully canceling a flight, users receive a confirmation of the cancellation along with any applicable refund details. The system updates the booking status for the canceled flight in the user's booking history, marking it as canceled. Optionally, users may receive an email confirmation of the flight cancellation for their records.***

2. Account Management and Authorization:

The system shall enable users (Passengers) to initiate the creation of new accounts.

UC Name	*User Account Creation* *UC-201*
Summary	*Enabling passengers to create new accounts within the system.*
Dependency	*None*
Actors	**Primary Actor: User (Passenger)** **Secondary Actor: System**
Preconditions	*1.The user attempts to sign up using personal information.* *2.The user's unique account identifiers (email) do not match with another user's in the system.* *3.The user agrees to the terms and conditions of service before proceeding with the sign-up process.* *4. The user provides all required information fields (such as name, email, password) during the sign-up attempt.*
Description of the Main Sequence	*Step 1: The user navigates to the sign-up page on the system.* *Step 2: The user fills in the required personal information such as name, email address, and password.* *Step 3: The system validates the entered information to ensure all required fields are filled correctly.* *Step 4: The system checks if the provided email address is unique and not already associated with an existing account.* *Step 5: If the email address is unique, the system sends a verification email to the provided address.* *Step 6: The user receives the verification email and clicks on the verification link to confirm their email address.* *Step 7: Upon email verification, the system creates a new account for the user.* *Step 8: The user receives a confirmation message indicating successful account creation.* *Step 9: The user can now log in to the system using their email address and password.*

Description of the Alternative Sequence	**Alternative Sequence 1: If the email address provided is already associated with an existing account, the system prompts the user to choose a different email address or attempt to recover their existing account.** **Alternative Sequence 2: If any errors occur during the sign-up process, such as invalid information or technical issues, the system provides appropriate error messages and prompts the user to correct the issues and try again.**
Non functional requirements	**Security: The security requirement for the sign-up process ensures the protection of user accounts and sensitive information from unauthorized access and potential breaches.** **Performance: The authentication process is expected to conclude within a specified duration of seconds.** **Scalability: The authentication database system should be capable of handling a large number of accounts.**
Postconditions	● **If account creation is successful, user should be able to login with their registered information.** ● **In case account creation fails, user shall not be able to login.**

The system shall provide users (every level) with the ability to securely authenticate and access their accounts.

UC Name	***User Account Log-In*** ***UC-202***
Summary	***Enabling passengers to securely access their accounts within the system.***
Dependency	***User Account Creation (UC-201)***
Actors	**Primary Actor: User** **Secondary Actor: System**

Preconditions	*1.The user has already created an account (passenger) with the system or has been given one by the admin (privileged user).* *2.The user possesses valid login credentials, including a registered email address and password.* *3.The user has agreed to the terms and conditions of service before attempting to log in.* *4.The system is operational and accessible for user login.*
Description of the Main Sequence	*Step 1: The user enters their credentials to log in to the system.* *Step 2: The system verifies the provided credentials against the stored user data.* *Step 3: If the credentials match an existing user account, the system grants access to the user.*
Description of the Alternative Sequence	**Alternative Sequence 1: If the credentials do not match or are invalid, the system denies access and prompts the user to try again or reset their password.** **Alternative Sequence 2: If any errors occur during the log-in process, such as invalid information or technical issues, the system provides appropriate error messages and prompts the user to correct the issues and try again.**
Non functional requirements	**Security: The security requirement for the login process ensures the protection of user accounts and sensitive information from unauthorized access and potential breaches.** **Performance: The authentication process is expected to conclude within a specified duration of seconds.** **Scalability: The authentication database system should be capable of handling a large number of accounts.**

Postconditions	• **1. If the user's credentials are validated successfully, the user gains access to their account.** • **2. Upon successful login, the system may redirect the user to their account dashboard or another designated landing page.** • **3. If the user's credentials are invalid, the system denies access and provides appropriate error messages.** • **4. After a specified number of unsuccessful login attempts, the system may lock the user's account for security purposes.** • **5. The system logs the login activity, recording successful and unsuccessful login attempts for security auditing purposes.**

The system shall grant administrators the capability to create new specialized permission accounts, edit permissions, delete or reset password for users.

UC Name	***Admin Account Management*** ***UC-203***
Summary	***Enabling administrators to manage accounts (create, edit permissions, delete, password reset) for privileged users.***
Dependency	***None***
Actors	**Primary Actor: User (Admin)** **Secondary Actor: System**
Preconditions	1. ***The administrator has appropriate access privileges and permissions to create, edit permissions, delete accounts or reset password for a specified account.*** 2. ***The administrator is logged into the system.*** 3. ***The system is operational and accessible.*** 4. ***The administrator possesses all necessary information required to create , edit or delete the accounts, including user details and assigned permissions.***

Description of the Main Sequence	*Step 1: The administrator accesses the account management section of the system.* *Step 2: The administrator chooses the service he wants to do: create new account, edit an already existing account or delete an account.* *Step 3:* **In case of account creation:* *--1: The administrator selects or defines the special permissions for the new account.* *--2: The system validates the entered information to ensure accuracy and completeness.* *--3: Upon successful validation, the administrator confirms the creation of the new account.* *--4: The system generates a confirmation message, indicating that the new account has been successfully created.* *--5: If applicable, the system sends a notification to the newly created account, providing login credentials and instructions.* ***In case of account permission edit:* *--1: The administrator modifies the permissions as required.* *--2: The system verifies the modified permissions and updates them for the selected account.* *--3: The system generates a confirmation message, indicating that the permissions have been successfully modified.* ****In case of account deletion:* *--1: The administrator navigates to the list of user accounts and selects the account to be deleted.* *--2: The system prompts the administrator to confirm the deletion action.* *--3: The administrator confirms the deletion of the selected account.* *--4: The system removes the selected account from the user database.* *--5: The system generates a confirmation message, indicating that the account has been successfully deleted.* *****In case of password reset:* *--1: The administrator navigates to the list of user accounts and selects the account for which the password needs to be reset.* *--2: The system prompts the administrator to enter a new password for the selected account.* *--3: The administrator enters the new password.* *--4: The system verifies the new password and updates it for the selected account.* *--5: The system generates a confirmation message, indicating that the password has been successfully reset.* *Step 4: The system logs the creation of the new account for auditing purposes*

	Step 5: The administrator is returned to the main interface or account management section for further actions.
Description of the Alternative Sequence	**Alternative Sequence 1: If during the account management process, the system encounters a critical error such as database connectivity issues or server malfunction, it halts the process, displays an error message informing the administrator of the technical issue, and advises them to attempt the process again later or contact technical support for assistance.**
Nonfunctional requirements	**Reliability: The system should maintain consistent availability, minimizing downtime to ensure users can reliably access account management functionalities.** **Usability: The account management interface should be intuitive and user-friendly, guiding administrators through the process with clear instructions and minimal complexity.** **Scalability: The authentication database system should be capable of handling a large number of accounts.** **Performance: The authentication process is expected to conclude within a specified duration of seconds.** **Security: The security requirement for the account management process ensures the protection of user accounts and sensitive information from unauthorized access and potential breaches.**

Postconditions	**1. Account is added/updated to the system's user database, allowing the administrator to manage its permissions and access rights.** **2. The system generates a confirmation message, notifying the administrator of the successful account management.** **3. If applicable, the system sends a notification to the account, providing login credentials and instructions on accessing the system if needed.** **4. The account management event is logged in the system's audit trail, recording details such as the administrator responsible, timestamp, and any relevant metadata for auditing purposes.** **5. The administrator is returned to the main interface or account management section, ready for further actions or tasks.**

3.Financial Transaction Management

Flight Ticket Payment : The system shall provide users with options to choose from multiple payment methods including credit/debit cards, digital wallets, and bank transfers and shall securely process payments made by users through the selected payment method, ensuring accuracy and reliability of transaction data.

UC Name	**Flight Ticket Payment (UC-301)**
Summary	**Allows users to select a preferred payment method during the checkout process.**
Dependency	

Actors	**Primary Actor: User (Passenger) Secondary Actor: System**
Preconditions	**User has initiated the booking process and reached the payment step.**
Description of the Main Sequence	**1. System presents the available payment methods (credit/debit cards, digital wallets, bank transfers) to the user.** **2. User selects a preferred payment method from the options provided.** **3. System proceeds with the selected payment method for transaction processing.** **4. User provides payment details through the selected payment method (e.g., card details, wallet information).** **5. Upon successful authorization, the payment system updates the transaction status and records the payment details.** **6. Confirmation of successful payment is displayed to the user. 7. The system delivers the E-ticket to the user through email.**
Description of the Alternative Sequence	**1a. If the user is not satisfied with the available payment methods, they can abort the transaction and can contact customer support if needed.** **1b. If the selected payment method is unavailable or encounters an error, the system prompts the user to choose an alternative payment method.**

	1c. If the system fails to present the available payment methods due to technical issues, it displays an error message and prompts the user to try again later. **4a.If the system finds something suspicious it will not approve the transaction and will instruct the user to contact customer support.** **4b. If the payment authorization fails, the payment system notifies the user and prompts for alternative payment details or methods. 5a. If the payment processing encounters an error after authorization, the payment system provides appropriate error messages and instructs the users to contact customer support.**
Non functional requirements	**Security: The system must ensure that users' payment information is securely handled and transmitted during the payment method selection process.** **Performance: The payment method selection process should have low latency and high responsiveness to provide users with a smooth and efficient checkout experience, even during periods of high traffic.** **Compatibility: The payment method selection interface should be compatible with various devices and screen sizes, ensuring accessibility for users across different platforms.**
Postconditions	**User successfully performed the payment for the selected flight.**

Managing booked flights: After successful booking passengers can view and manage their booked flights

UC Name	**Managing booked flights (UC-302)**

Summary	**After successfully booking flights, passengers can view and manage their bookings.**
Dependency	
Actors	**Primary Actor: User (Passenger) Secondary Actor: System**
Preconditions	**The passenger has successfully booked one or more flights.**

Description of the Main Sequence	**1.The passenger selects the view bookings option in the system. 2.The system retrieves the passenger's booking information. 3.The system displays a list of the passenger's booked flights, including relevant details such as flight numbers, departure times, and destinations.** **4.The passenger selects a booked flight to view its details. 5.The system retrieves and displays detailed information about the selected flight, including departure and arrival times, airline details, and booking reference number.** **6.The passenger has options to:** **a. Modify the booking (if permitted by airline policies). b. Cancel the booking (if permitted by airline policies). c. Check-in for the flight (if available).** **d. Provide feedback on the booking experience.** **e. Request Upgrade** **7.The passenger performs the desired action(s).** **8.The passenger confirms their changes.**

	9.The system updates the booking information according to the passenger's actions.
Description of the Alternative Sequence	**2.Flight not found: If the system cannot retrieve the passenger's booked flights, an error message is displayed, and the use case terminates.**
Non functional requirements	**Security: The system must ensure that users' payment information is securely handled and transmitted during the payment method selection process.** **Performance: The payment method selection process should have low latency and high responsiveness to provide users with a smooth and efficient checkout experience, even during periods of high traffic.** **Compatibility: The payment method selection interface should be compatible with various devices and screen sizes, ensuring accessibility for users across different platforms.**

Postconditions	**The passenger has successfully viewed and managed their booked flights.**

Monitor Revenue Performance: The finance department accesses revenue performance reports through the booking software's reporting module.

UC Name	**Monitor Revenue Performance (UC-303)**

Summary	**The finance department accesses revenue performance reports through the booking software's reporting module. They interact with the UI to view charts, graphs, and tables that visualize revenue data over time, by route, or other relevant metrics.**
Dependency	**Log in**
Actors	**Primary Actor: Finance Department Secondary Actor: System**
Preconditions	**The finance department user has access to the reporting module of the booking software.**
Description of the Main Sequence	**1.The finance department navigates to the reporting module within the administrative interface.** **2.The finance department selects the option to generate revenue performance reports.** **3.The system presents various parameters for generating reports, such as time period, route, or revenue category.** **4.The finance department specifies the desired parameters and initiates the report generation process.** **5.The system retrieves relevant revenue data and generates visualizations, such as charts, graphs, and tables, based on the specified parameters.**

	6.The finance department may choose to export or save the generated reports for further analysis or sharing with stakeholders.
Description of the Alternative Sequence	**2a.If the system encounters errors or delays in retrieving revenue data or generating reports, the finance department may need to retry the process later or report the issue to technical support for resolution.** **2b.If the reporting module is unavailable or inaccessible within the administrative interface, the finance department may submit a request for module activation or access rights to system administrators.** **4.If the finance department encounters difficulties in specifying parameters or initiating report generation, they may seek assistance from technical support or refer to user documentation for guidance.** **5.If the generated visualizations do not provide clear insights or are difficult to interpret, the finance department may adjust parameters and regenerate the reports as needed.**
Non functional requirements	**Security: The system must ensure that users' payment information is securely handled and transmitted during the payment method selection process.** **Performance: The payment method selection process should have low latency and high responsiveness to provide users with a smooth and efficient checkout experience, even during periods of high traffic.** **Compatibility: The payment method selection interface should be compatible with various devices and screen sizes, ensuring accessibility for users across different platforms.**

Postconditions	**The system successfully generated the requested report for the finance department to analyze**

5. Flight Management by Air Control:

The system shall provide secure user authentication mechanisms.

UC Name	*User Authentication and Authorization* *UC-501*
Summary	*Verifying the identity and the permissions of the users accessing the planning features.*
Dependency	*None*
Actors	**Primary Actor**:Air Control Department Users **Secondary Actor**: System
Preconditions	*1.The user's credentials are valid.* *2.The user attempts to access the air control department.*
Description of the Main Sequence	**Step 1**: The user fills in the username and password. **Step 2**: The system verifies the provided credentials with those on the database. **Step 3**: The system checks the user's role and permissions based on credentials. **Step 4**: If the credentials are valid, the system gives access to the user as part of air control department. **Step 5**: If the credentials are invalid, the system denies access and the user has to try again.
Description of the Alternative	**Step 1**: If the user fails to give the valid credentials after three times, the system deactivates the user's account and notifies the administrator.

Sequence	
Non functional requirements	**Security**: User authentication must have strong encryption methods to protect sensitive information. **Performance**: The authentication process should be completed within … seconds. **Scalability**: The authentication system should be capable of handling a large number of login attempts.
Postconditions	• If authentication and authorisation is successful, user should have access as air control department personnel. • In case of failure, user access is denied.

The system shall validate user inputs to ensure data integrity and consistency.

UC Name	*Flight Plan Data Integrity* *UC-502*
Summary	Ensuring the integrity and consistency of data inputs by users.
Dependency	*User Authentication and Authorization (UC-501)*
Actors	**Primary Actor**:Air Control Department Users **Secondary Actor**: System
Preconditions	The user attempts to input or modify flight data into the system.
Description of the Main Sequence	**Step 1**: The user provides input data such as airport coordinates, aircraft details, routes and estimated time of arrival. **Step 2**: The system provides validation checks on the integrity and consistency of the data. **Step 3**: The system checks the user's role and permissions based on credentials. **Step 4**: Verifies if the coordinates are according to the required format. **Step 5**: The system ensures that the provided information aligns with known

	parameters. **Step 6**: If validation errors are detected,the system notifies the user. **Step 7**: The system provides the user with the correct data. **Step 8**: Once all the validations are passed successfully, the input data is accepted by the system and proceed for further actions.
Description of the Alternative Sequence	If the input data fails any validation check, the system provides a specific error message, indicating the nature of the failure.
Non functional requirements	**Accuracy:** Validation checks should identify errors in user input. **Performance:** Data validation should be performed in real-time. **Flexibility:** Tha validation should be configurable to accommodate changes in flight data.
Postconditions	Validated input data is stored in the system, ensuring integrity and consistency of information about the flight.

The system shall support real-time collaboration features for multiple users.

UC Name	Real-Time collaboration UC-503
Summary	The system should support real-time collaboration, where changes should be immediately visible to other users.
Dependency	*User Authentication and Authorization (UC-501)* *Flight Plan Data Integrity (UC-502)*
Actors	**Primary Actor**:Air Control Department Users **Secondary Actor**: System
Preconditions	• The user is authorized to access the system as part of the air control department.

	• The user has initiated the collaboration session within the system.
Description of the Main Sequence	***Step 1****: The system displays the list of all available flight plans.* ***Step 2****: The user selects a specific flight plan.* ***Step 3****: The system gets the flight plan details for the one that is chosen and presents them to the user for viewing and modifying.* ***Step 4****: If another user is editing the same flight at that time the system notifies both parties for the presence.* ***Step 5****: The user can change the plan such as updating route details, modifying aircraft information.* ***Step 6****: When the user makes the changes, the system updates them in real-time.* ***Step 7****: If another user is currently editing the same plan, the system updates their view po to reflect the made changes.* ***Step 8****: If conflicts arise, such as modifying the same data field at the same time, the system provides a version control for the differences.*
Description of the Alternative Sequence	*If the conflict occurred due to edits by multiple users on the same time, the system prompts the affected users to review and resolve the conflict manually.*
Non functional requirements	***Performance*** *: Real-time updates must happen within a short time.* ***Scalability*** *: The system should scale to accommodate a large number of users collaborating on multiple flight plans at the same time.* ***Reliability*** *: Collaborating features should be reliable, ensuring the changes are shown properly at all user's views.*
Postconditions	Collaborative changes to the flight plan are successfully integrated and reflected in the system, maintaining consistency and coherence.

The system shall perform regular backups for flight plan data.

UC Name	*Backup and Recovery* *UC-504*

Summary	The regular backup of flight plan data to prevent loss due to system failures or data corruption.
Dependency	Audit Trail (UC-505)
Actors	**Primary actor**: Administrator **Secondary actor** : System
Preconditions	● The system is capable of performing backup operations. ● In the system are existing flight plans data.
Description of the Main Sequence	**Step 1** : The system administrator initiates the backup process. **Step 2** : The system identifies the flight plan data that is going to be backed up. **Step 3** : The system creates a backup of the plan, ensuring data integrity and consistency. **Step 4** : Backup files are stored in a secure location according to data policies and procedures. **Step 5** : Administrator verifies and confirms the successful creation of backup files. **Step 6** : The system maintains a log of backup operations with timestamps and details.
Description of the Alternative Sequence	If the backup process fails, the system notifies the administrator and retires the process automatically.
Non functional requirements	**Reliability** : The backup process should be reliable and resilient, capable of handling large volumes of data without loss or errors. **Security** : Backup files should be encrypted to protect the data. **Scalability** : The backup mechanism should scale to store increasing volume of data.
Postconditions	● Backup files are successfully stored and created in a secure location , mitigating the risk of data loss in the event of system failures or data corruption.

	• The system is equipped with a robust recovery mechanism to restore the data from backup-s in case of emergencies with minimal downtime.

The system shall maintain an audit trail of all actions performed on flight plans.

UC Name	*Audit Trail* *UC-505*
Summary	*The maintenance of audit trail, documenting all actions performed on flight plans such as creation, modification and deletion. It includes the timestamp and the user responsible for the action.*
Dependency	*User Authentication and Authorization (UC-501)* *Flight Plan Data Integrity (UC-502)* *Real-time Collaboration (UC-503)*
Actors	***Primary actor****:Administrator, Air Control Department User* ***Secondary actor****: System*
Preconditions	*The system is operational and capable of tracking user actions.* *Flight plan data exists in the system.*
Description of the Main Sequence	***Step 1*** *: The system captures the data associated with each action performed on the plans.* ***Step 2*** *: When the user creates a new flight plan, the system records the timestamp, the user and the details of the created flight plan* ***Step 3*** *: When the user modifies an existing plan, the system records the timestamp, the name of the user and the specific changes made to the plan.* ***Step 4*** *: When a user deletes a flight plan, the system logs the timestamp, the responsible user and all the details of the deleted flight.* ***Step 5*** *: Audit trail events are stored in a secure manner to ensure data integrity.* ***Step 6*** *: The administrator can access and review the audit trail.* ***Step 7****: The trail is searchable and filterable.* ***Step 8*** *: The audit trails events are maintained according to data policies and procedures.*
Description of	*If the system encounters errors while logging in into audit trail*

the Alternative Sequence	*events, it notifies the administrator and retires to log in.*
Non functional requirements	***Reliability** : The audit trail logging mechanism should be reliable and resilient.* ***Security** : Audit trail events should be securely stored and protected for maintaining integrity and trustworthiness.* ***Performance** : The audit trail logging process should have minimal impact on system performance, allowing the system to operate efficiently under normal and peak load conditions.*
Postconditions	*An audit trail containing details of all actions performed on flight plans is maintained within the system providing accountability and traceability.* *The administrator can review and analyze audit trail events.*

The system shall be capable of integrating with external airline systems.

UC Name	*Integration with External Systems* *UC-506*
Summary	*This use case involves enabling the software to integrate with external systems, aircraft tracking systems or weather services.*
Dependency	*Flight Plan Data Integrity(UC-502)*
Actors	***Primary Actor**: Administrator* ***Secondary Actor**: Ail Control Department User*
Preconditions	*The system is operational and capable of integrating with external systems.*
Description of the Main Sequence	***Step 1** : Administrator initiates the integration process.* ***Step 2** : Administrator identifies the external systems to integrate with (aircraft tracking systems, weather forecasting services).* ***Step 3** : Administrator configures connection parameters, authentication credentials, data formats.* ***Step 4** : The system establishes connections with external systems verifying the compatibility.*

	Step 5 *: The system retrieves relevant data from the external system (real-time aircraft locations from tracking system, weather forecasts for specific routes).* ***Step 6*** *: The integrated data is processed and incorporated into the flight planning features providing comprehensive information.* ***Step 7****: Air control department u* *sers can access the integrated data to make informed decisions and adjustments to flight plans.*
Description of the Alternative Sequence	*If there are connectivity issues or errors in retrieving data, the system notifies the administrator.*
Non functional requirements	***Compatibility*** *: The integration mechanism should support the interoperability with a wide range of external systems.* ***Reliability*** *: Integration with external systems should be reliable and resilient, with error handling mechanisms.* ***Security*** *: Integration interfaces should be secured using encryption and authentication to protect sensitive data exchange.*
Postconditions	• *The software is successfully integrated with external systems, providing users with real-time data for decision making.* • *Users can access and utilize integrated data improving operational efficiency and flight management.*

The system shall allow managers to monitor user accounts and permissions, excluding admins, ensuring effective security measures and resource allocation.

UC Name	***UC - 601 User Account and Permission Management (Excluding Admins)***

Summary	This use case allows managers to oversee user accounts and permissions within the system, with the exception of admin accounts. Managers have the authority to control user access and privileges for those under their supervision, which helps to maintain security procedures and manage resources effectively.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System
Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system. • User accounts must already exist within the system. • The manager must have the necessary permissions to manage user accounts and permissions.
Description of the Main Sequence	• ***Step 1:*** The manager accesses the user account management interface within the system. • ***Step 2:*** The system displays a list of existing user accounts, along with their associated permissions. • ***Step 3***: The manager selects a specific user account they wish to modify. • ***Step 4:*** The system presents options to edit the permissions or details of the selected user account. • ***Step 5:*** The manager makes the necessary changes to the user account, such as adjusting permissions or updating user information. • ***Step 6:*** The manager confirms the changes made. • ***Step 7:*** The system updates the user account according to the modifications made by the manager. • ***Step 8:*** The use case concludes, returning the manager to the user account management interface.

Description of the Alternative Sequence	• ***Step 1:*** If the selected user account is not found in the system, the manager receives a notification indicating the account does not exist. • ***Step 2:*** If the manager attempts to modify permissions beyond their authorization level, the system displays an error message indicating insufficient privileges. • ***Step 3:*** The use case concludes, returning the manager to the user account management interface.
Non functional requirements	• ***Performance:*** Achieve quick response times and support concurrent operations efficiently. • ***Security:*** Ensure all operations are over secure. • ***Scalability:*** The system should be capable of handling a large number of accounts. • ***Reliability:*** Ensure high availability, minimal downtime, and regular data backups for system integrity.
Postconditions	The system correctly implements and reflects the changes the manager makes to the user account, ensuring that any changes to permissions or user details are accurately updated.

The system shall generate a unique code for operator-requested modifications, requiring manager confirmation for validation and authorization.

UC Name	***UC - 602 Generate Unique Code***
Summary	This use case involves the generation of a unique code for confirming modifications requested by operators in the system. Before proceeding with the modification, the system requires confirmation from the manager, who inputs

	their unique code.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actors:*** System, Operators
Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system. • A modification request from an operator or passenger must have been received. • The requested modification must require manager confirmation, as specified in the system settings.
Description of the Main Sequence	• ***Step 1:*** The system receives a modification request from an operator, indicating the need for a manager's confirmation. • ***Step 2:*** The system prompts the manager to input their unique code, verifying their authorization to confirm the requested modification. • ***Step 3:*** The manager enters their unique code, initiating the confirmation process. • ***Step 4:*** The system validates the manager's code and the requested modification to ensure compliance with established policies. • ***Step 5:*** If the code is valid and the modification request is authorized. • ***Step 6:*** If the code is valid, the system prompts the manager to review the requested modification. • ***Step 7:*** The use case concludes.
Description of the Alternative Sequence	• ***Step 1:*** If the code is invalid or the modification request is unauthorized, the system asks the manager to input the correct code. • ***Step 2:*** The use case concludes.

Non functional requirements	• ***Performance:*** Ensure prompt system response and acceptable processing times for modification requests. • ***Security:*** Implement robust user authentication and encryption protocols to safeguard user accounts and passenger data. • ***Usability:*** Provide an intuitive interface and clear error messages to facilitate easy navigation and user guidance. • ***Reliability:*** Maintain high system availability and implement backup mechanisms for data integrity and continuity. • ***Compliance:*** Adhere to data protection regulations.
Postconditions	The unique code is securely stored and associated with the specific modification request, ensuring that only authorized personnel can proceed with the requested changes.

The system shall enable managers to monitor overall system performance and usage statistics, providing valuable insights for informed decision-making and resource allocation.

UC Name	***UC - 603 System Performance and Usage Monitoring***
Summary	This use case enables managers to monitor overall system performance and usage statistics, providing valuable insights for informed decision-making and resource allocation.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System
Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system.

	• System performance monitoring and usage statistics must be available and generated within the system. • The manager must have the necessary permissions to access system performance and usage statistics.
Description of the Main Sequence	• ***Step 1:*** The manager navigates to the system performance and usage monitoring section within the system. • ***Step 2:*** The system presents an interface (dashboard) displaying overall system performance metrics and usage statistics. • ***Step 3:*** The manager reviews the presented information, including metrics such as, network traffic, user activity etc. • ***Step 4:*** The manager analyzes the collected data to identify any trends, anomalies, or areas requiring attention. • ***Step 5:*** If necessary, the manager may drill down into specific performance metrics or usage statistics for more detailed analysis. • ***Step 6:*** If the manager needs to compare current performance metrics or usage statistics with historical data, the system provides options to access and analyze historical records. • ***Step 7:*** In case the manager identifies potential issues or areas for improvement during the analysis, the system allows them to initiate corrective actions. • ***Step 8:*** The use case concludes, returning the manager to the main interface or allowing them to continue monitoring system performance and usage statistics as needed.
Description of the Alternative Sequence	• ***Step 1:*** In case of system errors or unavailability, the manager receives a notification and is prompted to retry accessing system performance and usage statistics later. • ***Step 2:*** If the presented performance metrics or usage statistics appear inconsistent or inaccurate, the manager requests a system check or data validation from admins.

	• ***Step 3:*** The use case concludes, returning the manager to the main interface or allowing them to continue monitoring system performance and usage statistics as needed.
Non functional requirements	• ***Performance:*** Ensure system performance and usage statistics load fast and scale effectively to handle increased user loads. • ***Security:*** Restrict access to authorized personnel, encrypt data, and maintain audit trails for accountability. • ***Reliability:*** Maintain high availability and perform regular backups for data recovery. • ***Compliance:*** Adhere to data privacy regulations and retention policies to ensure legal compliance.
Postconditions	The manager has successfully accessed and utilized the system performance and usage statistics, enabling them to make informed decisions and take appropriate actions based on the insights gained.

The system shall facilitate annual performance management for operators.

UC Name	***UC - 604 Staff (Operators) Performance Management***
Summary	This use case involves the annual review and management of staff (operators) performance within the system. It includes activities such as setting performance goals, monitoring performance metrics, providing feedback, and initiating corrective actions as necessary to ensure optimal staff performance and productivity.
Dependency	
Actors	***Primary Actor:*** Manager

	Secondary Actor: System, Operators
Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system. • Managers must be authenticated and authorized to conduct performance reviews. • The annual performance review period must have commenced. • Performance goals and evaluation criteria for staff must be established.
Description of the Main Sequence	• ***Step 1:*** Manager initiates the annual performance review process for staff by accessing the performance management interface. • ***Step 2:*** Manager retrieves performance data and metrics for each operator from the system. • ***Step 3:*** Manager sets performance goals and establishes evaluation criteria based on the collected data and organizational objectives. • ***Step 4:*** Manager conducts performance evaluations for each operator according to the established criteria. • ***Step 5:*** Manager provides constructive feedback to operators regarding their performance, highlighting strengths and areas for improvement. • ***Step 6:*** Manager identifies specific areas for improvement and formulates corrective action plans if necessary. • ***Step 7:*** Manager documents the outcomes of the performance review process, including performance ratings and any agreed-upon action plans. • ***Step 8:*** The annual performance review process concludes, with staff members informed of their performance assessments and any necessary next steps.
Description of the Alternative Sequence	• ***Step 1:*** In case performance data and metrics are unavailable or incomplete, the manager requests additional data sources or reschedules the review process. • ***Step 2:*** If the manager faces challenges in setting performance goals or evaluation criteria, they consult with admins.

Non functional requirements	• ***Performance:*** Ensure prompt response and scalability of the performance management system. • ***Security***: Restrict access to authorized personnel and maintain robust user authentication mechanisms. • ***Usability:*** Provide a user-friendly interface and clear guidance for efficient navigation. • ***Reliability:*** Ensure high availability and data integrity through regular backups. • ***Compliance:*** Adhere to data privacy regulations and organizational policies for performance management processes and documentation.
Postconditions	The performance review process has been successfully conducted, documented, and concluded, with staff members informed of their performance assessments and any necessary action plans for improvement.

The system shall grant managers access to comprehensive analytics, aiding informed decision-making.

UC Name	***UC - 605 Analytics Access***
Summary	This use case allows managers to access detailed analytics within the system, facilitating informed decision-making processes.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System

Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system. • Detailed analytics must be generated and available within the system. • The manager must have the necessary permissions to access analytics.
Description of the Main Sequence	• ***Step 1:*** The manager navigates to the analytics section within the system. • ***Step 2:*** The system presents a list of available analytics options. • ***Step 3:*** The manager selects the desired analytics to view. • ***Step 4:*** The system generates and displays the selected analytics data. • ***Step 5:*** The manager analyzes the presented information to gain insights and make informed decisions. • ***Step 6:*** If necessary, the manager may download or save the analytics data for further reference. • ***Step 7:*** The use case concludes, returning the manager to the main interface or allowing them to continue accessing additional analytics as needed.
Description of the Alternative Sequence	• ***Step 1:*** In case of system errors or unavailability, the manager receives a notification and is prompted to retry accessing analytics later. • ***Step 2:*** If the selected analytics data is not available or cannot be generated, the system displays an error message and prompts the manager to choose an alternative option. • ***Step 3:*** Should there be discrepancies or inconsistencies in the analytics data, the system provides additional explanations or guidance. • ***Step 6:*** In case the manager needs to share the analytics data with others, the system provides options for collaboration or sharing functionalities. • ***Step 7:*** The use case concludes, either returning the manager to the main interface or allowing them to continue accessing and analytics.
Non functional requirements	• ***Performance:*** Ensure prompt response and scalability of the performance

	management system. • ***Security:*** Restrict access to authorized personnel, encrypt data, and maintain audit trails for accountability. • ***Reliability:*** Maintain high availability and perform regular backups for data recovery. • ***Usability:*** Provide an intuitive interface and allow customization options to enhance user experience. • ***Compliance:*** Adhere to data privacy regulations and retention policies to ensure legal compliance.
Postconditions	The manager has successfully accessed and utilized the desired analytics, enabling them to make informed decisions based on the presented information.

The system shall incorporate client feedback for evaluating flight booking process performance.

UC Name	***UC - 606 Incorporate Client Feedback***
Summary	This requirement ensures that client feedback is considered in evaluating the performance of the flight booking process.
Dependency	
Actors	***Primary Actor:*** Passengers ***Secondary Actor:*** System, Managers
Preconditions	• The system must be operational and accessible. • The system must have a mechanism in place for clients to submit reviews or feedback about their experience.

	• Clients must have interacted with the system or its services to provide meaningful reviews or feedback. • The manager must be authenticated and logged into the system. • Managers must have appropriate permissions to access and analyze the feedback data. • The system should have infrastructure in place to collect, store, and manage client reviews efficiently.
Description of the Main Sequence	• ***Step 1:*** Clients submit reviews or feedback through the designated feedback mechanism provided by the system. • ***Step 2:*** Managers review and analyze the received feedback to identify common themes, trends, or areas for improvement. • ***Step 3:*** Based on the analysis, prioritization, and decision-making process, relevant changes or enhancements are identified for incorporation into the system.
Description of the Alternative Sequence	• ***Step 1:*** In case the feedback mechanism provided by the system is not accessible or malfunctioning, clients may resort to alternative communication channels such as email, phone calls, or in-person meetings to provide their feedback. • ***Step 2:*** Managers manually gather feedback received through alternative channels and document them for analysis. • ***Step 3:*** The analysis of feedback gathered through alternative channels may differ in process or priority compared to feedback received through the system's designated mechanism. • ***Step 4:*** Based on the analysis, relevant changes or enhancements are identified for incorporation into the system, considering both feedback received through the system and alternative channels.

Non functional requirements	• ***Scalability****:* System should handle multiple users without performance degradation. • ***Availability****:* Maintain uptime, with minimal scheduled maintenance during off-peak hours. • ***Reliability****:* Ensure accurate data retrieval and display with built-in redundancy and failover mechanisms.
Postconditions	The successful retrieval, selection, and utilization of client feedback to enact system improvements.

The system shall analyze flight frequency data in reports to enhance booking pattern understanding over time.

UC Name	***UC - 607 Include Flight Frequency Data***
Summary	This requirement ensures that the reports offer comprehensive analysis by considering the frequency of flight occurrences, allowing for a deeper understanding of booking patterns and trends over time.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System
Preconditions	• The system must be operational and accessible. • Flight frequency data must be accessible.

	• The manager must be authenticated and logged into the system. • Managers must have necessary permissions to access and integrate data. • The system must be compatible with the format and structure of the flight frequency data. • Adequate technical resources must be available for data integration. • Clear documentation and understanding of requirements are necessary.
Description of the Main Sequence	• ***Step 1:*** Manager accesses flight frequency data. • ***Step 2:*** Validate compatibility of the data format and structure with the system. • ***Step 3:*** Configure necessary permissions and settings for data integration. • ***Step 4:*** Implement data integration procedures into the system. • ***Step 5:*** Conduct testing to ensure accuracy and functionality of integrated data. • ***Step 6:*** Provide documentation as needed for users accessing flight frequency data within the system. • ***Step 7:*** Monitor ongoing data updates and system performance to maintain data accuracy and reliability.
Description of the Alternative Sequence	• ***Step 1:*** If flight frequency data is unavailable, initiate communication with alternative data providers (e.g.operator). • ***Step 2:*** Adapt data integration procedures to accommodate different data formats or structures from alternative sources. • ***Step 3:*** Validate the quality and reliability of data obtained from alternative sources through thorough testing and validation processes.

Non functional requirements	• ***Performance****:* Ensure fast data processing and display. • ***Scalability****:* System should handle multiple users without performance degradation. • ***Availability****:* Maintain uptime, with minimal scheduled maintenance during off-peak hours. • ***Reliability****:* Ensure accurate data retrieval and display with built-in redundancy and failover mechanisms. • ***Security****:* Adhere to industry-standard security practices, including encryption, access controls, and regular audits.
Postconditions	The system successfully integrates accurate and accessible flight frequency data, ensuring stability, updated documentation, user training if necessary, and ongoing monitoring for reliability.

The system shall produce monthly statistical reports covering the entire flight booking process, incorporating insights from client reviews and flight frequency data.

UC Name	***UC - 608 Generate Monthly Statistical Reports***
Summary	This use case entails the system's ability to produce monthly statistical reports regarding the maintenance of the flight booking process. These reports encompass the entire booking process, from initiation to completion, and provide valuable insights derived from client reviews and flight frequency data.
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System
Preconditions	• The system is operational and accessible. • The manager must be authenticated and logged into the system. • Sufficient data related to the flight booking process, including client reviews and flight frequency data, is available for analysis.

	• The Manager has access to the statistical reports and intends to utilize the data, including flight frequency information, for analysis and decision-making purposes • There are no ongoing system maintenance activities or technical issues that hinder report generation. • The designated time period for generating monthly statistical reports has commenced (e.g., beginning of a new month).
Description of the Main Sequence	• ***Step 1:*** The Manager accesses the system and selects the option to generate a monthly statistical report. • ***Step 2:*** The system collects data on the flight booking process, including client reviews and flight frequency. • ***Step 3:*** Using the collected data, the system generates a comprehensive report. • ***Step 4:*** The Manager reviews and finalizes the report. • ***Step 5:*** The system compiles and presents the report in a suitable format.
Description of the Alternative Sequence	• ***Step 1:*** The Manager selects the option to generate a monthly statistical report. • ***Step 2:*** The system encounters an error while collecting data on the flight booking process. • ***Step 3:*** The system prompts the Manager with an error message indicating the issue. • ***Step 4:*** The Manager attempts to troubleshoot the error by reinitiating the data collection process. • ***Step 5:*** The system successfully collects the necessary data and proceeds with generating the report. • ***Step 6:*** The Manager reviews and finalizes the report as usual. • **Step 7:** The system compiles and presents the report in a suitable format.
Non functional requirements	• ***Performance:*** Fast response time, scalable for growth. • ***Reliability:*** High uptime, quick recovery from failures. • ***Security:*** Secure authentication, encrypted data. • ***Maintainability:*** Modular design, comprehensive documentation.

Postconditions	The monthly statistical report for the flight booking process has been generated and is available for review by the Manager.

The system shall allow managers to access financial reports.

UC Name	***UC - 609 Financial Reports***
Summary	This use case involves managers accessing financial reports
Dependency	
Actors	***Primary Actor:*** Manager ***Secondary Actor:*** System
Preconditions	• The system must be operational and accessible. • The manager must be authenticated and logged into the system.
Description of the Main Sequence	• ***Step 1:*** Managers are directed to the financial reports interface. • ***Step 2:*** They request the needed financial data • ***Step 3:*** The system retrieves the requested financial data and generates the report. • ***Step 4:*** The system presents the report in a user-friendly format (table, graphic,charts). • ***Step 5:*** Managers analyze the presented data to gain insights in financial health.
Description of the Alternative Sequence	• ***Step 1:*** If the system encounters an error and is unable to retrieve the required data, it displays an error message and managers notify of the issue.
Non functional	• ***Security:*** Access to financial reports should be restricted to authorized

requirements	shareholders to maintain data confidentiality. • ***Usability:*** The system interface for accessing financial reports should be intuitive and easy to navigate for shareholders.
Postconditions	Managers have successfully accessed financial reports

7.Customer Support by Operators

The system shall allow the passengers to communicate with customer service operators through live chat.

UC Name	***UC - 701 Live Chat Communication***
Summary	It provides a means of communication within the platform for the passenger to get help from experienced staff, enabling real-time interaction for inquiries, assistance, and support throughout the booking process.
Dependency	
Actors	***Primary actor:*** Passenger ***Secondary actor:*** Operator
Preconditions	***1.*** The airline booking system must be operational and accessible to passengers and operators. ***2.*** The passenger must be logged in to their account to access the live chat functionality. ***3.*** The operator must be logged in to their account and available to respond to passengers. ***4.*** Live chat support should be available during specified operating hours as per the airline's customer service policy. ***5.*** The system should provide a way for the operator to access the passenger’s booking by using booking details or booking code to locate it.

Description of the Main Sequence	***Step 1:*** The operator logs in to their account during operating hours to be available to assist customers through live chat. ***Step 2:*** The passenger logs in to their account using their credentials. ***Step 3:*** The passenger accesses the live chat feature through their profile during operating hours. ***Step 4:*** Upon activating the live chat feature, the system connects the passenger with an available operator. ***Step 5:*** Once connected, the passenger provides the booking details and makes inquiries regarding the booking process for the operator to help them. ***Step 6:*** The available operator receives the passenger's requests and proceeds to help with the request in real-time.
Description of the Alternative Sequence	The passenger logs in to their account and accesses the live chat feature outside of operating hours. The system won't be able to connect the passenger with any operator since no one will be available. The system will show an informative popup to the passenger reminding them to try again within operating hours.
Non-functional requirements	***Performance:*** The live chat system should have low latency to ensure quick response times between passengers and operators. ***Scalability:*** The live chat system should be scalable to accommodate increasing demand during peak periods without compromising performance. It should be capable of dynamically allocating resources to handle fluctuations in chat volume efficiently. ***Availability:*** The chat service depends on the number of operators working in different countries. If there are enough employers to have night shifts as well, the chat will be available 24/7 in that country, otherwise, the chat will be available from 7 pm to 10 pm. ***Security:*** The live chat communication should be encrypted to ensure the confidentiality and integrity of passenger data and conversations.

Postconditions	The passenger's query or issue is resolved satisfactorily, and they receive the necessary assistance or information from the customer service operator. The live chat session is successfully concluded, and both the passenger and the operator are disconnected from the chat interface. Relevant details of the live chat interaction, including the query, response, and any actions taken by the operator, are logged or documented for future reference.

The system shall provide updates in real-time to passengers regarding booking confirmations, changes and cancellations.

UC Name	***UC - 702 Booking Updates Notifications***
Summary	The system ensures that SMS and/or emails are sent in real-time to passengers to inform them regarding booking confirmation, any modifications or changes to their existing booking (such as flight changes or seat changes), booking cancellations, and different available upgrades or discounts.
Dependency	
Actors	***Primary Actor:*** System ***Secondary Actor:*** Passenger
Preconditions	***1.*** The passenger must have an existing booking with the airline for the system to provide updates. ***2.*** The airline's booking system must support real-time modification capabilities for bookings, allowing changes such as flight rescheduling, seat upgrades, or cancellations. ***3.*** Passengers must have access to communication channels through which they can receive updates, such as email or SMS. ***4.*** Passengers must provide at least one form of communication (SMS or email) as information in their existing booking.
Description of the Main Sequence	***Step 1:*** The system continuously monitors booking data and associated flight information for any changes. ***Step 2:*** Upon detection, the system generates update notifications containing relevant information about the modification, including the nature of the change and its impact on the passenger's itinerary. ***Step 3:*** The system checks the booking to see available/preferred forms of communication provided by the passenger. ***Step 4:*** The system dispatches the update notifications to the affected passengers in real-time via email and/or SMS.

	Step 5: Passengers receive the update notifications on their preferred communication devices, providing them with all important information. ***Step 6:*** Passengers acknowledge receipt of the update notification and may take further action based on the information provided, such as confirming the change, requesting assistance, or initiating alternative arrangements if necessary.
Description of the Alternative Sequence	The system continuously monitors the booking for any changes or available upgrades. Upon detection, the system generates the update notifications with the relevant information. The system then checks the booking for available forms of communication but doesn't find any provided. The system will terminate the process and the passenger won't be notified.
Non-functional requirements	***Performance:*** The system should deliver update notifications to passengers within a specified timeframe, ensuring timely communication of booking changes. ***Reliability:*** The system should be highly reliable, ensuring that update notifications are delivered accurately and consistently to passengers without loss or delay. ***Availability:*** The system should be available 24/7 to provide real-time updates to passengers, regardless of time zone or location. ***Scalability:*** The system should be scalable to accommodate increasing numbers of passengers and booking modifications without impacting performance or reliability. ***Security:*** The system should ensure the security and confidentiality of passenger data and update notifications, protecting them from unauthorized access or interception. It should comply with industry standards and regulations for data protection and privacy.

Postconditions	Update notifications regarding changes to the existing booking or available upgrades for the existing booking are successfully delivered to the passengers through the communication channels provided by them. Passengers have access to detailed information about the changes made to their booking, enabling them to understand the impact on their travel plans. Passengers may take appropriate actions based on the update notifications. The system records the successful delivery of update notifications.

The system shall allow operators to create new bookings for passengers.

UC Name	***UC - 703 Customer Service New Booking***
Summary	The system enables the operators to create a new booking, following the entire booking process, for passengers who might have difficulty booking flights on their own.
Dependency	
Actors	***Primary Actor:*** Operator ***Secondary Actor:*** Passenger
Preconditions	***1.*** The operators attempting to create new bookings must be logged in. ***2.*** The booking system must be operational and accessible to operators to initiate the creation of new bookings. ***3.*** Operators must have access to relevant passenger information required for booking creation, such as names, contact details, and travel preferences. ***4.*** The system must have up-to-date information on flight availability, including schedules, seat availability, and pricing. ***5.*** The system must be integrated with payment processing services to authorize and process transactions. ***6.*** Operators must confirm that all booking conditions, such as fare rules, baggage allowances, and cancellation policies, are communicated accurately to passengers during the booking process.
Description of the Main Sequence	***Step 1:*** The operator logs into the booking system using their credentials to access the booking creation functionality. ***Step 2:*** The operator enters the required passenger information into the booking system, including names, birthdays, and contact details. ***Step 3:*** The operator selects the desired flight(s) for the passenger(s), specifying the departure and arrival airports, dates, and flight class. ***Step 4:*** The operator may add additional services to the booking if the passenger requests it.

	Step 5: The system calculates the total price of the booking based on the selected flight(s), additional services, and any applicable taxes or fees. ***Step 6:*** The operator initiates the payment process using the selected payment method, such as credit card. ***Step 7:*** Once the payment is processed successfully, the system generates a booking confirmation containing the booking code, itinerary details, and payment receipt. ***Step 8***: The system sends a confirmation email or SMS to the passenger(s), providing them with the booking details and instructions for managing their reservation. ***Step 9:*** The system updates the booking database with the newly created reservation, ensuring that it is reflected accurately in the airline's records for future reference and management.
Description of the Alternative Sequence	***Alternative Sequence 1:*** The operator logs in to create a new booking. Some of the required passenger information is missing. The system will terminate the process and ask to start from the beginning providing all mandatory details. ***Alternative Sequence 2:*** The operator logs in to create a new booking. Provides all mandatory passenger information. There are no flights available meeting passenger criteria. The booking process is terminated. ***Alternative Sequence 3:*** The operator logs in to create a new booking. Provides all mandatory passenger information. The operator finds available desired flights. Calculates the total price. The passenger doesn’t accept the price or can’t provide a form of payment at the moment. The booking process is terminated.
Non-functional requirements	***Performance:*** The system should respond promptly to operator actions, with minimal latency during the booking creation process. It should be able to handle concurrent booking requests from multiple operators without experiencing performance degradation.

	Scalability: The system should be scalable to accommodate increasing numbers of booking transactions as the airline's operations grow. ***Security:*** The system should ensure the security and confidentiality of passenger data and payment information entered during the booking process. It should implement encryption and other security measures to protect against unauthorized access, data breaches, and fraudulent activities.
Postconditions	The system confirms the successful creation of the booking and provides the operator with a unique booking code. The newly created booking is added to the airline's booking database, ensuring that it is accurately reflected in the system for future reference and management. The system sends a confirmation email or SMS to the passenger(s), providing them with the booking details, itinerary, payment receipt, and instructions for managing their reservation.

The system shall allow the operator to modify the passenger's personal information with the manager's permission.

UC Name	***UC - 704 Personal Information Modification***
Summary	The system permits operators to modify passengers' personal information (such as full name, gender, and birthday), subject to managerial approval after receiving the necessary documentation, ensuring data accuracy and compliance with established protocols.
Dependency	
Actors	Primary Actor: Operator Secondary Actor: Manager, Passenger
Preconditions	1. The operator attempting the modification must be logged in to their account. 2. The system should provide a way for the operator to access the passenger's booking by using booking details or booking code to locate it. 3. The passenger must provide the necessary legal documentation for the change of personal data. 4. The manager must check the documentation and permit for the change to happen. 5. Before proceeding with the modification, the system should require a confirmation from the manager (inputting the manager's unique code) to ensure that the requested changes are valid and authorized.
Description of the Main Sequence	Step 1: The operator logs in to their account. Step 2: The passenger provides the booking code or booking details and the necessary legal documentation for the change. Step 3: The operator locates passengers booking. Step 4: The manager checks the documents and permits the change.

	Step 5: The operator requests to modify specific personal information fields for the identified passenger, such as name, gender, and birthday). Step 6: The system prompts the manager to review and approve the request by entering the manager's unique code. Step 7: With managerial approval obtained, the system goes through with the changes and saves the new information in the booking. Step 8: Once the modification is successfully processed, the system generates a notification regarding the changes made in the booking. Step 9:The system sends a confirmation email or SMS to the passenger.
Description of the Alternative Sequence	Alternative Sequence 1: The operator logs in to their account. The passenger provides the booking code or booking details and the necessary legal documentation for the change. The operator locates passengers booking. The manager checks the documents but doesn't permit the change. The process is terminated.
Non-functional requirements	Security: The system should ensure the confidentiality and integrity of passenger data during the modification process, implementing measures such as encryption and access controls to prevent unauthorized access or data breaches. Authorization and Authentication: The system should authenticate operators and managers securely before granting access to modify passenger information, ensuring that only authorized personnel can initiate and approve changes. Error Handling: The system should provide clear error messages and guidance to operators and managers in case of invalid or unauthorized modification requests, helping them rectify issues and proceed with the correct procedures. Compliance: The system should comply with data protection regulations and privacy laws governing the handling of passenger personal information, ensuring that modification processes adhere to legal requirements and industry standards.

Postconditions	The system confirms the successful modification of the passenger's personal information, providing feedback to the operator that the changes have been applied. The passenger's record within the system is updated with the modified personal information, ensuring that the changes are accurately reflected for future reference and management. The system sends a notification to inform the passenger of the changes made to their personal information, ensuring transparency and accountability.

The system shall allow the operator to rebook an existing booking as per the passenger's request.

UC Name	***UC - 705 Rebooking***
Summary	The system enables the operator to modify the itinerary on an existing booking as per passenger request, therefore assisting passengers having difficulties rebooking on their own.
Dependency	
Actors	Primary Actor: Operator Secondary Actor: Passenger
Preconditions	1. The operator attempting the rebooking process must be logged in to their account. 2. There must be an existing booking for the passenger making the rebooking request. 3. The system should provide a way for the operator to access the passenger's booking by using booking details or booking code to locate it. 4. The booking system must be operational and accessible to operators to initiate the rebooking process. 5. The system must have up-to-date information on flight availability, including schedules, seat availability, and pricing. 6. The system must be integrated with payment processing services to authorize and process transactions. 7. Operators must confirm all rebooking conditions, such as fare rules, before proceeding and must accurately communicate them to passengers during the rebooking process.
Description of the Main Sequence	Step 1: The operator logs in to their account. Step 2: The passenger provides the booking code or booking details. Step 3: The operator locates the booking. Step 4: The operator confirms all ticket rules to check if the ticket is rebookable and if there are any penalty fees to be paid.

	Step 5: The operator selects the desired flight(s) for the passenger(s), specifying the departure and arrival airports, dates, and flight class. Step 6: The system calculates the total price of the rebooking based on the selected flight(s), and any applicable taxes or fees. Step 7: If applicable, the operator initiates the payment process using the selected payment method, such as credit card. Step 8: Once the payment is processed successfully, the system generates a rebooking confirmation containing the booking code, itinerary details, and payment receipt. Step 9: The system sends a confirmation email or SMS to the passenger(s), providing them with the rebooking details. Step 10: The system updates the booking database with the modified reservation, ensuring that it is reflected accurately in the airline's records for future reference and management.
Description of the Alternative Sequence	Alternative Sequence 1: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator checks ticket rules. Ticket rules don’t allow rebooking. The process is terminated. Alternative Sequence 2: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator confirms all ticket rules. There are no available flights that meet passenger criteria. The process is terminated. Alternative Sequence 3: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator confirms all ticket rules. The operator selects the desired flight(s). The system calculates the total price of the rebooking. The passenger doesn’t accept the price or can’t provide a form of payment at the moment. The rebooking process is terminated.
Non-functional requirements	Performance: The system should respond promptly to operator actions, with minimal latency during the booking creation process. It should be able to handle

	concurrent booking requests from multiple operators without experiencing performance degradation. Scalability: The system should be scalable to accommodate increasing numbers of booking transactions as the airline's operations grow. Security: The system should ensure the security and confidentiality of passenger data and payment information entered during the booking process. It should implement encryption and other security measures to protect against unauthorized access, data breaches, and fraudulent activities.
Postconditions	The booking associated with the passenger's request is updated successfully with the new itinerary details, reflecting any changes made during the rebooking process. The system calculates any fare differences, fees, or penalties associated with the rebooking, providing accurate pricing information to the operator and passenger. The system sends a confirmation email or SMS to the passenger, providing them with the updated booking details and itinerary information. The system adds an entry to the audit log indicating the successful completion of the rebooking process, including details such as the date, time, user, and nature of the changes.

The system shall allow the operator to cancel an existing booking as per the passenger's request.

UC Name	***UC - 706 Cancellation***
Summary	The system enables the operator to cancel the itinerary of an existing booking as per passenger request and give a refund if applicable, therefore assisting passengers having difficulties canceling on their own.
Dependency	
Actors	Primary Actor: Operator Secondary Actor: Passenger
Preconditions	1. The operator attempting the cancellation process must be logged in to their account. 2. There must be an existing booking for the passenger making the cancellation request. 3. The system should provide a way for the operator to access the passenger's booking by using booking details or booking code to locate it. 4. The booking system must be operational and accessible to operators to initiate the cancellation process. 5. The system must be integrated with payment processing services to authorize and process refund transactions. 6. Operators must confirm all cancellation policies, before proceeding and must accurately communicate them to passengers during the cancellation process.
Description of the Main Sequence	Step 1: The operator logs in to their account. Step 2: The passenger provides the booking code or booking details. Step 3: The operator locates the booking. Step 4: The operator confirms all ticket rules to check if the ticket is fully, partially, or not at all refundable. Step 5: The system calculates the total amount that will be refunded.

	Step 6: If applicable, the operator initiates the refund transaction to be paid back to the original form of payment that was provided in the creation of the booking. Step 7: Once the refund is initiated, the itinerary is completely canceled from the booking. Step 8: The system generates a cancellation confirmation containing the booking code, the canceled itinerary, and the refund receipt. Step 9: The system sends a confirmation email or SMS to the passenger(s). Step 10: The system updates the booking database with the modified reservation, ensuring that it is reflected accurately in the airline's records for future reference and management.
Description of the Alternative Sequence	Alternative Sequence 1: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator checks ticket rules. Ticket rules state the ticket is not refundable or the refund amount isn't full. The passenger doesn't want to cancel any more. The process is terminated.
Non-functional requirements	Performance: The system should respond promptly to cancellation requests, ensuring minimal latency in processing time to provide a seamless user experience for operators and passengers. Reliability: The system should be highly reliable, ensuring that cancellation transactions are processed accurately and consistently without errors or data loss. Security: The system should ensure the security and confidentiality of passenger data during the cancellation process, implementing encryption and access controls to prevent unauthorized access or data breaches. Compliance: The system should comply with industry regulations and standards governing cancellation processes, ensuring that cancellation transactions adhere to legal requirements and industry best practices.
Postconditions	The booking was successfully canceled.

	The booking associated with the canceled reservation is updated within the system to reflect its cancellation status, ensuring that it is accurately recorded and no longer active. If a refund is due to the passenger, the system initiates the refund process, processing the refund amount to the original payment method used for the booking. The system sends a confirmation email or SMS to the passenger, informing them that their booking has been successfully canceled and providing any relevant details regarding refunds or penalties.

The system shall allow the operator to add/modify additional services (such as seat assignment, pet, special meal, extra baggage, etc.) to an existing booking as per passenger request.

UC Name	***UC - 707 Additional Services***
Summary	The system enables operators to add or modify additional services to existing bookings based on passenger requests. The additional services available are seat assignment, pet in cabin or cargo, special meal, extra baggage (including sports equipment), cabin baggage (eg. musical instruments or works of art), weapon, and wheelchair assistance. For these kinds of requests, the passengers don't have access to add them by themselves in the booking (except the seat assignment) so they need to be fulfilled by the customer service operators.
Dependency	
Actors	Primary Actor: Operator Secondary Actor: Passenger
Preconditions	1. The operator attempting to add additional services must be logged in to their account. 2. There must be an existing booking for the passenger making the request. 3. The system should provide a way for the operator to access the passenger's booking by using booking details or booking code to locate it. 4. The booking system must be operational and accessible to operators to fulfill the request. 5. The system must be integrated with payment processing services to authorize and process transactions if needed.
Description of the Main Sequence	Step 1: The operator logs in to their account. Step 2: The passenger provides the booking code or booking details. Step 3: The operator locates the booking. Step 4: The operator checks availability and all criteria for the additional service(s).

	Step 5: The system calculates the total amount that will need to be paid for the service(s). Step 6: If applicable, the operator initiates the payment process using the selected payment method, such as credit card. Step 7: Once the payment goes through, the system generates an update confirmation containing the booking code, the itinerary, the added service(s), and the payment receipt. Step 9: The system sends a confirmation email or SMS to the passenger(s). Step 10: The system updates the booking database with the modified reservation, ensuring that it is reflected accurately in the airline's records for future reference and management.
Description of the Alternative Sequence	Alternative Sequence 1: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator checks the availability and criteria for the additional service. One of the two (or both) conditions aren't satisfied. The passenger can't book the additional service. The process is terminated. Alternative Sequence 1: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator checks the availability and criteria for the additional service. The system calculated the total amount to be paid. The passenger doesn't accept the price or can't provide a form of payment at the moment. The booking process is terminated.
Non-functional requirements	Performance: The system should respond promptly to the requests, ensuring minimal latency in processing time to provide a seamless user experience for operators and passengers. Security: The system should ensure the security and confidentiality of passenger data during the process, implementing encryption and access controls to prevent unauthorized access or data breaches.

	Compliance: The system should comply with industry regulations and standards governing payment processes, ensuring that transactions adhere to legal requirements and industry best practices.
Postconditions	The additional service(s) is/are successfully added to the booking. The booking is updated within the system to keep track of data for future reference. The system calculates additional prices, providing accurate pricing information to the operator and passenger. The system sends a confirmation email or SMS to the passenger, providing them with the updated booking details and payment receipt.

The system shall allow the operator to upgrade the passenger(s).

UC Name	***UC - 708 Flight Upgrade***
Summary	The system permits the operator to give an upgrade of the compartment (when available) on the flight(s) that the passenger(s) want.
Dependency	
Actors	Primary Actor: Operator Secondary Actor: Passenger
Preconditions	1. The operator must be authenticated and authorized to access the upgrade functionality within the system. 2. There must be an existing booking for the passenger making the request. 3. The system should provide a way for the operator to access the passenger's booking by using booking details or booking code to locate it. 4. The upgrade functionality within the system must be operational and accessible to operators to facilitate the upgrade process. 5. There must be available upgrade options, such as class upgrades, that meet the passenger's preferences and the airline's offerings. 6. The passenger(s) requesting upgrades must meet the eligibility criteria set by the airline, such as loyalty status, fare class, or available inventory for upgrades.
Description of the Main Sequence	Step 1: The operator logs in to their account. Step 2: The passenger provides the booking code or booking details. Step 3: The operator locates the booking. Step 4: The operator confirms upgrade availability and all criteria. Step 5: The operator selects the desired flight(s) and the desired compartment to be upgraded to. Step 6: The system calculates the total price of the upgrade based on the selected flight(s), and any applicable taxes or fees.

	Step 7: If applicable, the operator initiates the payment process using the selected payment method, such as credit card. Step 8: Once the payment is processed successfully, the system generates an upgrade confirmation containing the booking code, itinerary details, and payment receipt. Step 9: The system sends a confirmation email or SMS to the passenger(s), providing them with the upgrade details. Step 10: The system updates the booking database with the modified reservation, ensuring that it is reflected accurately in the airline's records for future reference and management.
Description of the Alternative Sequence	Alternative Sequence 1: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator checks upgrade availability and criteria for the desired flight(s) and compartment. One, if not both, of the conditions aren't met. The upgrade isn't possible. The process is terminated. Alternative Sequence 2: The operator logs in. The passenger provides the booking code. The operator locates the booking. The operator confirms upgrade availability and criteria for the desired flight(s) and compartment. The system calculates the total price for the upgrade. The passenger doesn't accept the price or can't provide a form of payment at the moment. The upgrade process is terminated.
Non-functional requirements	Performance: The system should respond promptly to upgrade requests, ensuring minimal latency in processing time to provide a seamless user experience for operators and passengers. Security: The system should ensure the security and confidentiality of passenger data during the upgrade process, implementing encryption and access controls to prevent unauthorized access or data breaches.

	Compliance: The system should comply with industry regulations and standards governing upgrade processes, ensuring that upgrade transactions adhere to legal requirements and industry best practices.
Postconditions	The passenger(s) is/are successfully upgraded as requested. The booking associated with the upgraded passenger(s) is updated within the system to reflect the changes. If there are additional costs associated with the upgrade, the system calculates the total amount and adjusts the booking accordingly. The system sends a confirmation email or SMS to the passenger, informing them of the successful upgrade and providing details of the upgraded services. The system updates the booking database with the upgrade details, including the date, time, operator, and nature of the upgrade, ensuring accurate record-keeping for future reference and management.

Business scenarios:

1. Business Scenario: Streamlining Flight Booking Process

Significant Business Need:

The airline ticket booking company is facing challenges in providing a seamless flight booking experience for its passengers. The current booking system is outdated and lacks user-friendly features, resulting in decreased customer satisfaction and increased booking errors. As a result, there has been a decline in repeat bookings and negative feedback from passengers.

Problem Statement:

The existing flight booking system is cumbersome and unintuitive, leading to frustrated passengers and decreased revenue. Common issues include difficulty in searching for flights, cumbersome booking process, lack of transparency in pricing and availability, and limited payment options. These problems contribute to a poor user experience and impact the airline's reputation and profitability.

Business and Technical Environment:

To address these challenges, the airline ticket booking company aims to implement a modernized airline ticket booking system. The new system will leverage advanced technology and user-centric design principles to enhance the booking process. It will integrate seamlessly with existing airline systems such as flight scheduling, inventory management, and payment processing. The system will be accessible via multiple channels, including web, mobile app, and kiosks, catering to the diverse needs of passengers.

Desired Objectives:

1. Improve user experience: Enhance the booking process to make it intuitive, efficient, and user-friendly.
2. Increase booking accuracy: Minimize booking errors and discrepancies to improve overall customer satisfaction.
3. Enhance transparency: Provide clear and detailed information on flight options, pricing, and availability to passengers.
4. Expand payment options: Offer multiple payment methods, including credit/debit cards, mobile wallets, and bank transfers, to accommodate diverse customer preferences.
5. Boost revenue: Increase the number of successful bookings and encourage repeat bookings through a seamless user experience.
6. Reduce operational costs: Streamline internal processes and automate repetitive tasks to optimize resource utilization and improve efficiency.

Actors and Business Model:

- **Passengers:** Primary users who initiate flight bookings through the system.
- **Administrators:** Manage the airline ticket booking system, including system configuration, user management, and monitoring performance metrics.
- **Flight Operations Team:** Ensure flight data accuracy, update schedules, and manage inventory to reflect real-time availability.
- **Finance Department:** Monitor revenue performance, analyze booking trends, and generate financial reports to support decision-making.
- **Operators :** Provide assistance to passengers, resolve booking-related issues, and handle inquiries via various communication channels.

Metrics for Success:

1. **Booking Conversion Rate:** Increase the percentage of successful bookings completed without errors.
2. **Customer Satisfaction Score:** Improve passenger satisfaction ratings based on post-booking surveys and feedback.
3. **Average Booking Time:** Reduce the average time taken for passengers to complete the booking process.
4. **Booking Error Rate:** Decrease the frequency of booking errors and discrepancies reported by passengers.
5. **Revenue Growth:** Achieve an increase in overall revenue attributed to improved booking efficiency and customer retention.
6. **Operational Efficiency:** Optimize internal processes to reduce manual intervention and minimize operational costs.

Business Scenario: Strengthening Security and Compliance

The airline ticket booking company recognizes the critical importance of maintaining data security and compliance with industry regulations in its booking system. With increasing cybersecurity threats and regulatory requirements, there is a pressing need to fortify the system's defenses and ensure adherence to data protection standards.

Problem Statement:

The current booking system of airline ticket booking lacks robust security measures and may not fully comply with industry regulations such as GDPR (General Data Protection Regulation) or PCI DSS (Payment Card Industry Data Security Standard). This exposes the airline to potential data breaches, financial liabilities, and reputational damage.

Business and Technical Environment:

To address these challenges, the airline ticket booking company plans to implement enhanced security measures and compliance frameworks within its booking system. This involves upgrading encryption protocols, implementing multi-factor authentication, conducting regular security audits, and establishing robust data governance practices.

Desired Objectives:

1. **Data Security:** Strengthen the protection of passenger data, payment information, and sensitive operational data against unauthorized access, breaches, and cyber threats.
2. **Regulatory Compliance:** Ensure compliance with industry regulations, including GDPR, PCI DSS, and other relevant standards, to mitigate legal risks and uphold data privacy principles.
3. **Risk Management:** Identify, assess, and mitigate cybersecurity risks and vulnerabilities proactively to safeguard the integrity and confidentiality of data.
4. **Incident Response:** Establish clear protocols and procedures for detecting, responding to, and reporting data breaches or security incidents promptly and effectively.
5. **Employee Training:** Provide comprehensive training and awareness programs for employees to enhance their understanding of security best practices and compliance requirements.

Actors and Business Model:

- **Account Management and Authorization:** Ensure secure authentication and authorization mechanisms for user account management, registration, login, and profile management.
- **Passenger Services and Feedback:** Implement secure flight search, booking, and feedback/rating functionalities for passengers to interact with the system securely.
- **Financial Transaction Management:** Secure financial transactions, revenue performance reporting, and payment processing to protect sensitive financial data and ensure regulatory compliance.
- **Flight Management by Air Control:** Enhance security and authorization for flight planning, management, and coordination by air control department users.
- **Operator and Report Management by Managers:** Strengthen access control, authorization, and oversight for managers managing user accounts, performance monitoring, and reporting.
- **Customer Support by Operators:** Secure customer support interactions, notifications, and communication channels for operators assisting passengers with inquiries and issues.

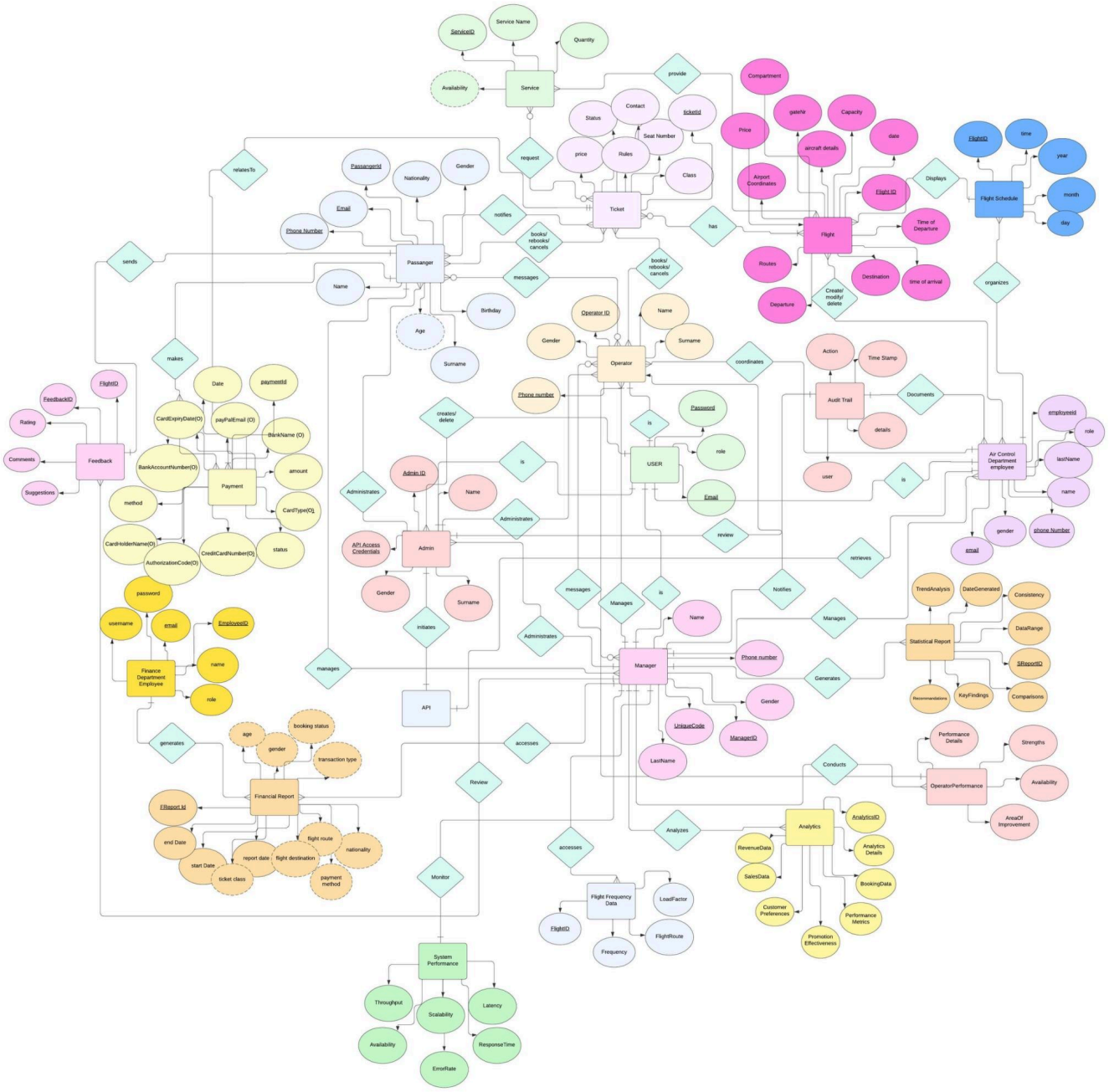
Metrics for Success:

1. **Security Compliance Score:** Evaluate the system's compliance with regulatory standards through periodic assessments and audits.

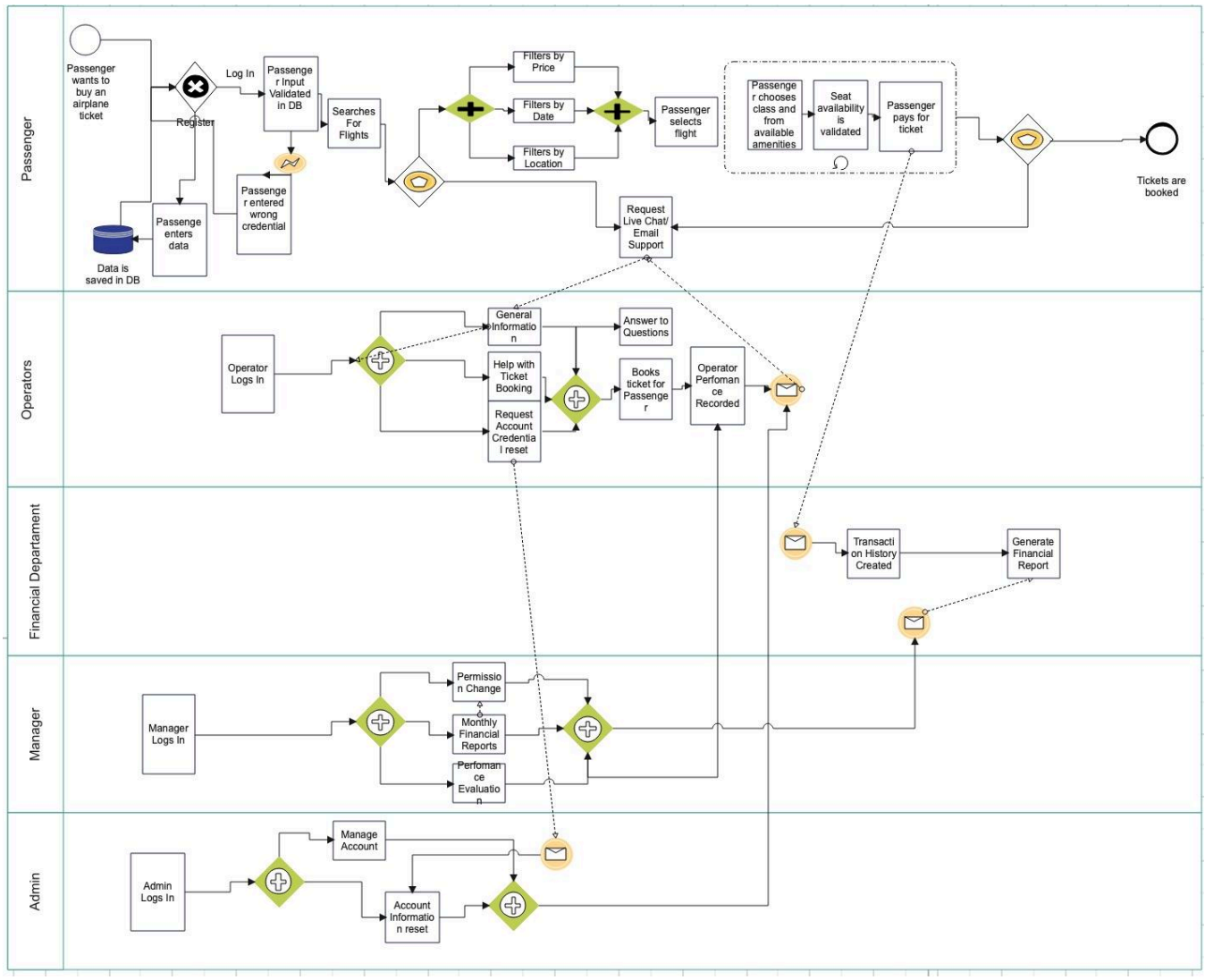
2. **Incident Response Time:** Measure the time taken to detect, respond to, and resolve security incidents to minimize impact and mitigate risks.
3. **Data Breach Rate:** Monitor the frequency and severity of data breaches to assess the effectiveness of security measures and risk mitigation strategies.
4. **User Training Completion Rate:** Track the completion of security awareness training programs by employees to ensure widespread understanding of security protocols.
5. **System Downtime due to Security Issues:** Minimize system downtime caused by security-related incidents or vulnerabilities to maintain operational continuity and user trust.

5. Diagrams

5.1. ERD Diagram

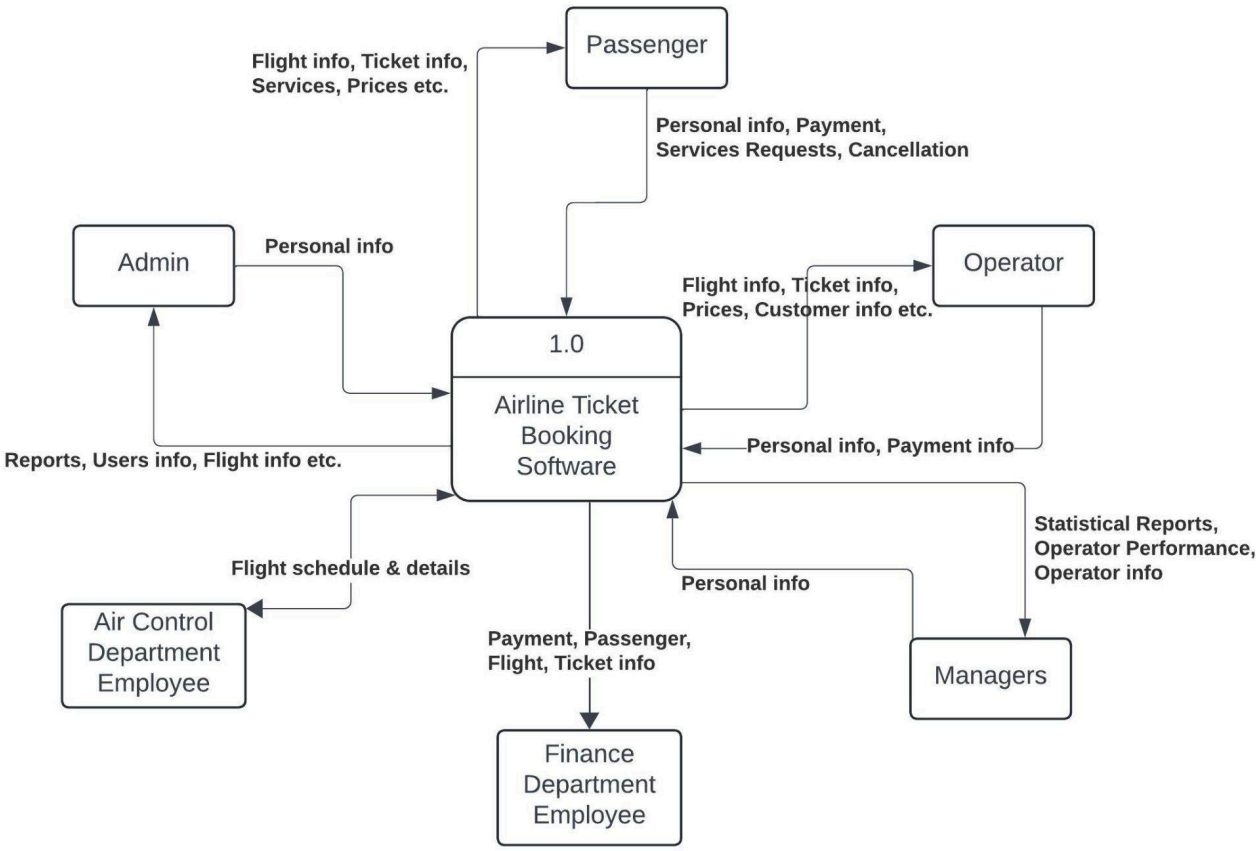


5.2. BPMN Diagram

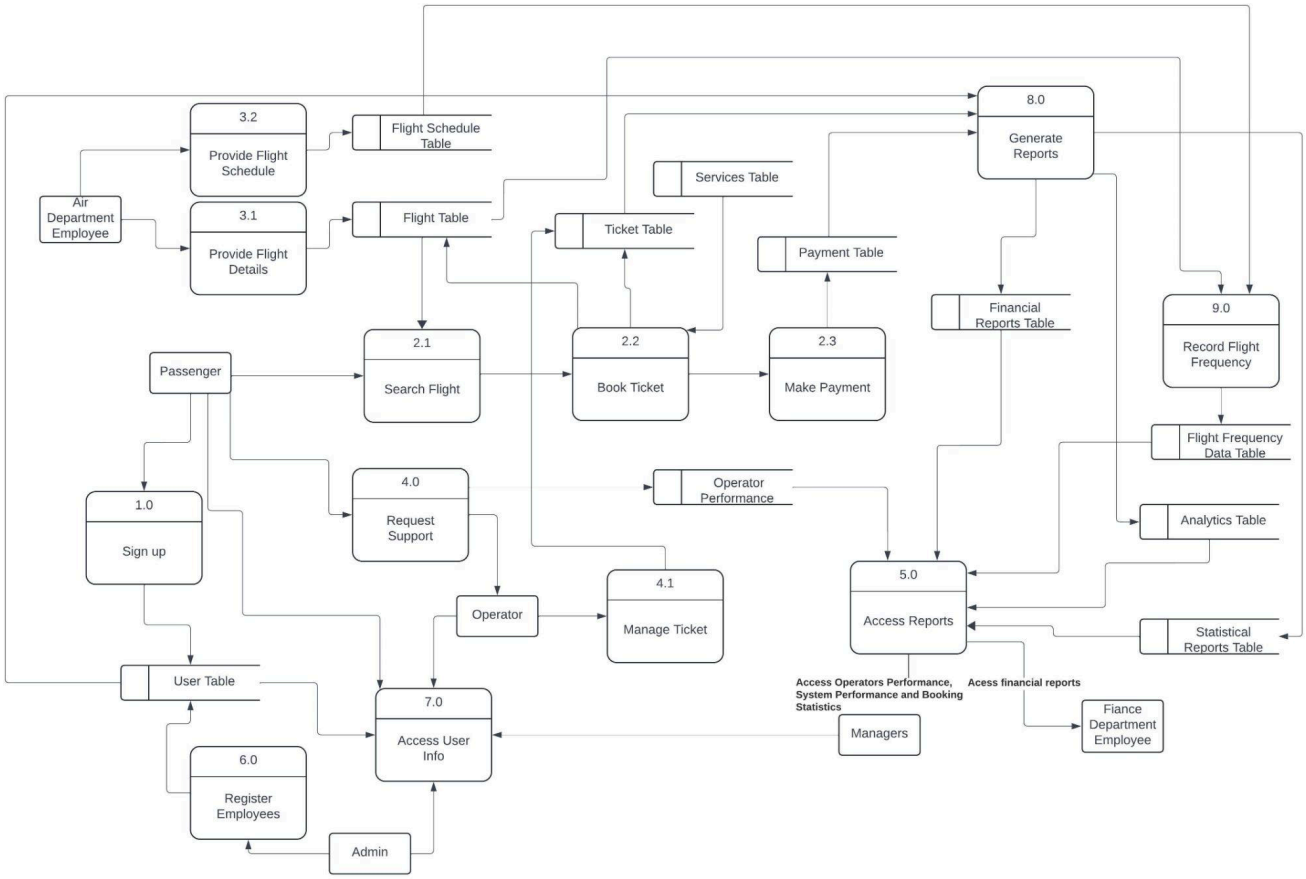


5.3. DFD Diagrams

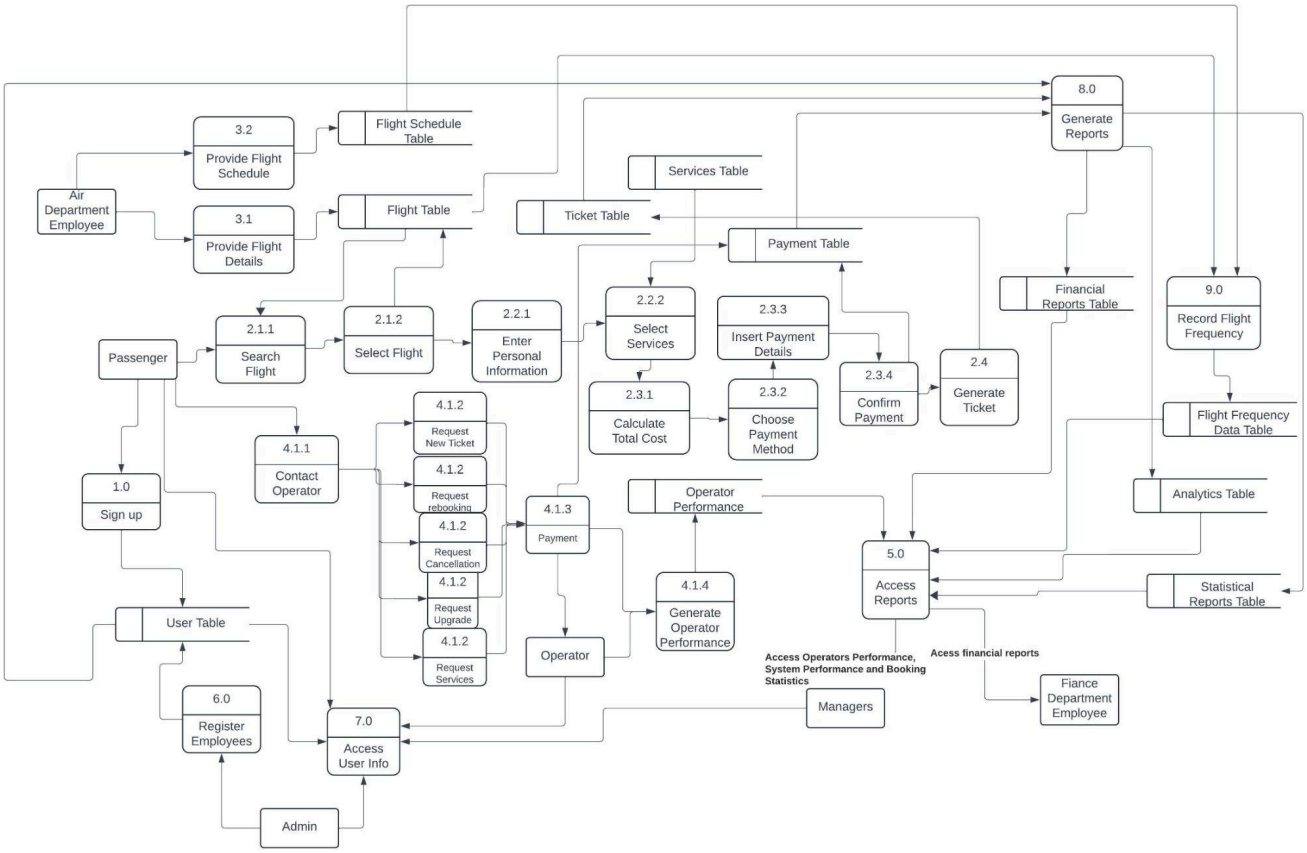
DFD Level 0



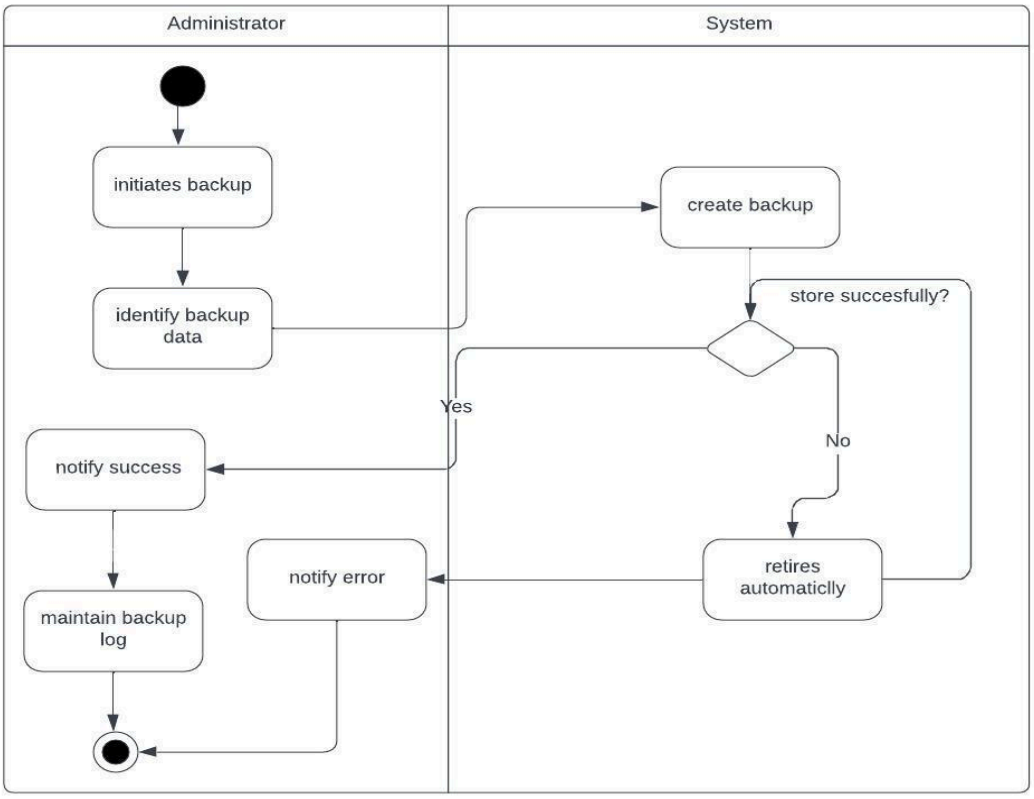
DFD Level 1

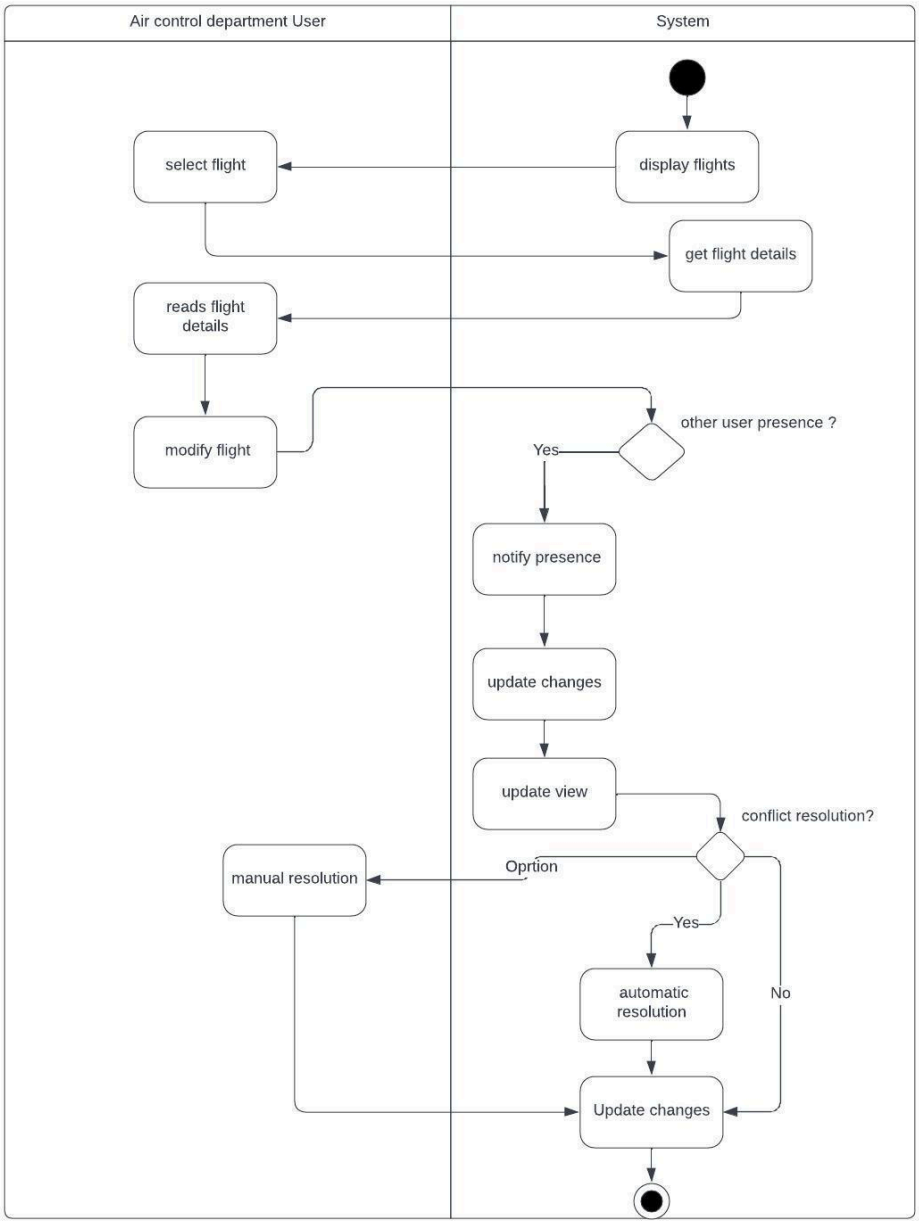

3.2
Provide Flight Schedule
Flight Schedule Table
Air Department Employee
3.1
Provide Flight Details
Flight Table
Services Table
Ticket Table
Payment Table
8.0
Generate Reports
Financial Reports Table
9.0
Record Flight Frequency
Flight Frequency Data Table
Passenger
2.1
Search Flight
2.2
Book Ticket
2.3
Make Payment
1.0
Sign up
4.0
Request Support
Operator Performance
Analytics Table
Operator
4.1
Manage Ticket
5.0
Access Reports
Statistical Reports Table
User Table
7.0
Access User Info
Access Operators Performance, System Performance and Booking Statistics
Acess financial reports
Managers
Fiance Department Employee
6.0
Register Employees
Admin

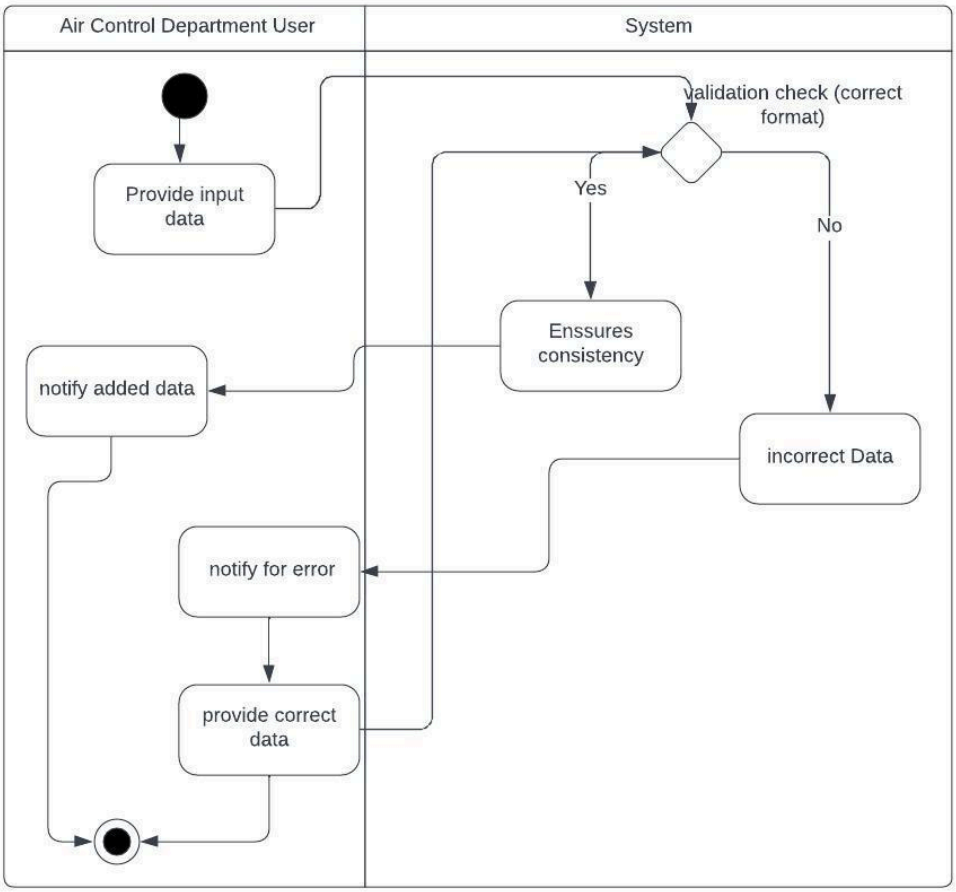
DFD Level 2

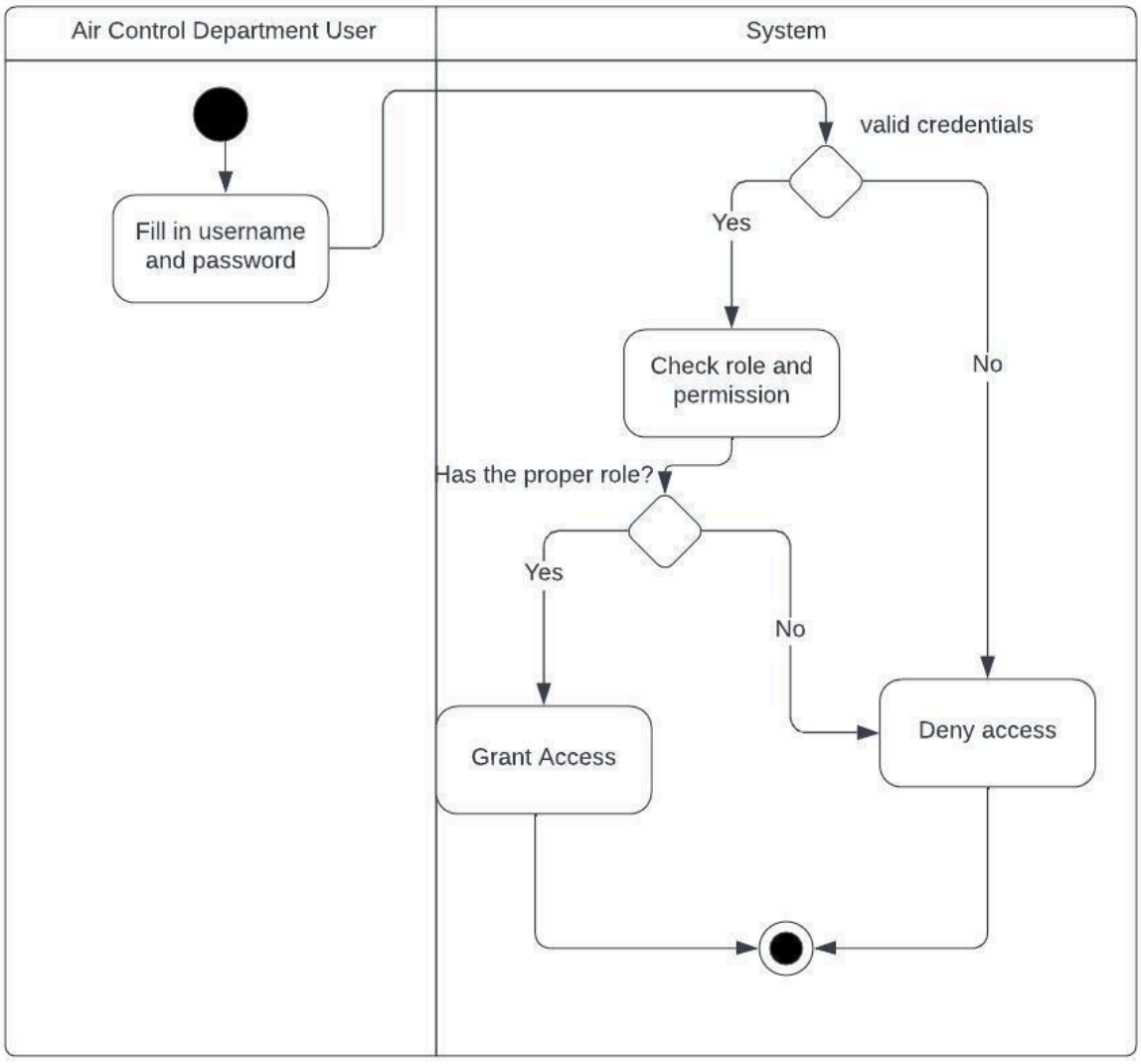

8.0
Generate Reports
3.2
Provide Flight Schedule
Flight Schedule Table
Services Table
Air Department Employee
3.1
Provide Flight Details
Flight Table
Ticket Table
Payment Table
Financial Reports Table
9.0
Record Flight Frequency
2.1.1
Search Flight
2.1.2
Select Flight
2.2.1
Enter Personal Information
2.2.2
Select Services
2.3.3
Insert Payment Details
Passenger
2.3.1
Calculate Total Cost
2.3.2
Choose Payment Method
2.3.4
Confirm Payment
2.4
Generate Ticket
Flight Frequency Data Table
4.1.2
Request New Ticket
4.1.1
Contact Operator
4.1.2
Request rebooking
1.0
Sign up
Operator Performance
Analytics Table
4.1.2
Request Cancellation
4.1.3
Payment
5.0
Access Reports
4.1.2
Request Upgrade
4.1.4
Generate Operator Performance
Statistical Reports Table
User Table
4.1.2
Request Services
Operator
Access Operators Performance, System Performance and Booking Statistics
Acess financial reports
6.0
Register Employees
7.0
Access User Info
Managers
Fiance Department Employee
Admin

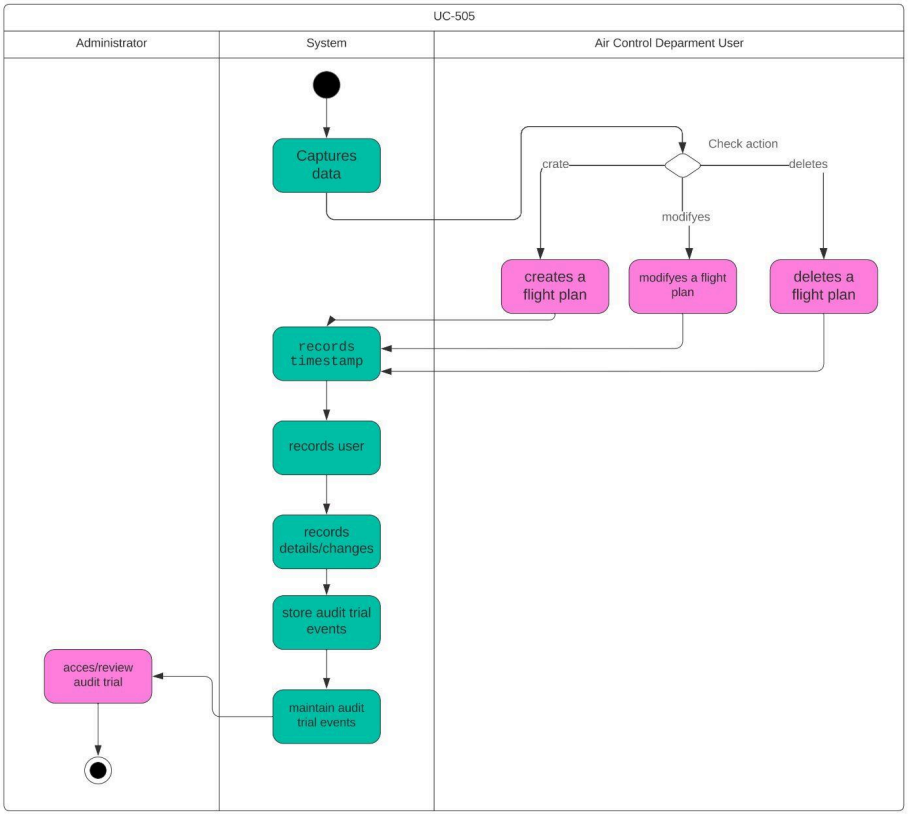
5.4. Activity Diagrams

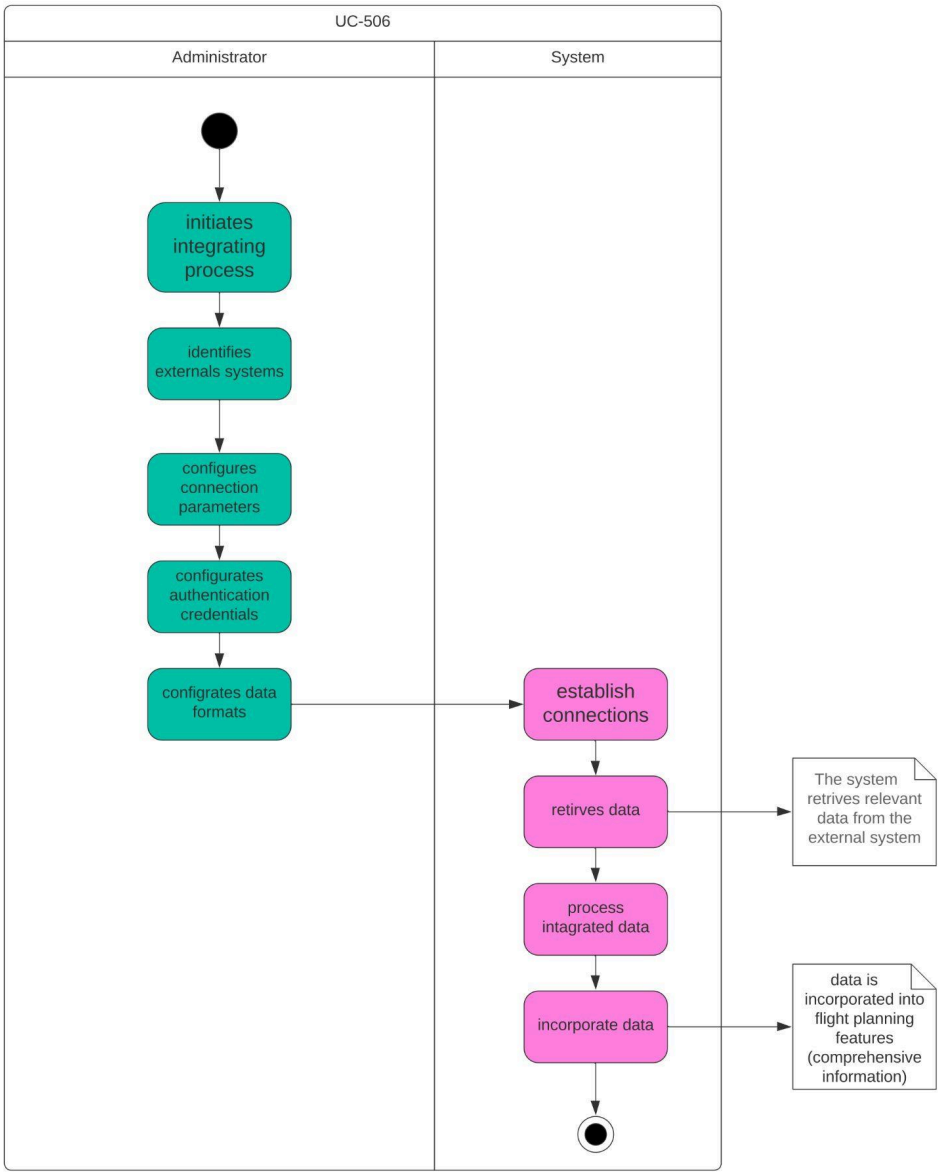


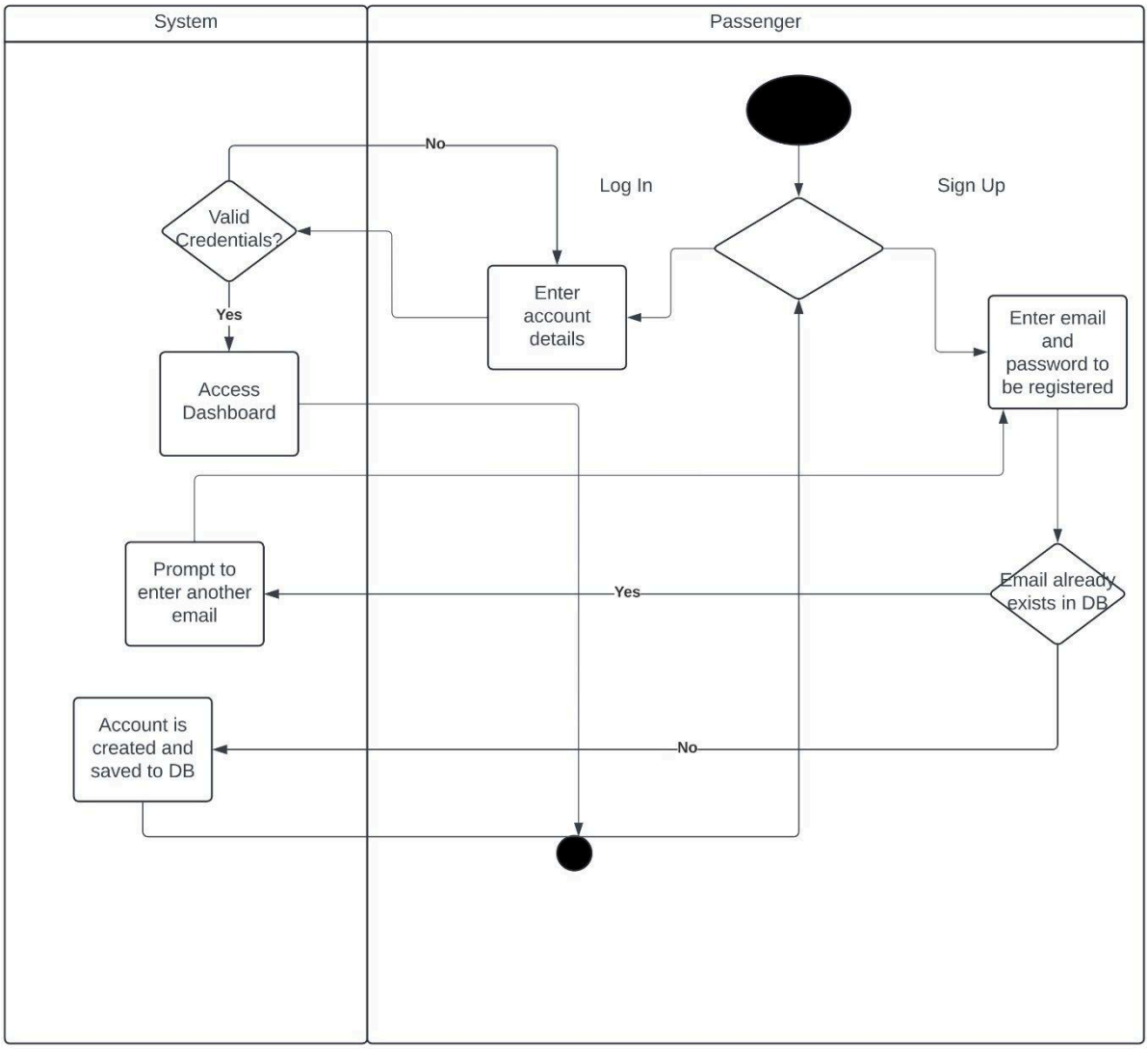

Air control department User
System
select flight
display flights
get flight details
reads flight details
modify flight
other user presence ?
Yes
notify presence
update changes
update view
conflict resolution?
manual resolution
Oprtion
Yes
automatic resolution
No
Update changes


Air Control Department User
System
Provide input data
validation check (correct format)
Yes
No
Enssures consistency
notify added data
incorrect Data
notify for error
provide correct data


Air Control Department User
System
Fill in username and password
valid credentials
Yes
No
Check role and permission
Has the proper role?
Yes
No
Grant Access
Deny access

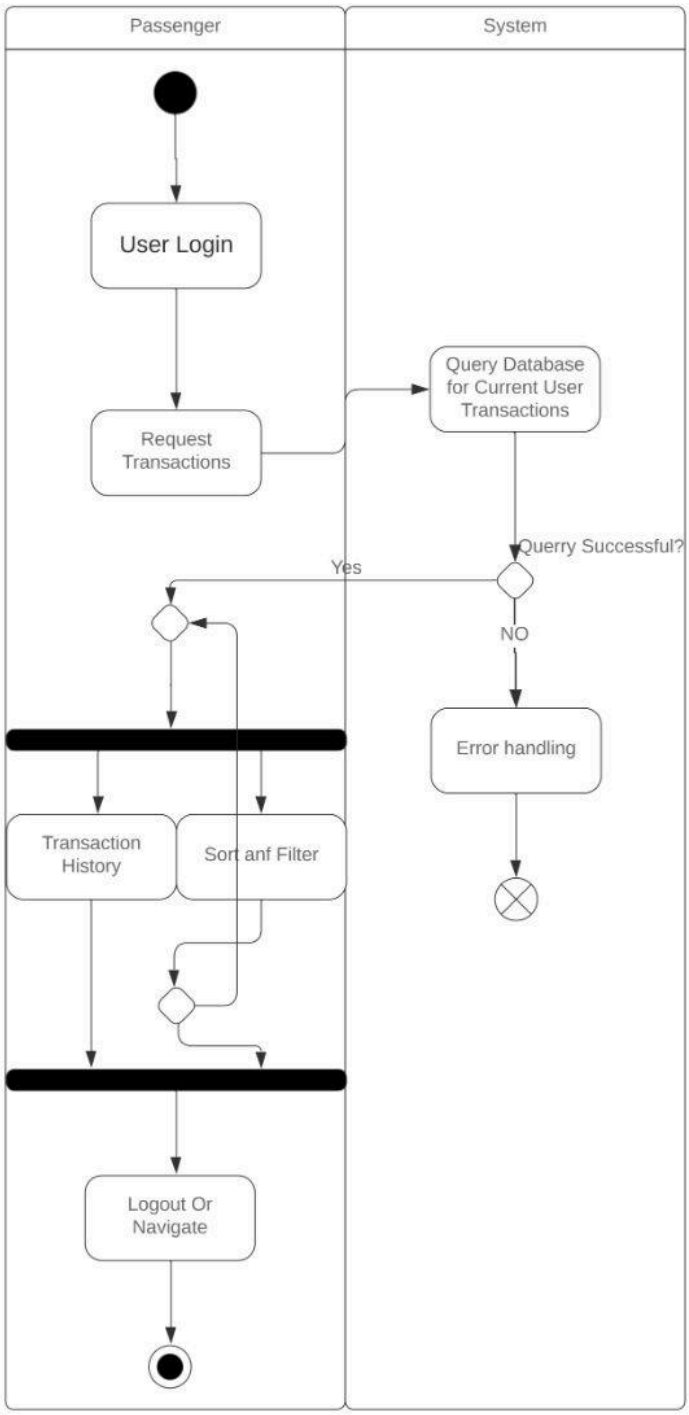

UC-505
Administrator
System
Air Control Deparment User
Captures data
Check action
crate
deletes
modifyes
creates a flight plan
modifyes a flight plan
deletes a flight plan
records timestamp
records user
records details/changes
store audit trial events
acces/review audit trial
maintain audit trial events


UC-506
Administrator
System
initiates integrating process
identifies externals systems
configures connection parameters
configurates authentication credentials
configrates data formats
establish connections
retirves data
The system retrives relevant data from the external system
process intagrated data
incorporate data
data is incorporated into flight planning features (comprehensive information)

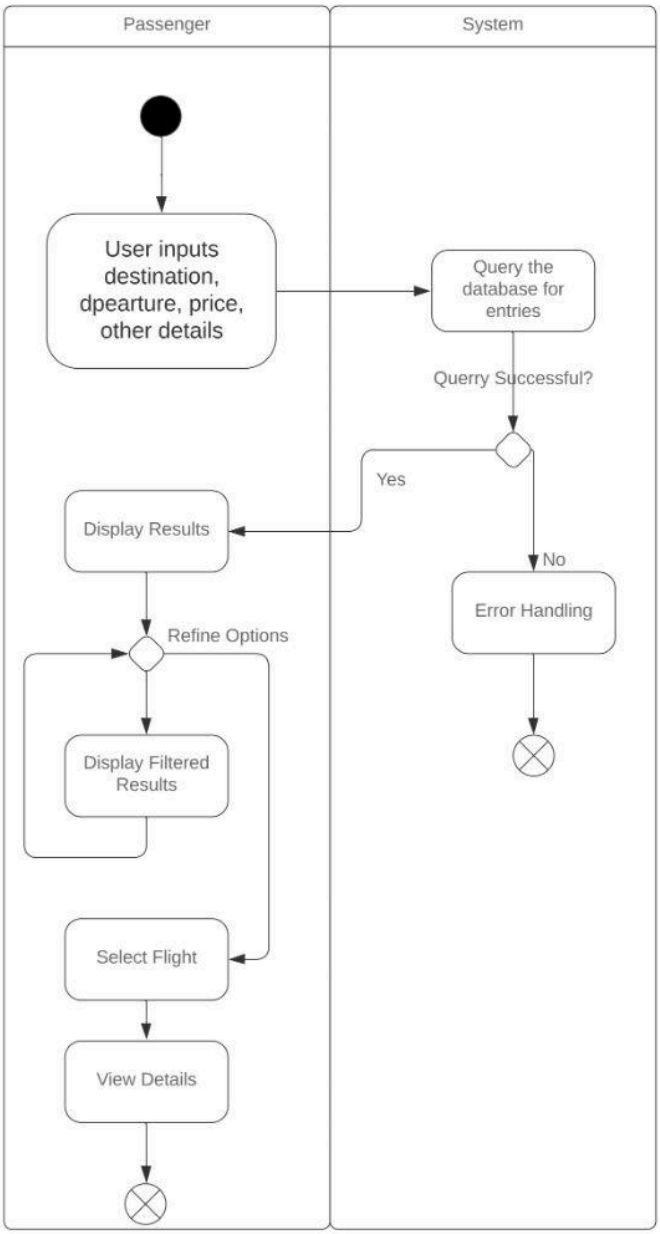

System
Passenger
No
Log In
Sign Up
Valid Credentials?
Yes
Enter account details
Enter email and password to be registered
Access Dashboard
Prompt to enter another email
Yes
Email already exists in DB
Account is created and saved to DB
No

shapes panel to see
State/Activity shapes.

Transaction History Activity Diagram



Filter Flights Activity Diagram



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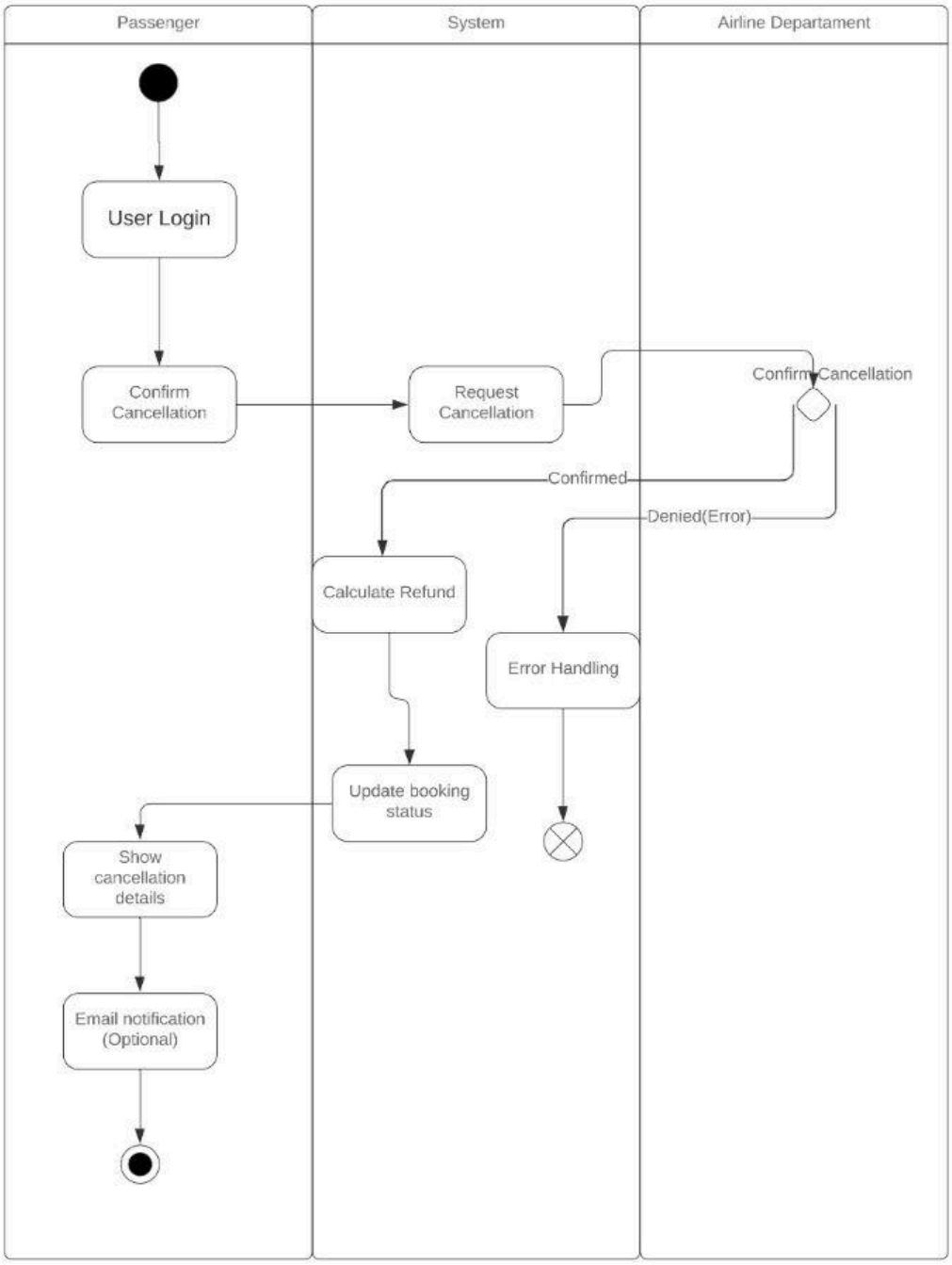
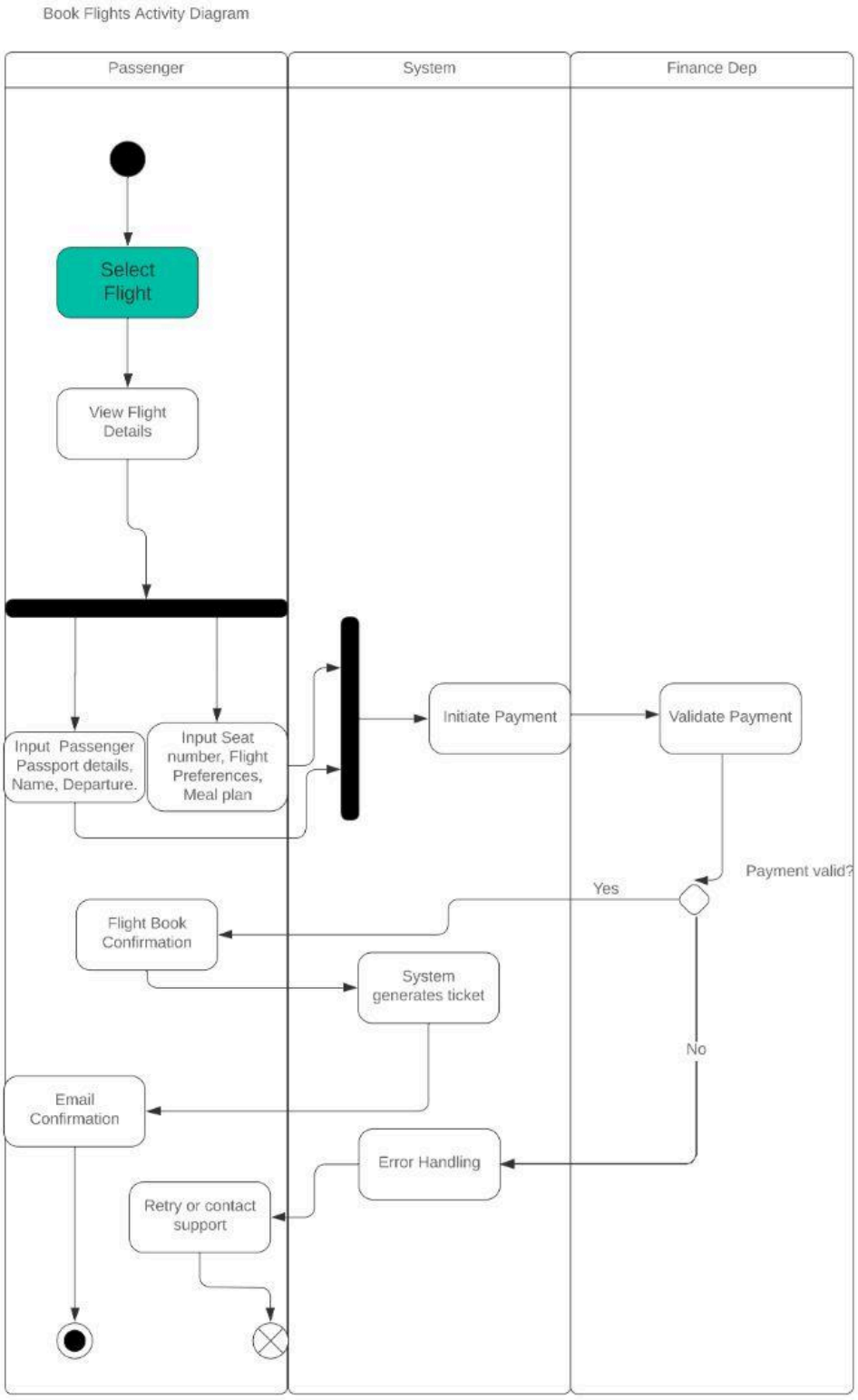
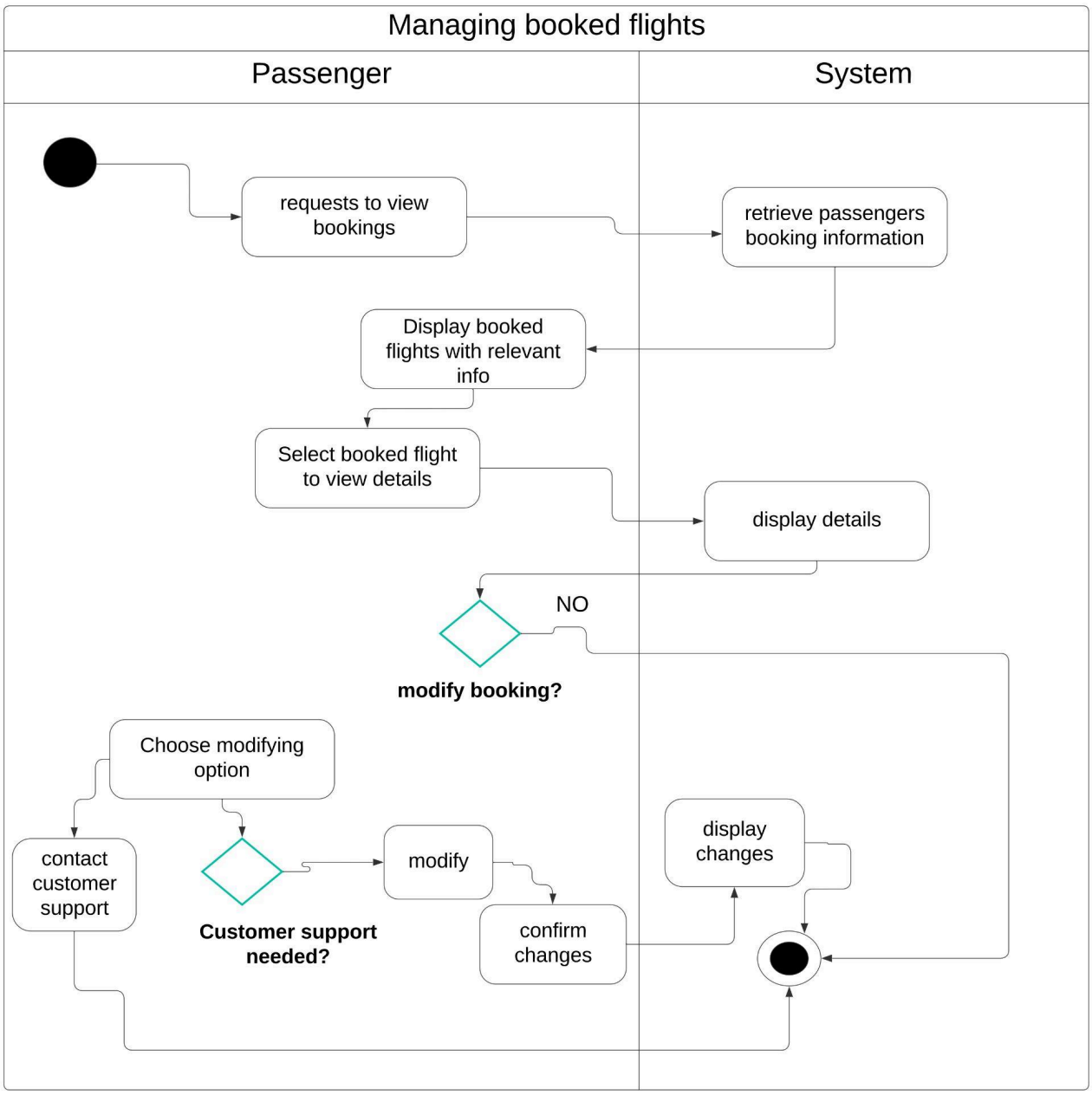
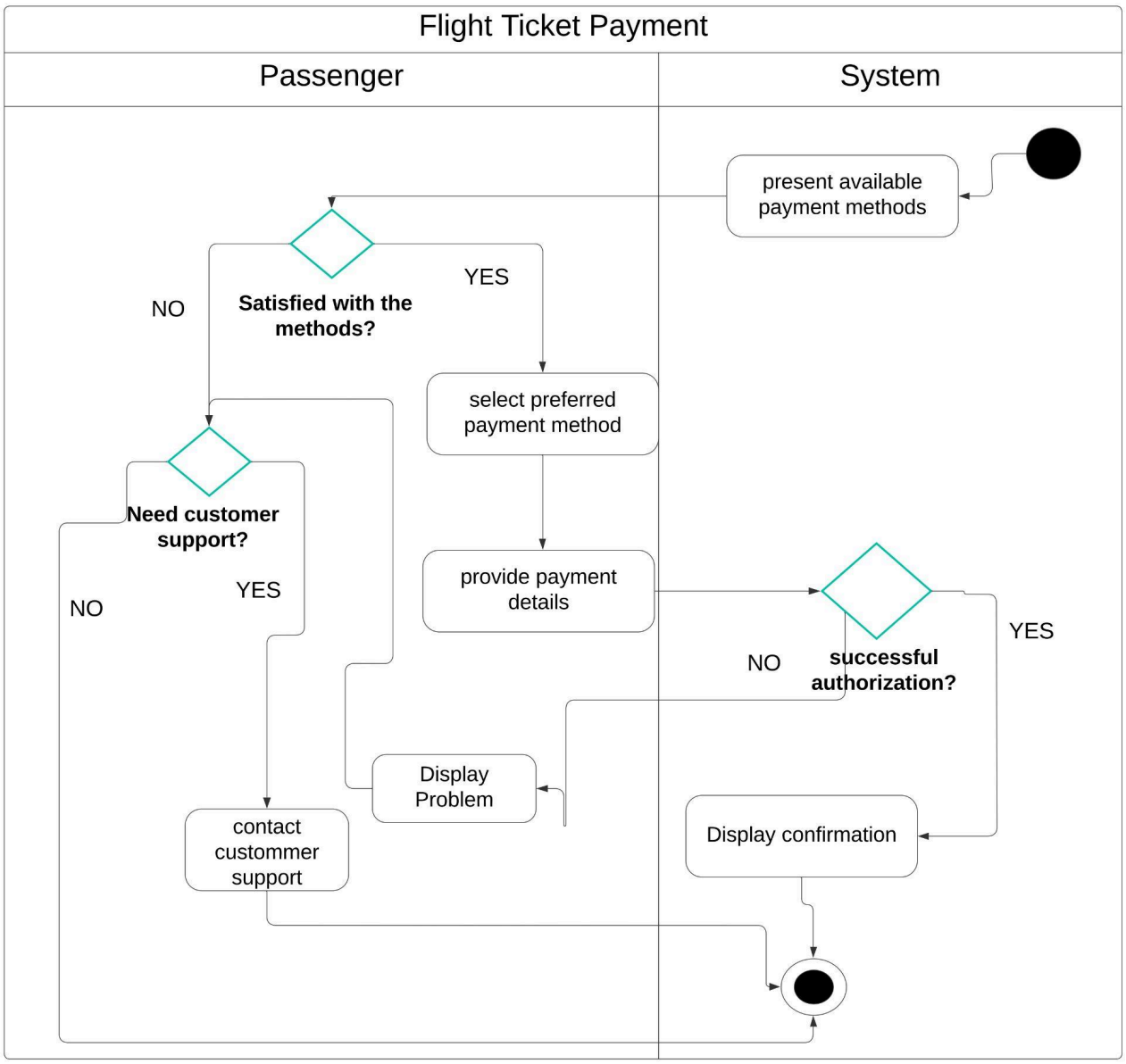
te/Activity shapes.

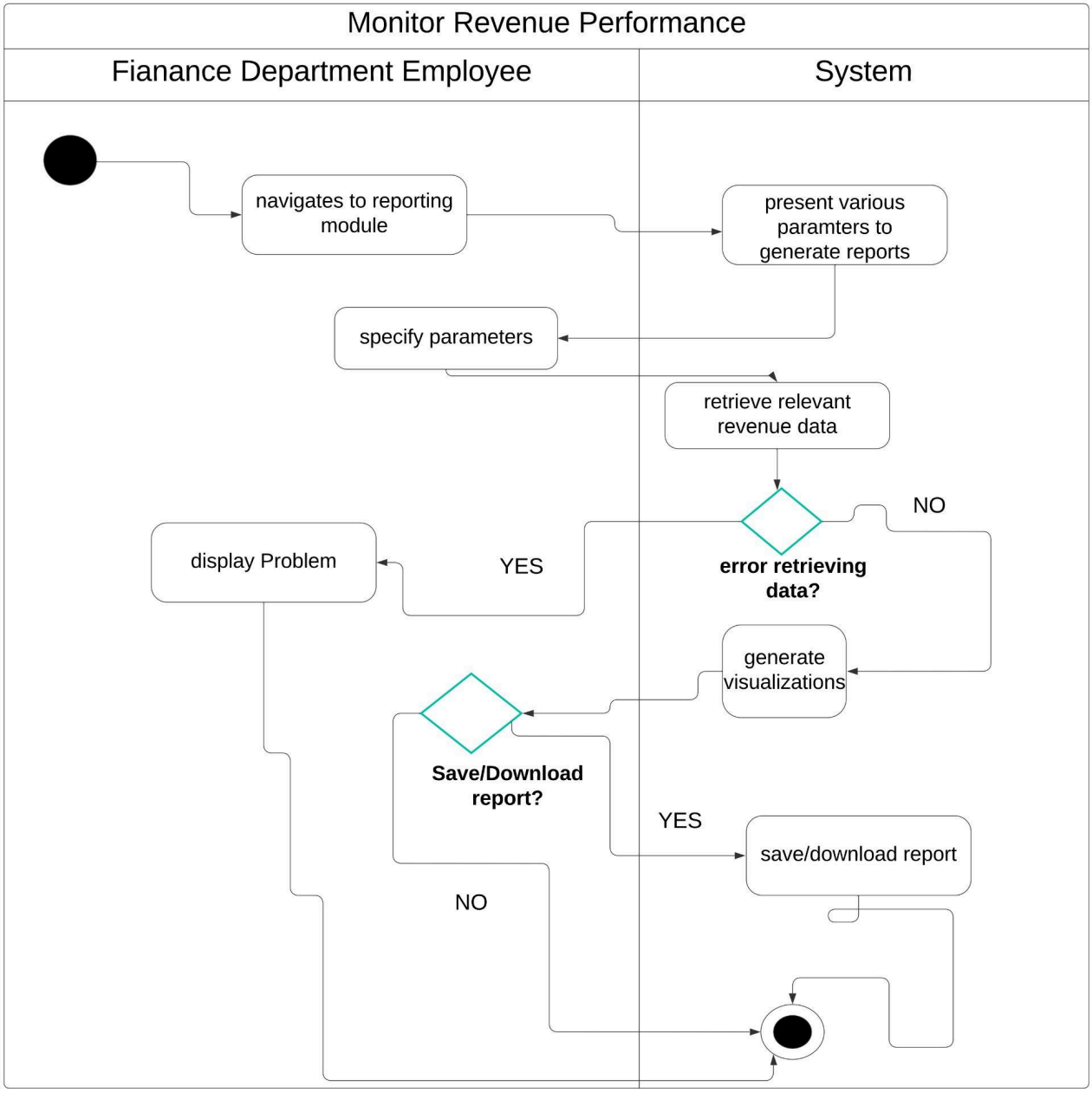
Cancel Flight Activity Diagram

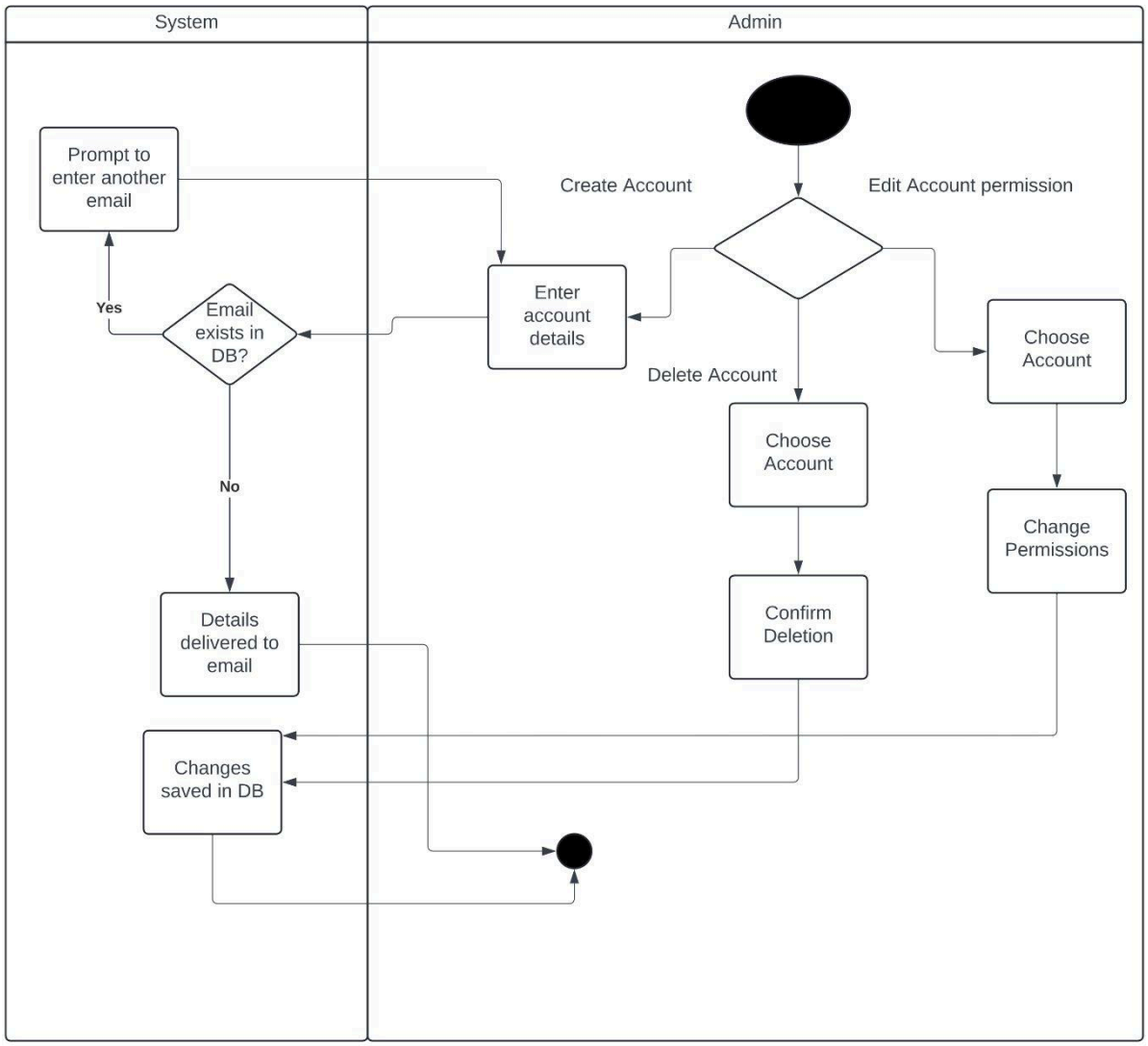


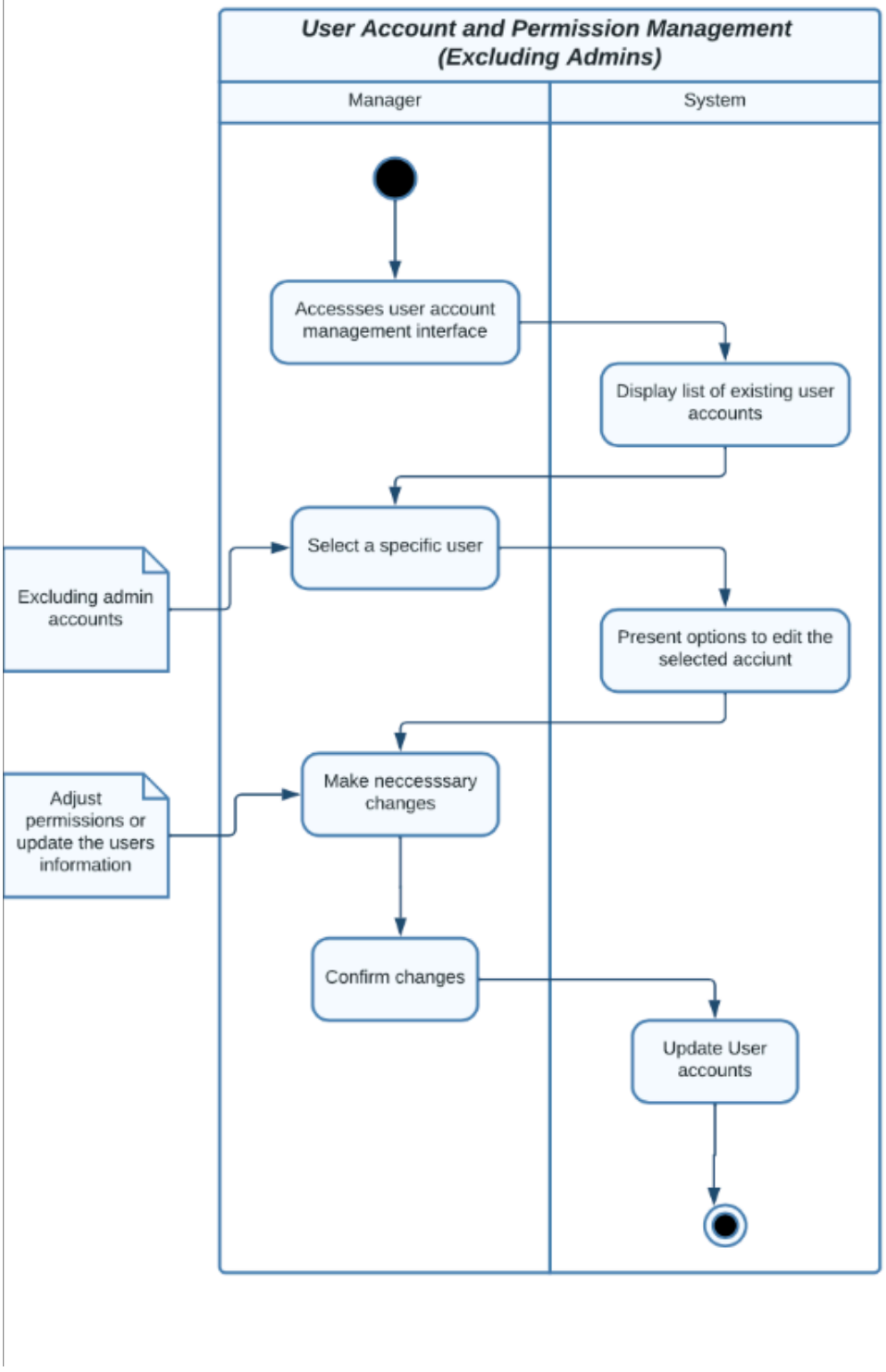

Book Flights Activity Diagram
Passenger
System
Finance Dep
Select Flight
View Flight Details
Input Passenger Passport details, Name, Departure.
Input Seat number, Flight Preferences, Meal plan
Initiate Payment
Validate Payment
Payment valid?
Yes
No
Flight Book Confirmation
System generates ticket
Email Confirmation
Error Handling
Retry or contact support

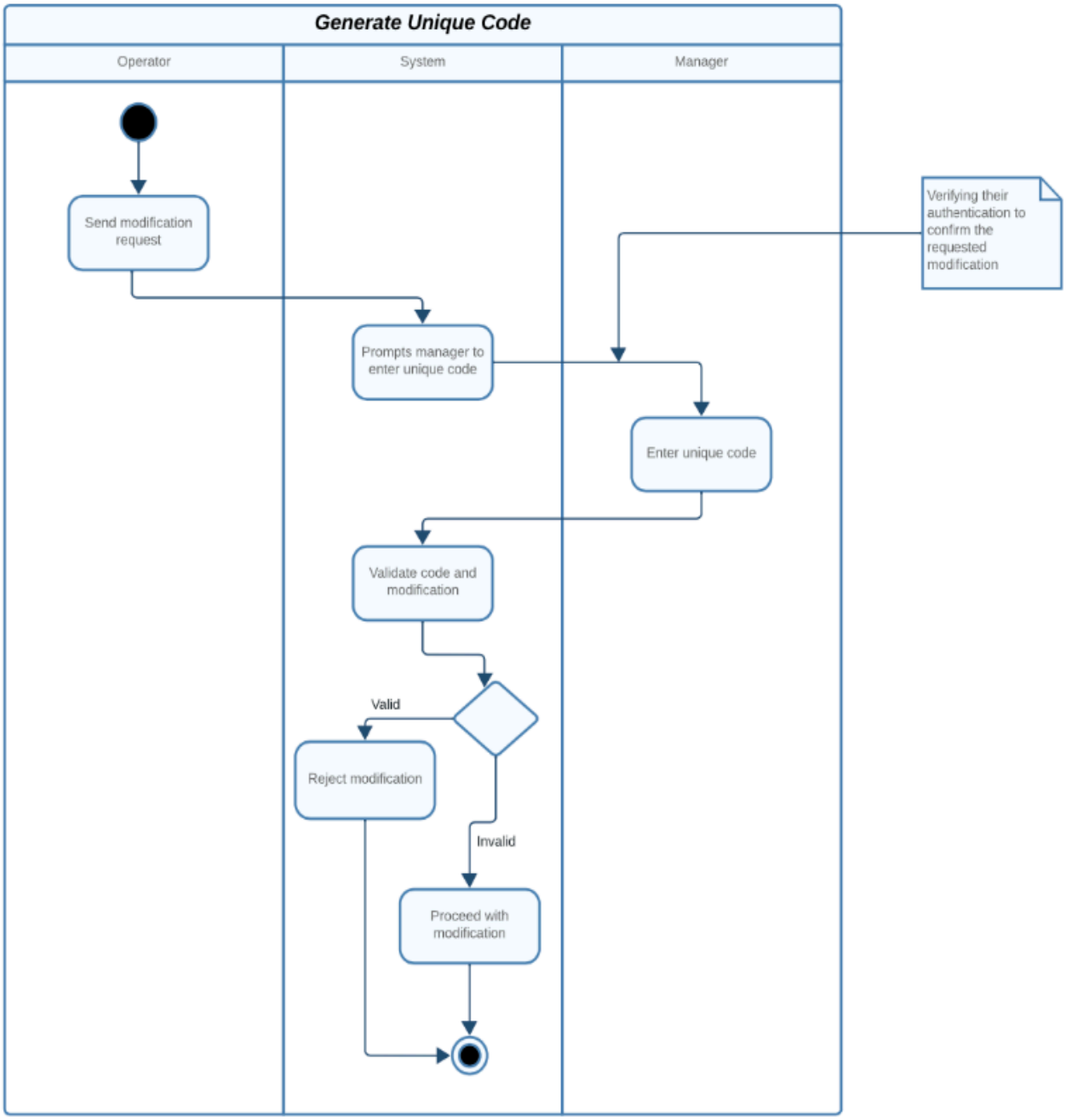

Managing booked flights
Passenger
System
requests to view bookings
retrieve passengers booking information
Display booked flights with relevant info
Select booked flight to view details
display details
NO
modify booking?
Choose modifying option
contact customer support
Customer support needed?
modify
confirm changes
display changes

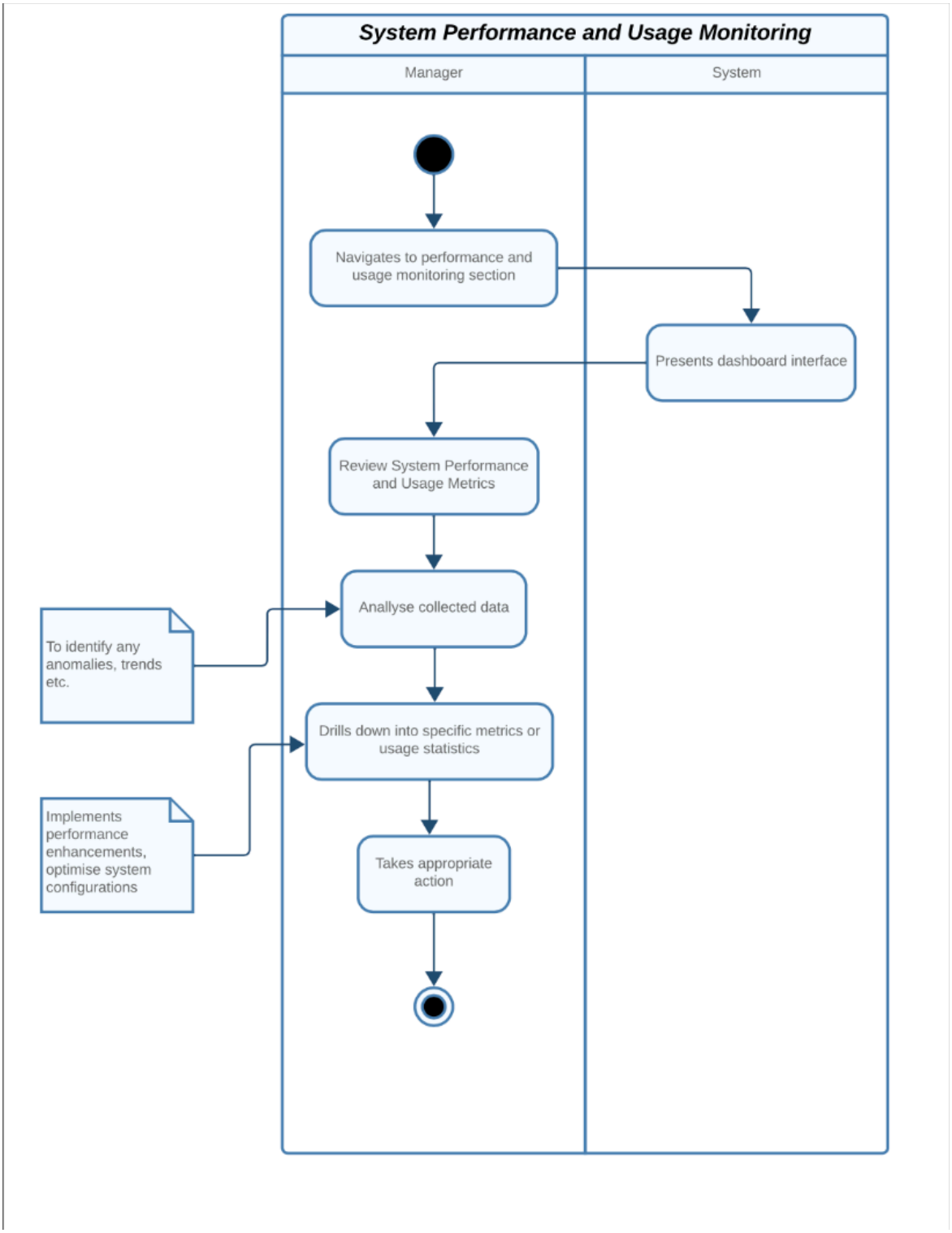

Flight Ticket Payment
Passenger
System
present available payment methods
Satisfied with the methods?
YES
NO
select preferred payment method
Need customer support?
YES
NO
provide payment details
successful authorization?
YES
NO
Display Problem
contact custommer support
Display confirmation

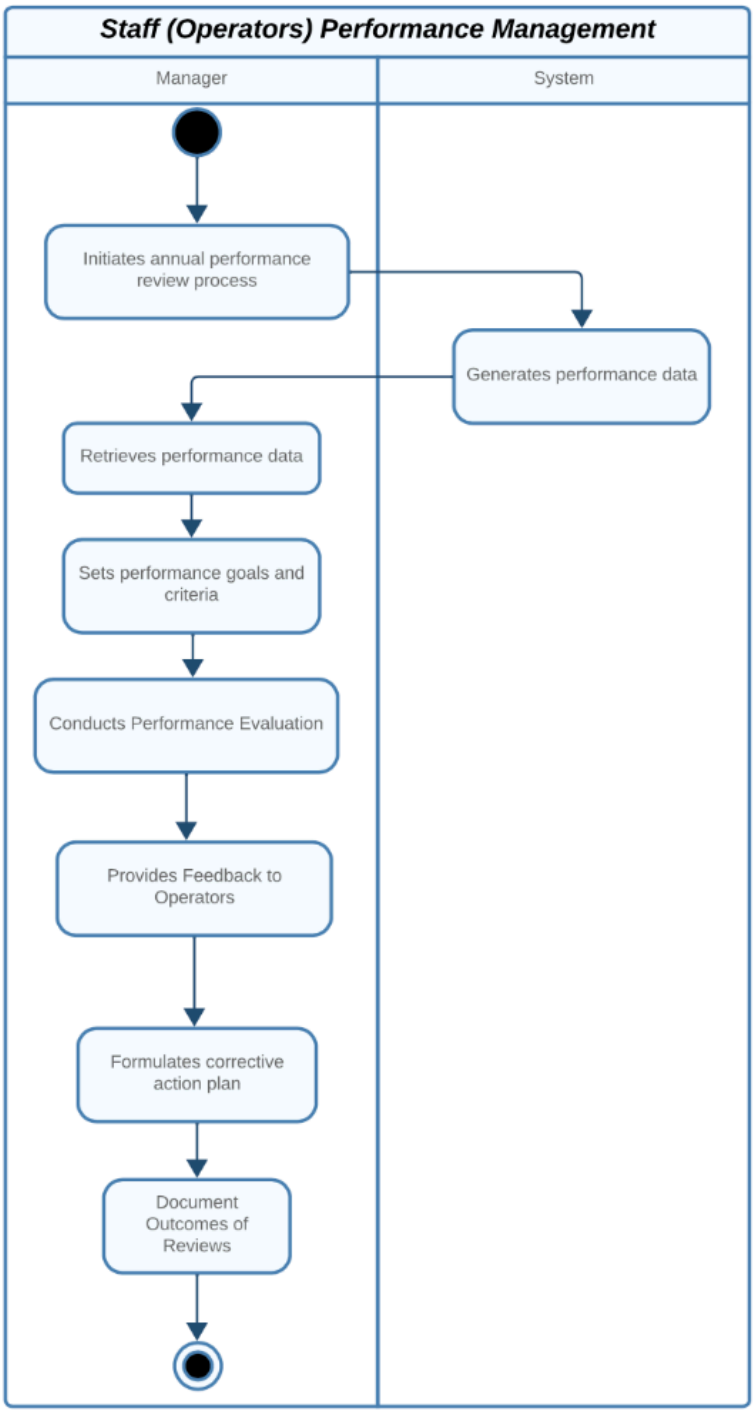

Monitor Revenue Performance
Fianance Department Employee
System
navigates to reporting module
present various paramters to generate reports
specify parameters
retrieve relevant revenue data
NO
display Problem
YES
error retrieving data?
generate visualizations
Save/Download report?
YES
save/download report
NO

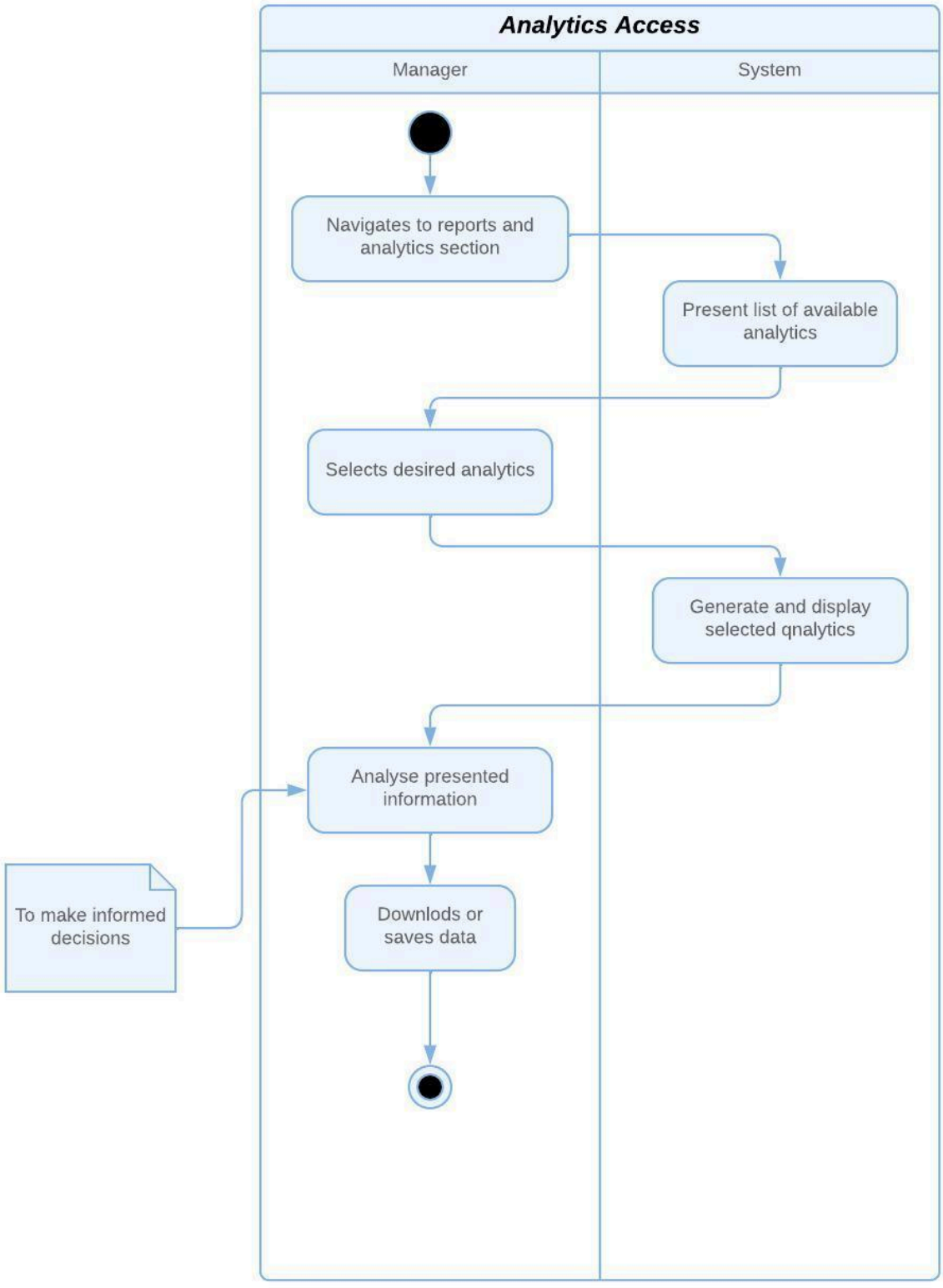

System
Admin
Prompt to enter another email
Create Account
Edit Account permission
Yes
Email exists in DB?
Enter account details
Choose Account
Delete Account
Choose Account
Change Permissions
No
Details delivered to email
Confirm Deletion
Changes saved in DB

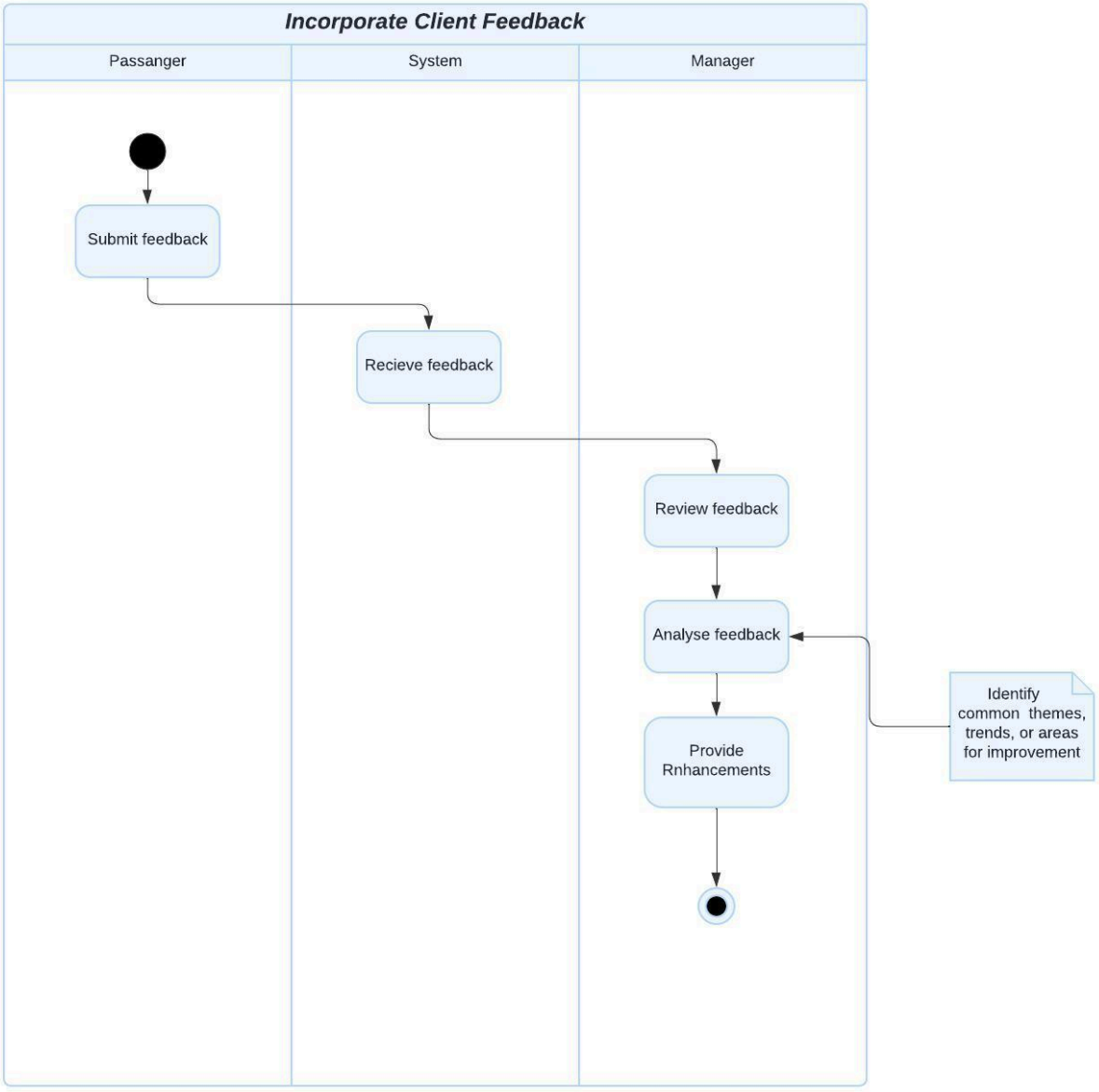

User Account and Permission Management
(Excluding Admins)
Manager
System
Accessses user account management interface
Display list of existing user accounts
Select a specific user
Excluding admin accounts
Present options to edit the selected acciunt
Make neccesssary changes
Adjust permissions or update the users information
Confirm changes
Update User accounts

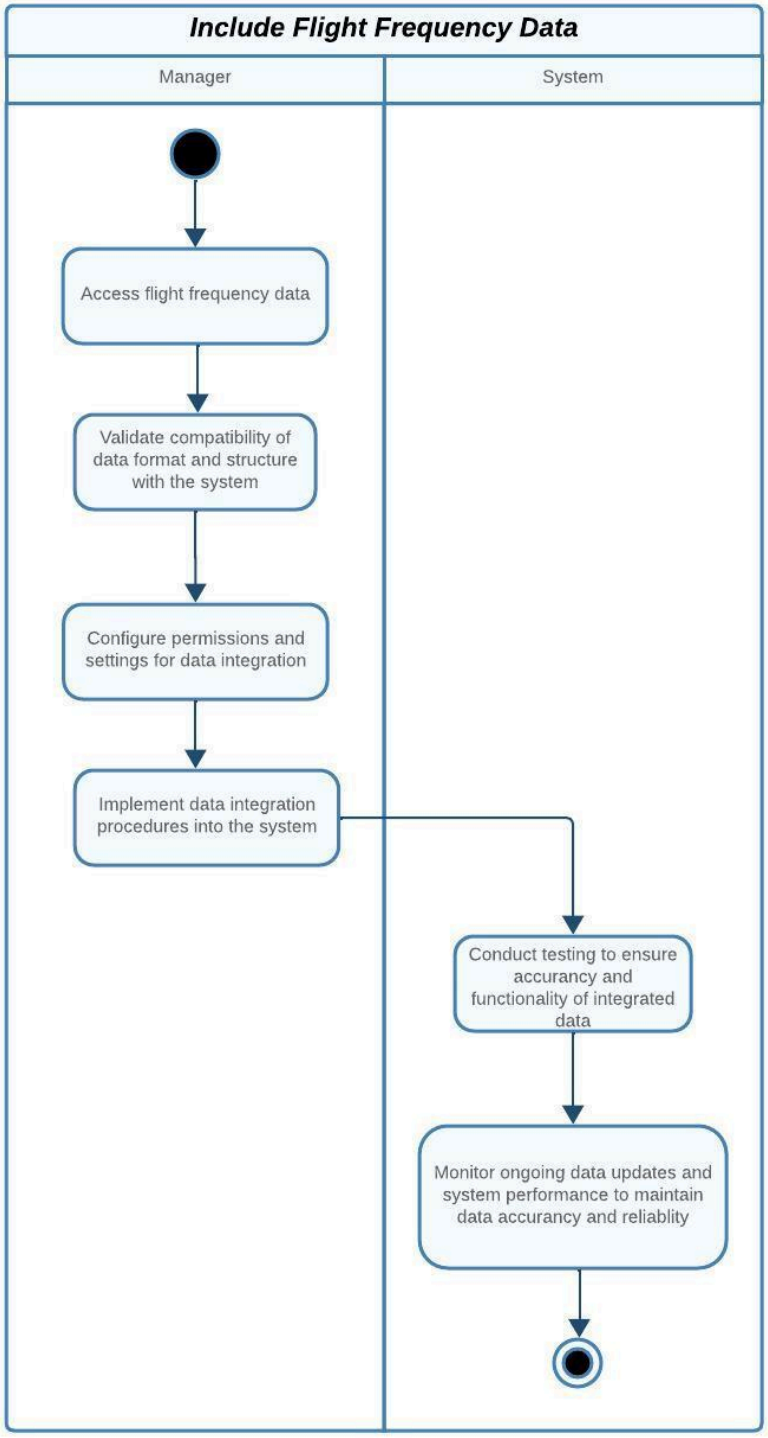

Generate Unique Code
Operator
System
Manager
Send modification request
Prompts manager to enter unique code
Verifying their authentication to confirm the requested modification
Enter unique code
Validate code and modification
Valid
Reject modification
Invalid
Proceed with modification

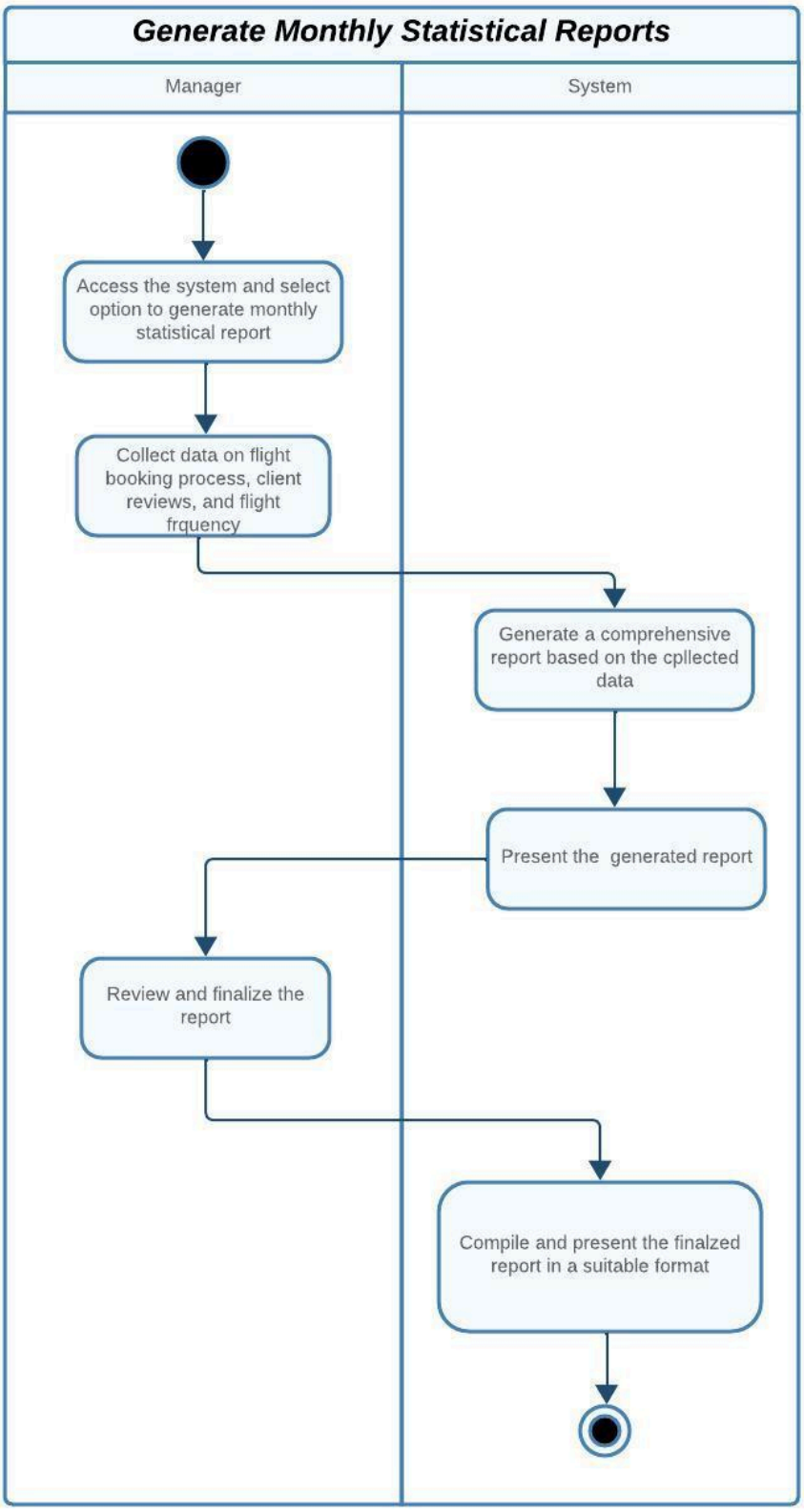

System Performance and Usage Monitoring
Manager
System
Navigates to performance and usage monitoring section
Presents dashboard interface
Review System Performance and Usage Metrics
Anallyse collected data
To identify any anomalies, trends etc.
Drills down into specific metrics or usage statistics
Implements performance enhancements, optimise system configurations
Takes appropriate action

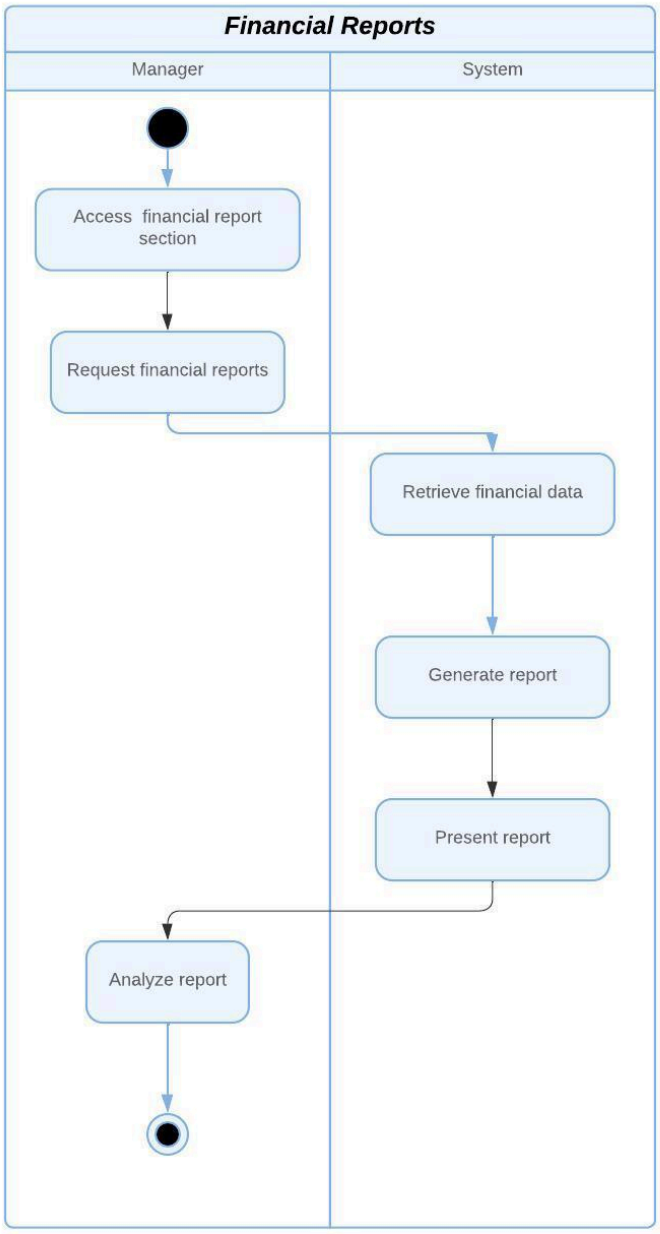

Staff (Operators) Performance Management
Manager
System
Initiates annual performance review process
Generates performance data
Retrieves performance data
Sets performance goals and criteria
Conducts Performance Evaluation
Provides Feedback to Operators
Formulates corrective action plan
Document Outcomes of Reviews


Analytics Access
Manager
System
Navigates to reports and analytics section
Present list of available analytics
Selects desired analytics
Generate and display selected qnalytics
Analyse presented information
Downlods or saves data
To make informed decisions

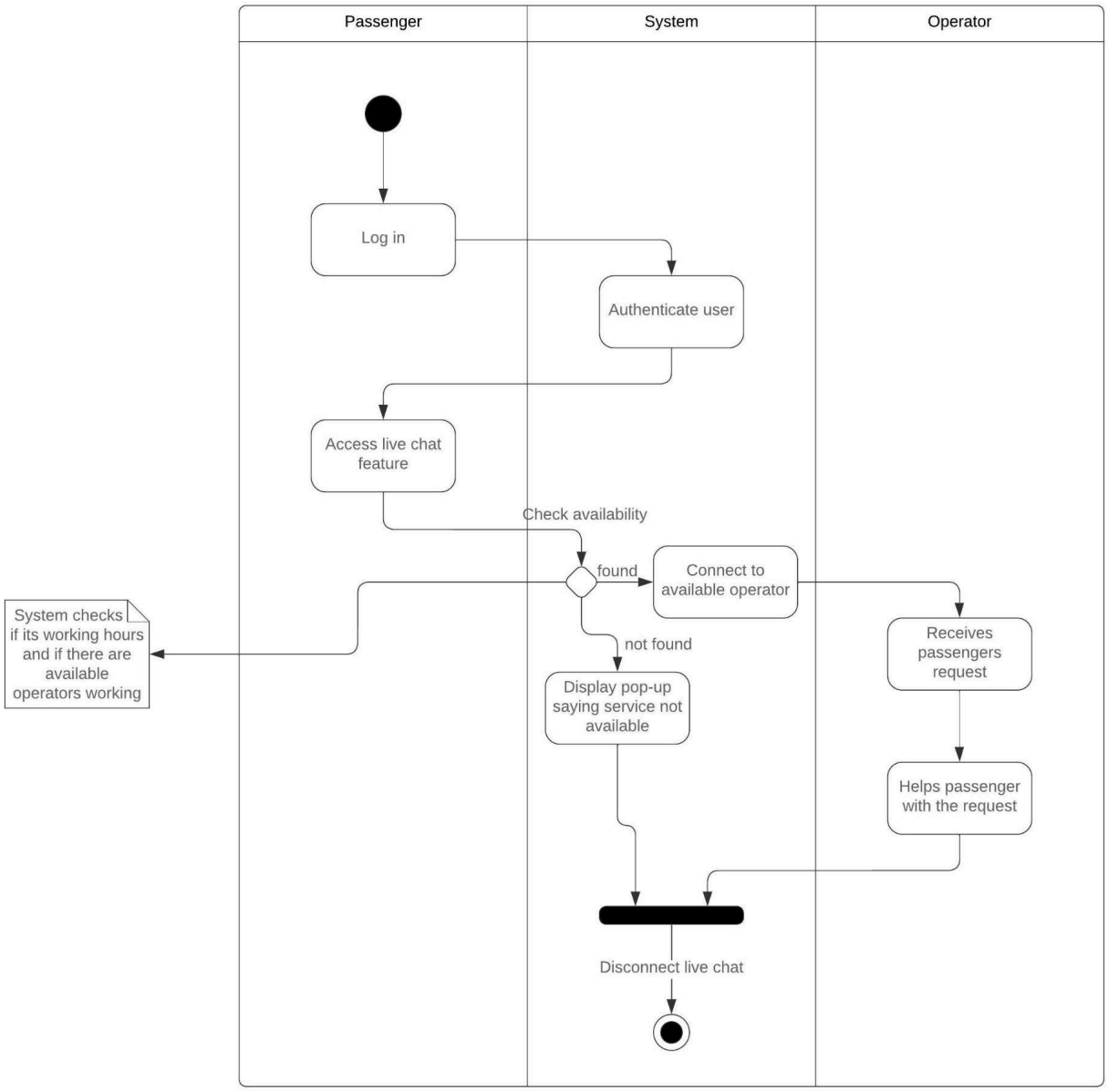

Incorporate Client Feedback
Passanger
System
Manager
Submit feedback
Recieve feedback
Review feedback
Analyse feedback
Provide Rnhancements
Identify common themes, trends, or areas for improvement


Include Flight Frequency Data
Manager
System
Access flight frequency data
Validate compatibility of data format and structure with the system
Configure permissions and settings for data integration
Implement data integration procedures into the system
Conduct testing to ensure accurancy and functionality of integrated data
Monitor ongoing data updates and system performance to maintain data accurancy and reliablity

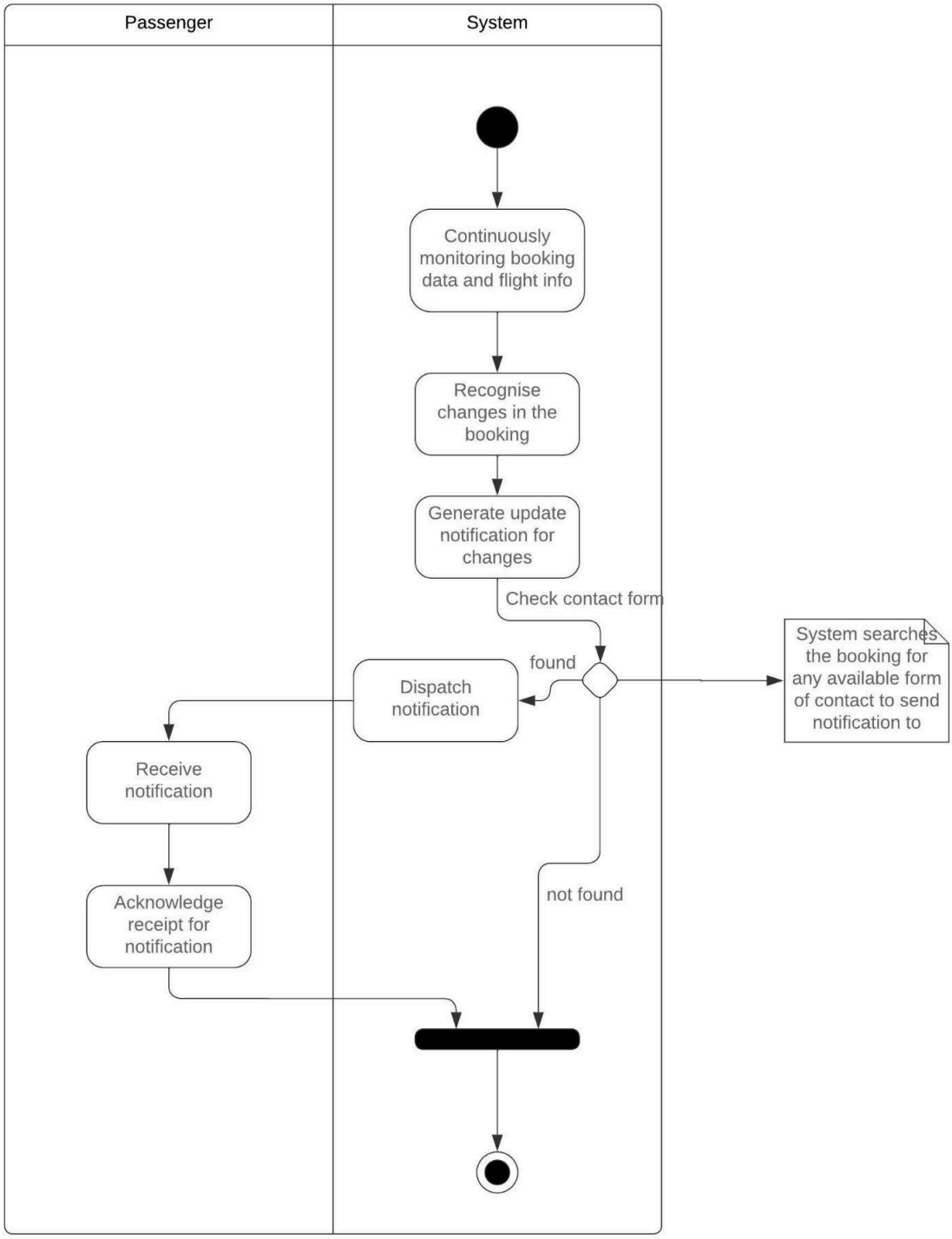

Generate Monthly Statistical Reports
Manager
System
Access the system and select option to generate monthly statistical report
Collect data on flight booking process, client reviews, and flight frquency
Generate a comprehensive report based on the cpllected data
Present the generated report
Review and finalize the report
Compile and present the finalzed report in a suitable format

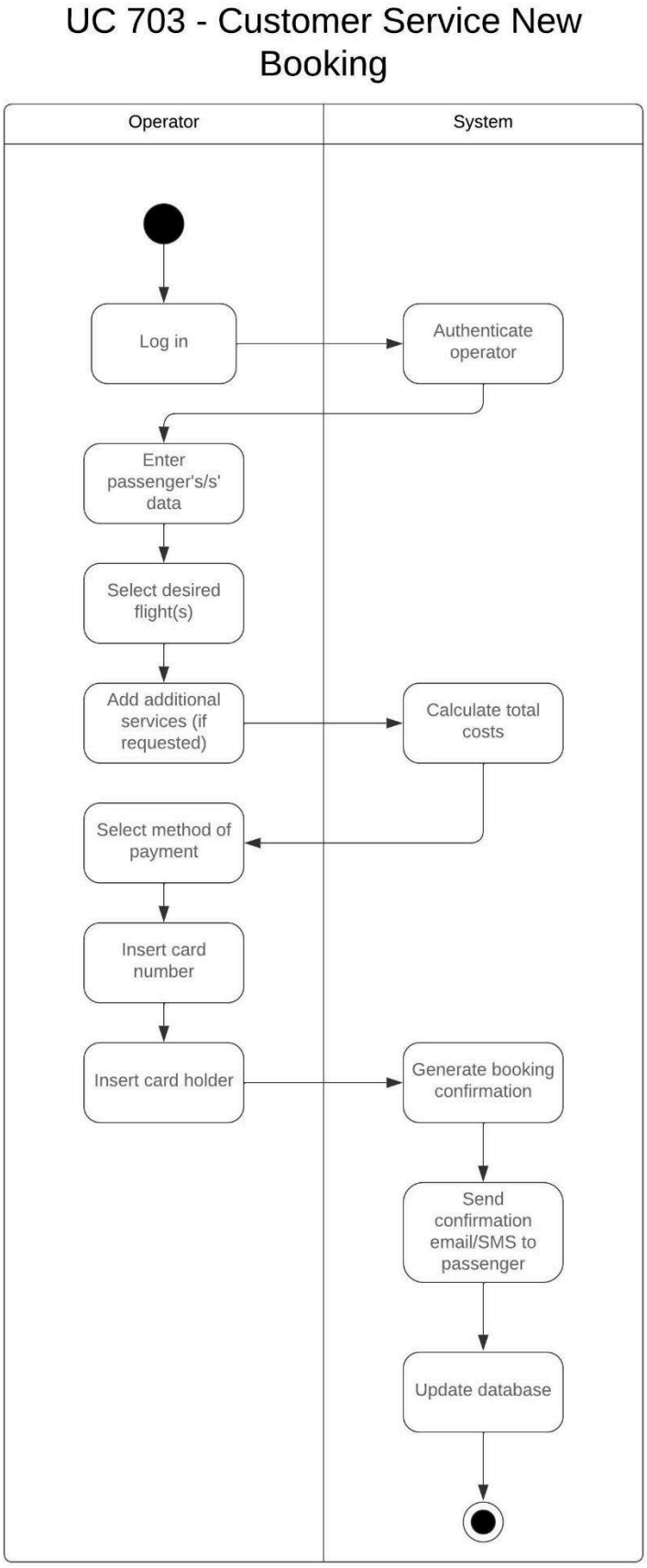

Financial Reports
Manager
System
Access financial report section
Request financial reports
Retrieve financial data
Generate report
Present report
Analyze report

UC 701 - Live Chat Communication

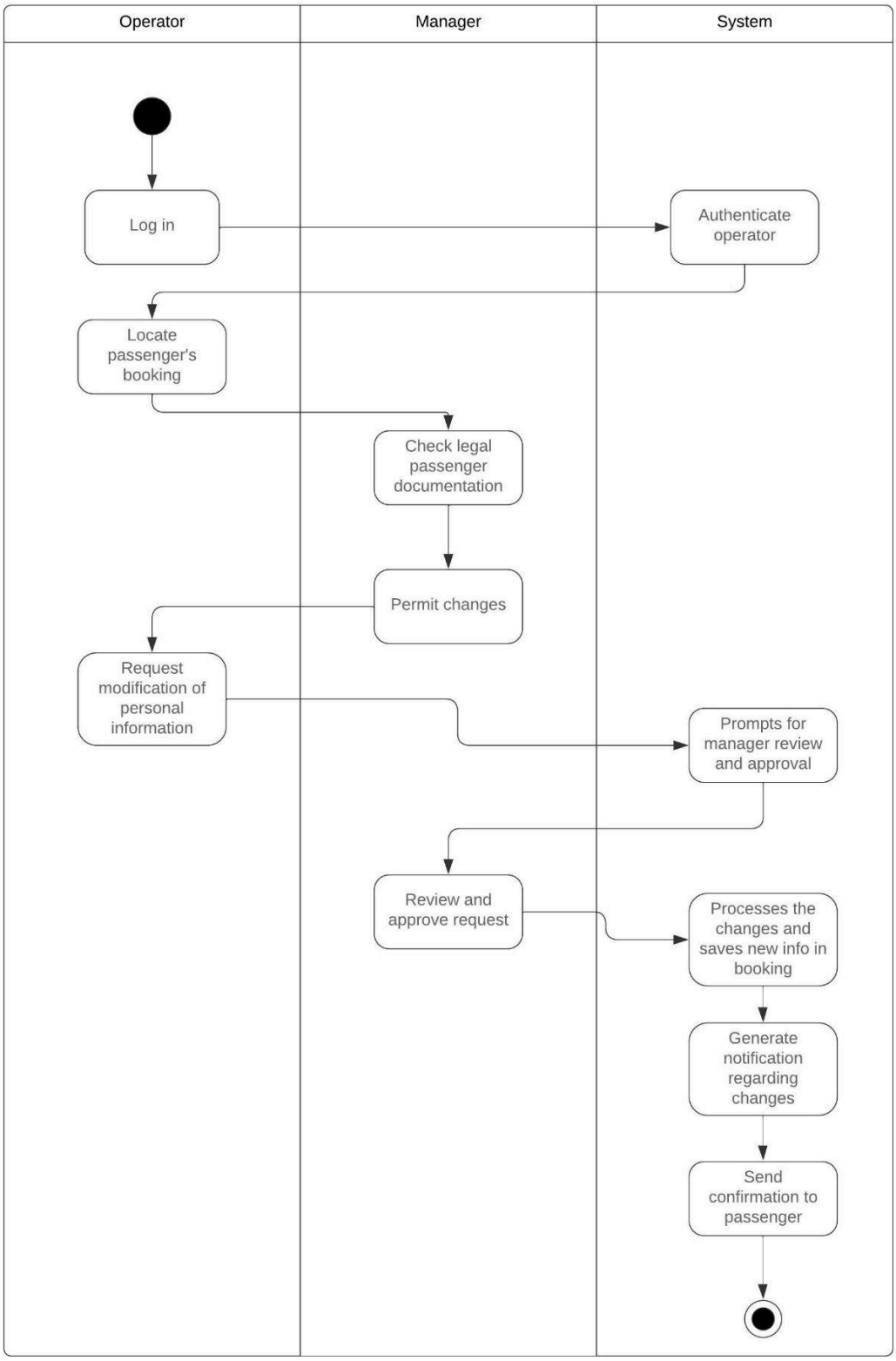


UC 702 - Booking Update Notifications

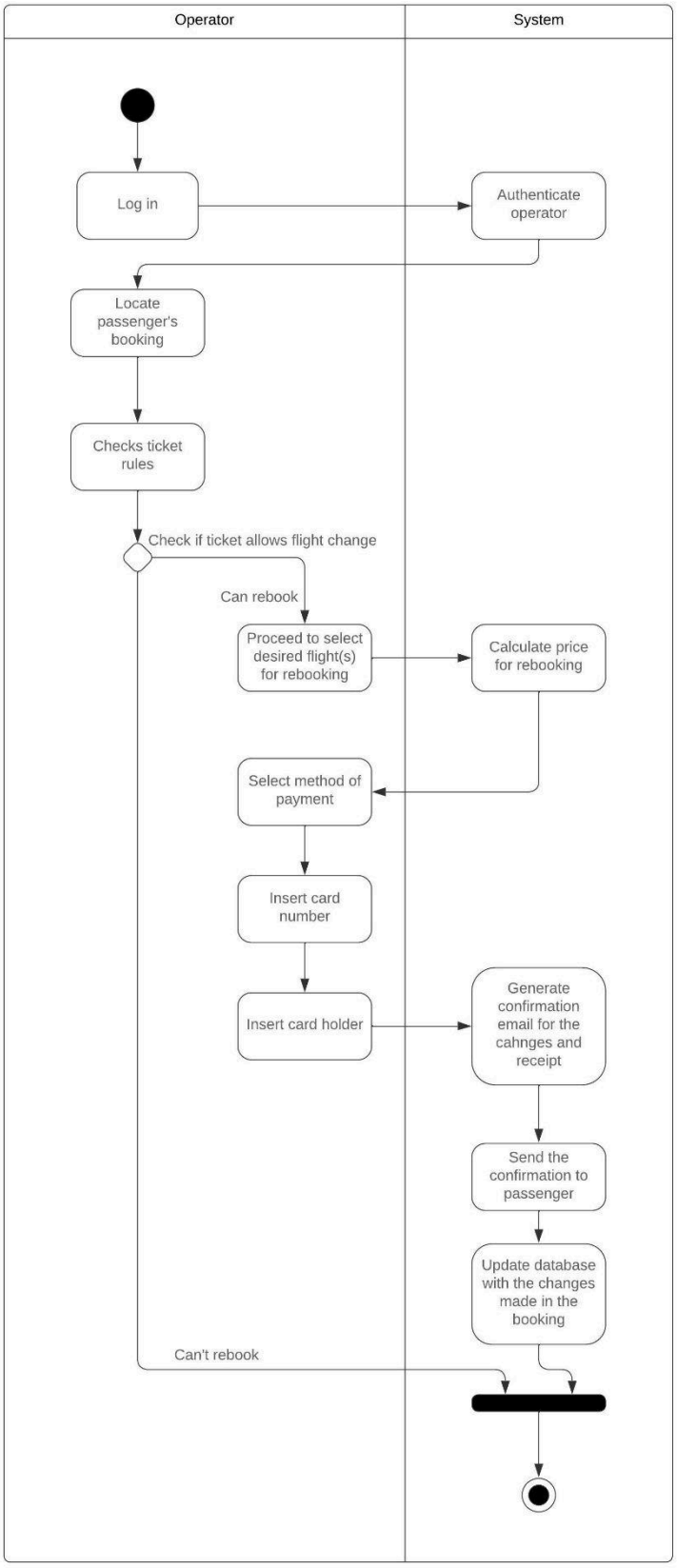



UC 703 - Customer Service New Booking
Operator
System
Log in
Authenticate operator
Enter passenger's/s' data
Select desired flight(s)
Add additional services (if requested)
Calculate total costs
Select method of payment
Insert card number
Insert card holder
Generate booking confirmation
Send confirmation email/SMS to passenger
Update database

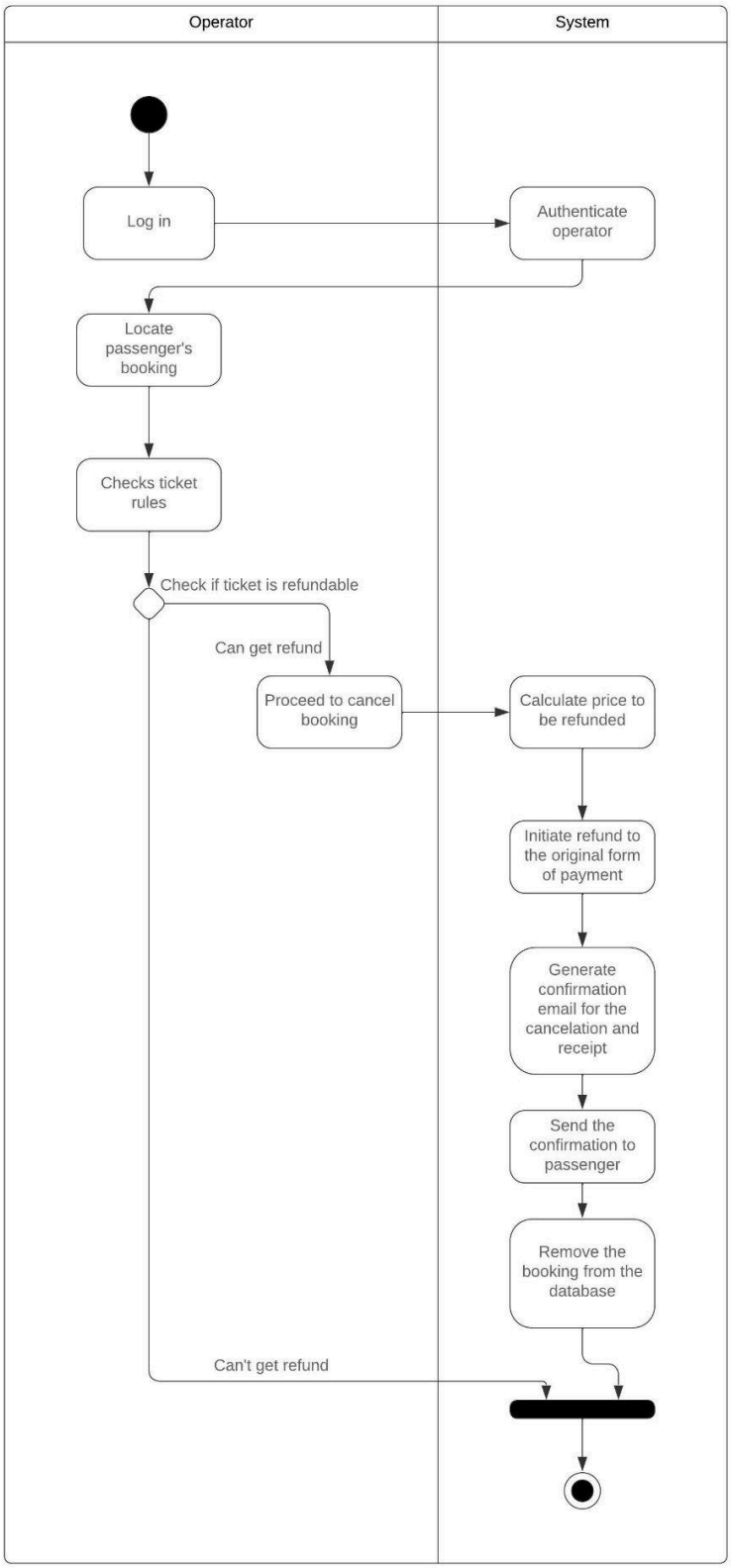
UC 704 - Personal Information Modification



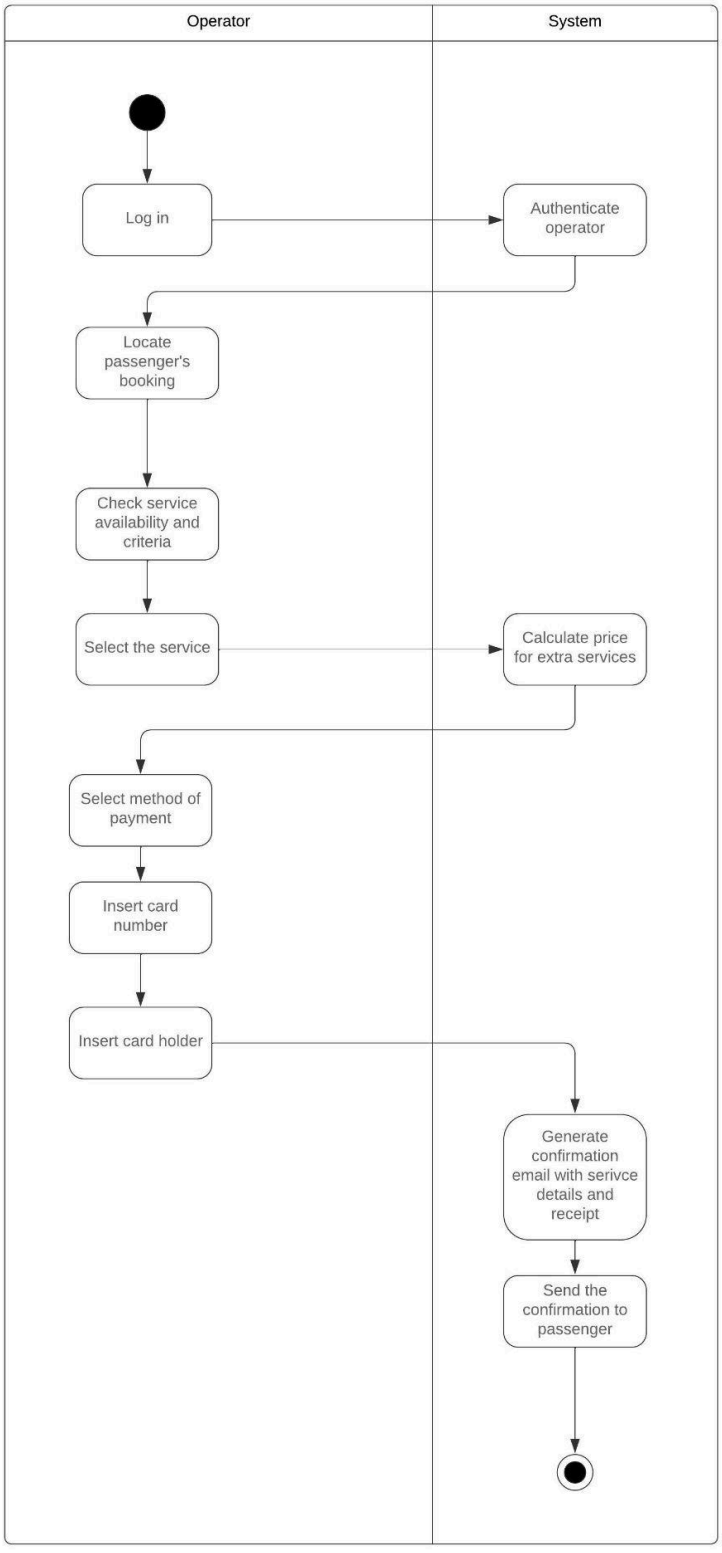
UC 705 - Rebooking



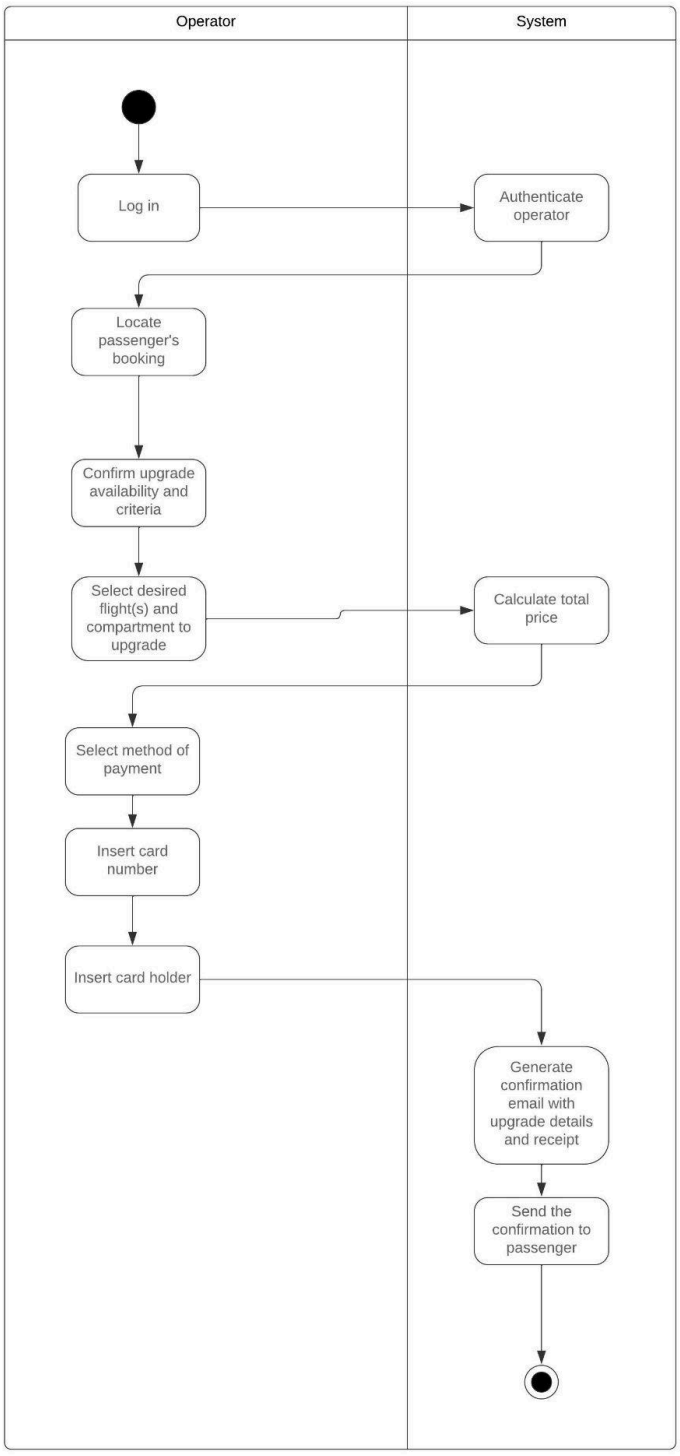
UC 706 - Cancellation



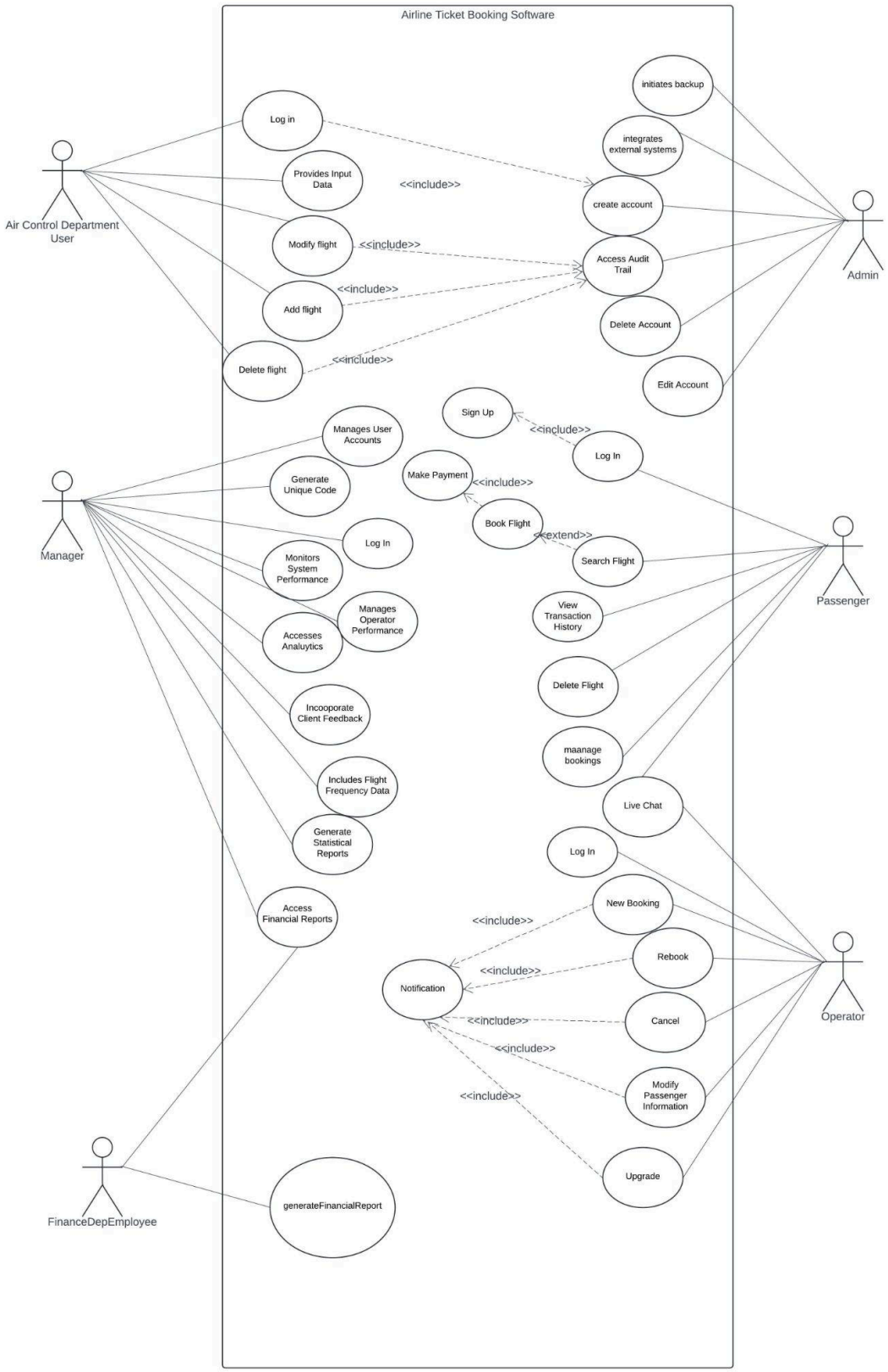
UC 707 - Additional Services



UC 708 - Flight Upgrade

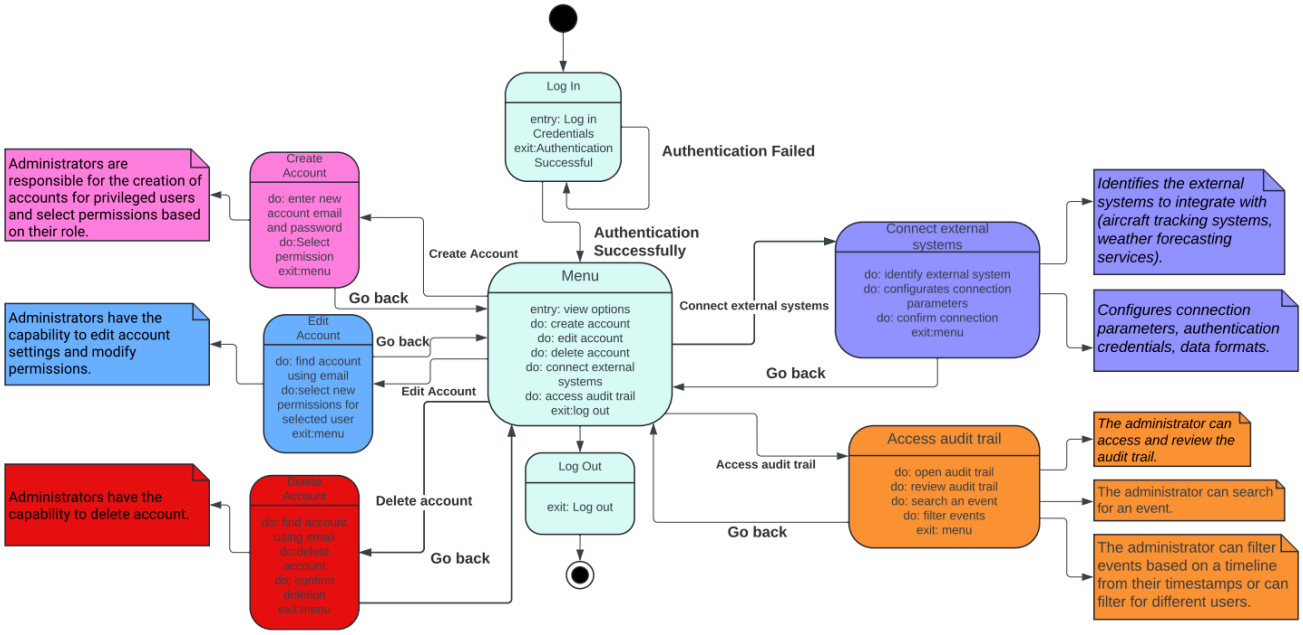


5.5. Use Case Diagram

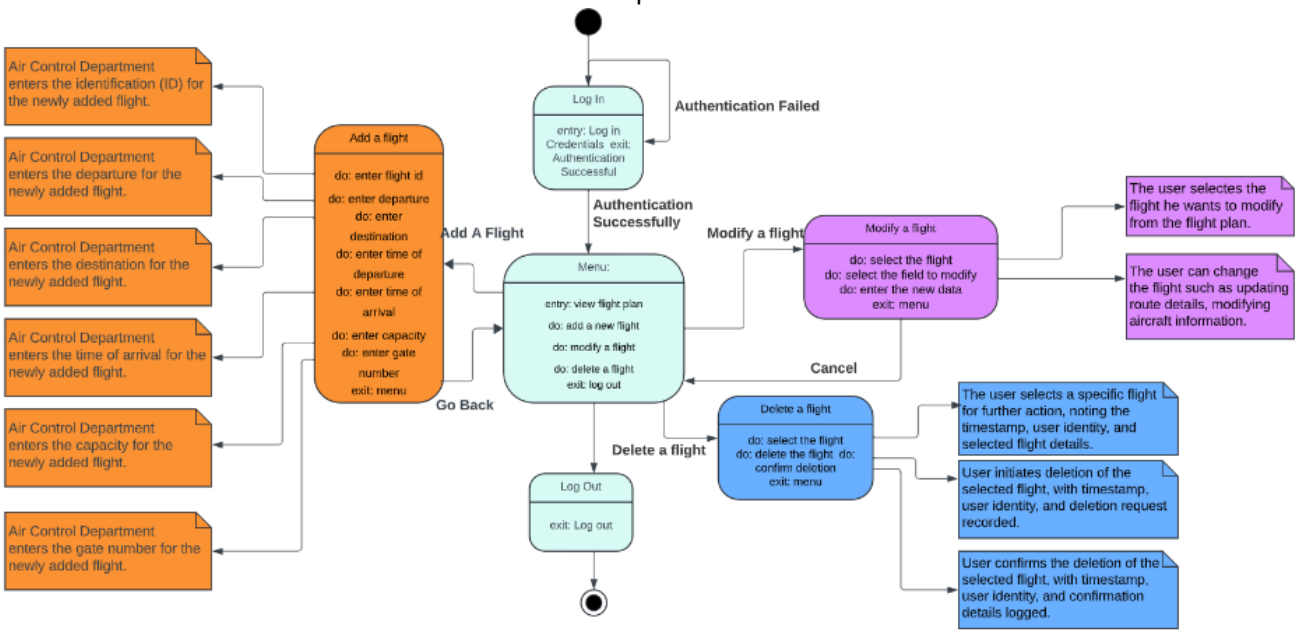


5.6. State Diagrams

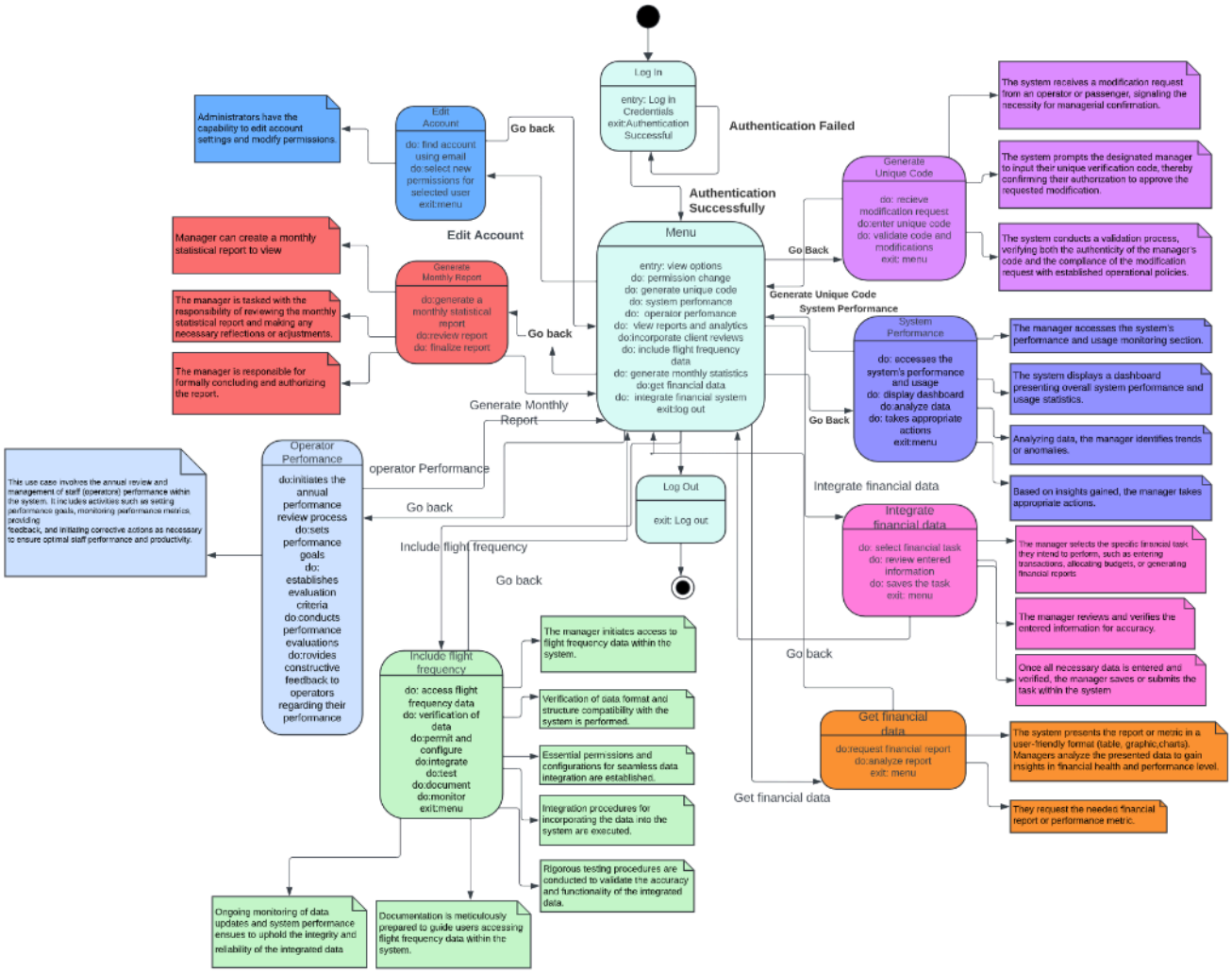
Administrator



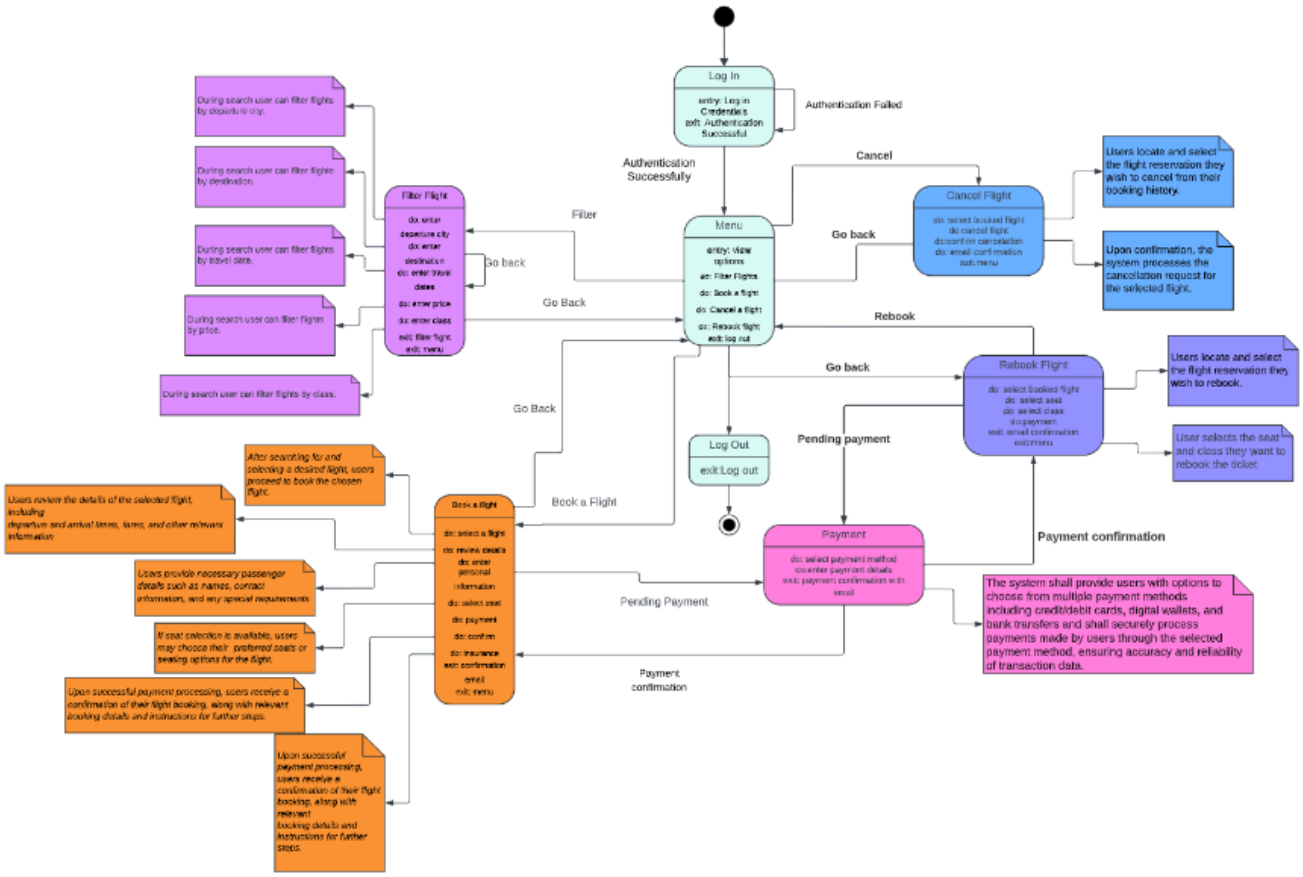
Air Control Department User



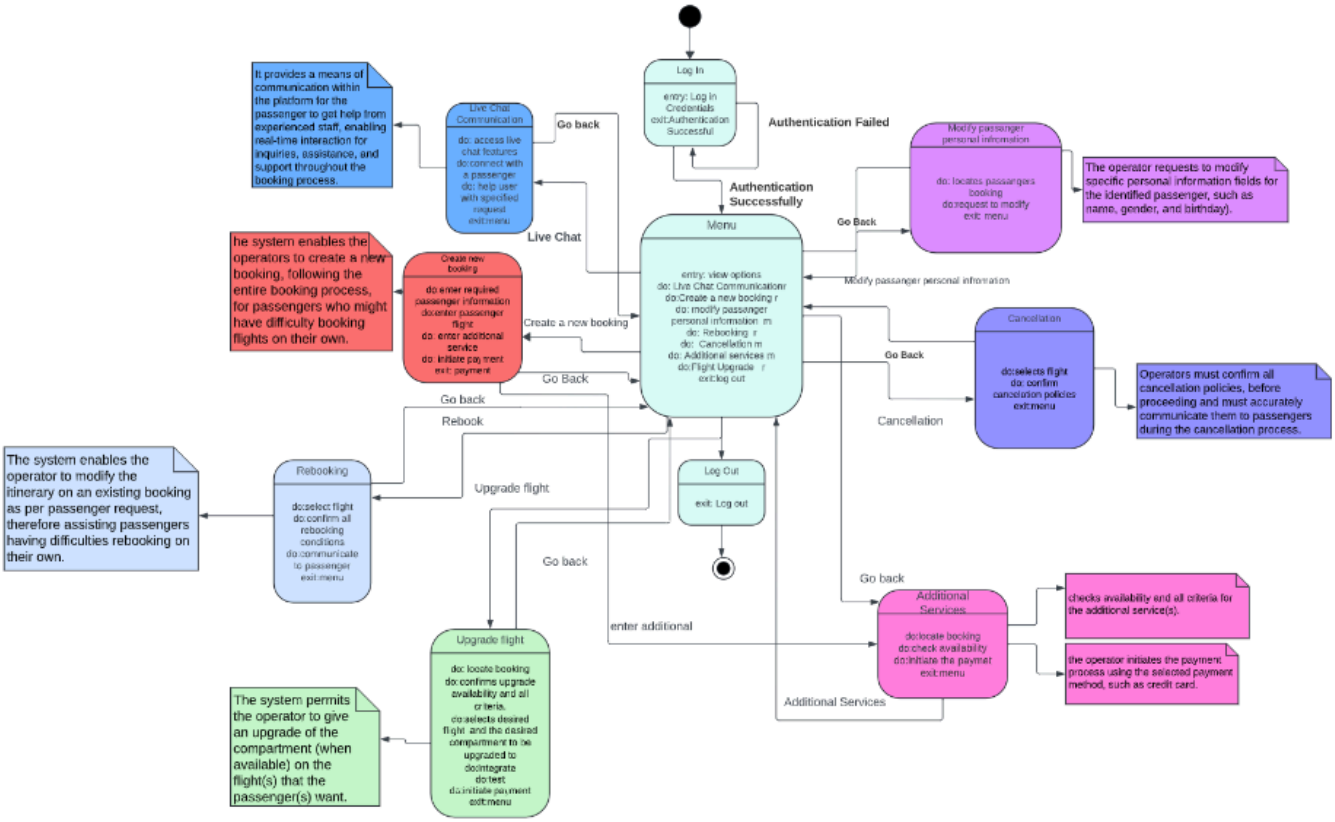
Manager


Log In
entry: Log in Credentials
exit:Authentication Successful
Authentication Failed
Authentication Successfully
Edit Account
do: find account using email
do:select new permissions for selected user
exit:menu
Go back
Administrators have the capability to edit account settings and modify permissions.
Edit Account
Menu
entry: view options
do: permission change
do: generate unique code
do: system performance
do: operator performance
do: view reports and analytics
do:incorporate client reviews
do: include flight frequency data
do: generate monthly statistics
do:get financial data
do: integrate financial system
exit:log out
Generate Unique Code
do: recieve modification request
do:enter unique code
do: validate code and modifications
exit: menu
Go Back
Generate Unique Code
The system receives a modification request from an operator or passenger, signaling the necessity for managerial confirmation.
The system prompts the designated manager to input their unique verification code, thereby confirming their authorization to approve the requested modification.
The system conducts a validation process, verifying both the authenticity of the manager's code and the compliance of the modification request with established operational policies.
Generate Monthly Report
do:generate a monthly statistical report
do:review report
do: finalize report
Manager can create a monthly statistical report to view
The manager is tasked with the responsibility of reviewing the monthly statistical report and making any necessary reflections or adjustments.
The manager is responsible for formally concluding and authorizing the report.
Go back
Generate Monthly Report
System Performance
do: accesses the system's performance and usage
do: display dashboard
do:analyze data
do: takes appropriate actions
exit:menu
Go Back
System Performance
The manager accesses the system's performance and usage monitoring section.
The system displays a dashboard presenting overall system performance and usage statistics.
Analyzing data, the manager identifies trends or anomalies.
Based on insights gained, the manager takes appropriate actions.
Operator Performance
do:initiates the annual performance review process
do:sets performance goals
do: establishes evaluation criteria
do:conducts performance evaluations
do:rovides constructive feedback to operators regarding their performance
operator Performance
Go back
This use case involves the annual review and management of staff (operators) performance within the system. It includes activities such as setting performance goals, monitoring performance metrics, providing feedback, and initiating corrective actions as necessary to ensure optimal staff performance and productivity.
Log Out
exit: Log out
Integrate financial data
do: select financial task
do: review entered information
do: saves the task
exit: menu
Integrate financial data
The manager selects the specific financial task they intend to perform, such as entering transactions, allocating budgets, or generating financial reports
The manager reviews and verifies the entered information for accuracy.
Once all necessary data is entered and verified, the manager saves or submits the task within the system
Go back
Include flight frequency
do: access flight frequency data
do: verification of data
do:permit and configure
do:integrate
do:test
do:document
do:monitor
exit:menu
Include flight frequency
Go back
The manager initiates access to flight frequency data within the system.
Verification of data format and structure compatibility with the system is performed.
Essential permissions and configurations for seamless data integration are established.
Integration procedures for incorporating the data into the system are executed.
Rigorous testing procedures are conducted to validate the accuracy and functionality of the integrated data.
Ongoing monitoring of data updates and system performance ensues to uphold the integrity and reliability of the integrated data
Documentation is meticulously prepared to guide users accessing flight frequency data within the system.
Get financial data
do:request financial report
do:analyze report
exit: menu
Get financial data
The system presents the report or metric in a user-friendly format (table, graphic,charts). Managers analyze the presented data to gain insights in financial health and performance level.
They request the needed financial report or performance metric.

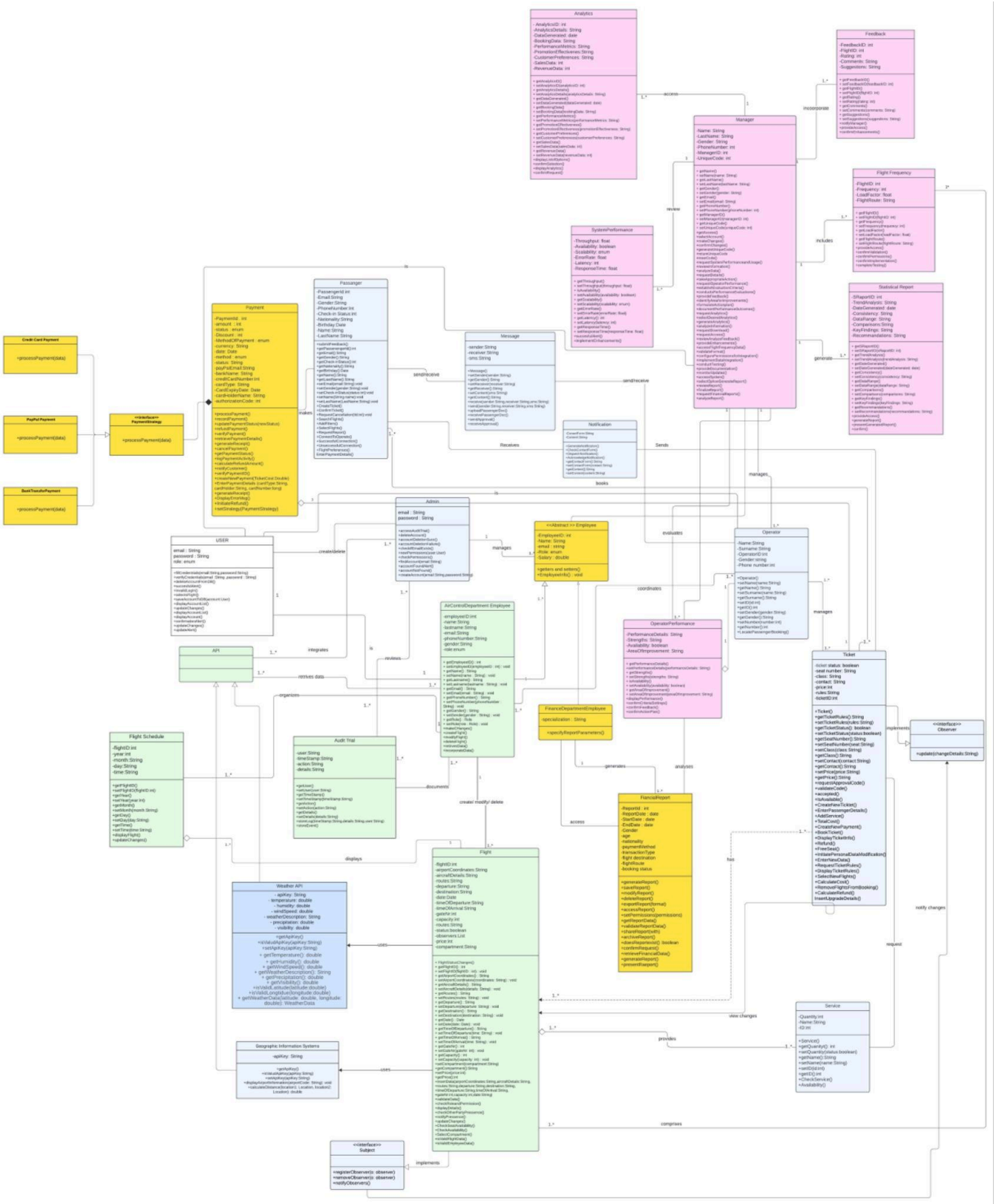
Passenger


Log In
entry: Log in Credentials
exit: Authentication Successful
Authentication Failed
Authentication Successfully
Cancel
Users locate and select the flight reservation they wish to cancel from their booking history.
Cancel Flight
Upon confirmation, the system processes the cancellation request for the selected flight.
Go back
Filter
Filter Flight
Go back
Menu
entry: view options
Go Back
Rebook
Rebook Flight
Users locate and select the flight reservation they wish to rebook.
User selects the seat and class they want to rebook the ticket
Go back
Go Back
Log Out
exit:Log out
Pending payment
Book a Flight
Payment
Payment confirmation
The system shall provide users with options to choose from multiple payment methods including credit/debit cards, digital wallets, and bank transfers and shall securely process payments made by users through the selected payment method, ensuring accuracy and reliability of transaction data.
Pending Payment
Payment confirmation
During search user can filter flights by departure city.
During search user can filter flights by destination.
During search user can filter flights by travel date.
During search user can filter flights by price.
During search user can filter flights by class.
After searching for and selecting a desired flight, users proceed to book the chosen flight.
Users review the details of the selected flight, including departure and arrival times, fares, and other relevant information
Users provide necessary passenger details such as names, contact information, and any special requirements
If seat selection is available, users may choose their preferred seats or seating options for the flight.
Upon successful payment processing, users receive a confirmation of their flight booking, along with relevant booking details and instructions for further steps.
Upon successful payment processing, users receive a confirmation of their flight booking, along with relevant booking details and instructions for further steps.

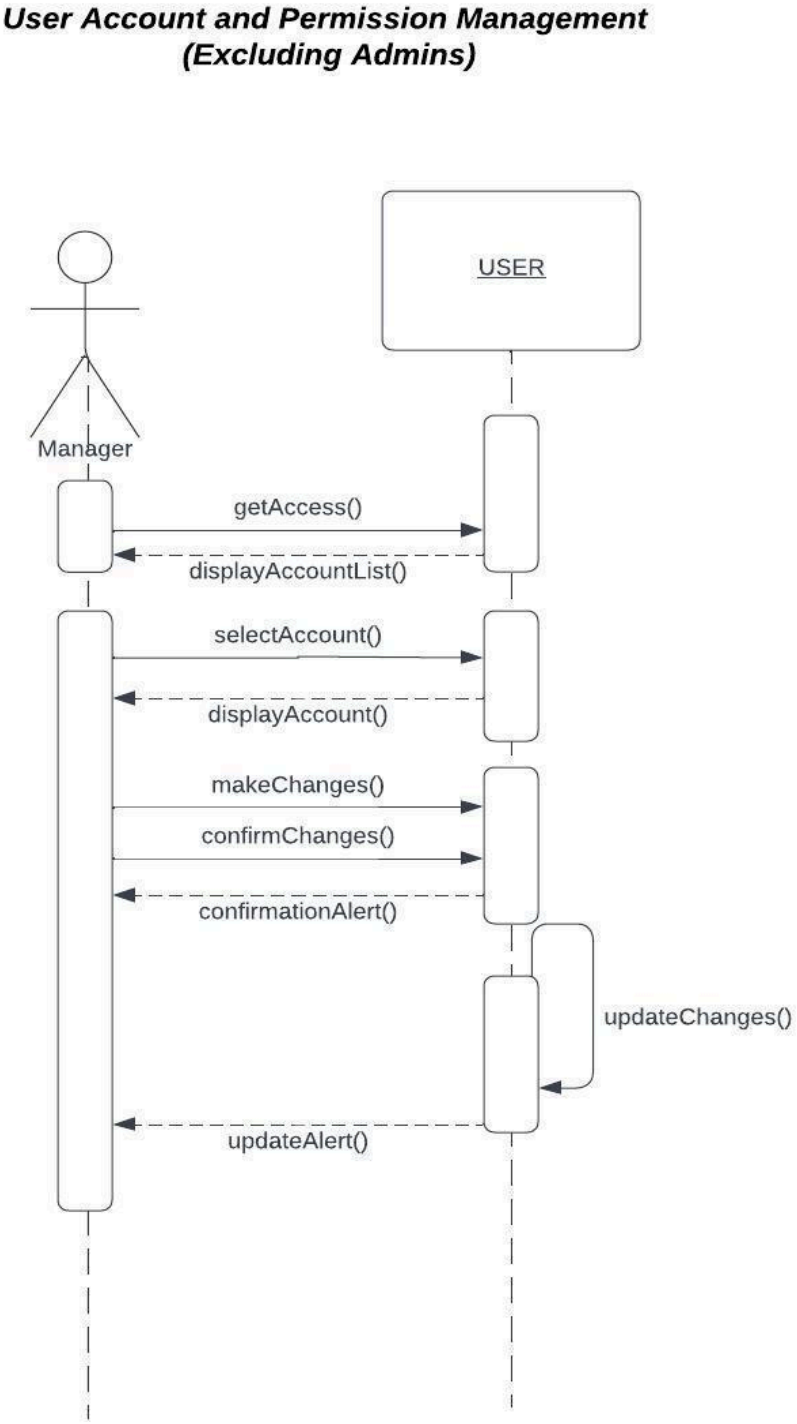
Operator


Log In
entry: Log In Credentials
exit:Authentication Successful
Authentication Failed
Authentication Successfully
Live Chat Communication
do: access live chat features
do:connect with a passenger
do: help user with specified request
exit:menu
Go back
Live Chat
It provides a means of communication within the platform for the passenger to get help from experienced staff, enabling real-time interaction for inquiries, assistance, and support throughout the booking process.
Menu
entry: view options
do: Live Chat Communicationr
do:Create a new booking r
do: modify passenger personal information m
do: Rebooking r
do: Cancellation m
do: Additional services m
do:Flight Upgrade r
exit:log out
Modify passenger personal information
do: locates passengers booking
do:request to modify
exit: menu
Go Back
The operator requests to modify specific personal information fields for the identified passenger, such as name, gender, and birthday).
Modify passanger personal information
Create new booking
do:enter required passenger information
do:enter passenger flight
do: enter additional service
do: initiate payment
exit: payment
he system enables the operators to create a new booking, following the entire booking process, for passengers who might have difficulty booking flights on their own.
Create a new booking
Go Back
Cancellation
do:selects flight
do: confirm cancelation policies
exit:menu
Go Back
Cancellation
Operators must confirm all cancellation policies, before proceeding and must accurately communicate them to passengers during the cancellation process.
Go back
Rebook
Rebooking
do:select flight
do:confirm all rebooking conditions
do:communicate to passenger
exit:menu
The system enables the operator to modify the itinerary on an existing booking as per passenger request, therefore assisting passengers having difficulties rebooking on their own.
Upgrade flight
Log Out
exit: Log out
Go back
Upgrade flight
do: locate booking
do: confirms upgrade availability and all criteria.
do:selects desired flight and the desired compartment to be upgraded to
do:integrate
do:test
do:initiate payment
exit:menu
The system permits the operator to give an upgrade of the compartment (when available) on the flight(s) that the passenger(s) want.
enter additional
Go back
Additional Services
do:locate booking
do:check availability
do:initiate the paymet
exit:menu
Additional Services
checks availability and all criteria for the additional service(s).
the operator initiates the payment process using the selected payment method, such as credit card.

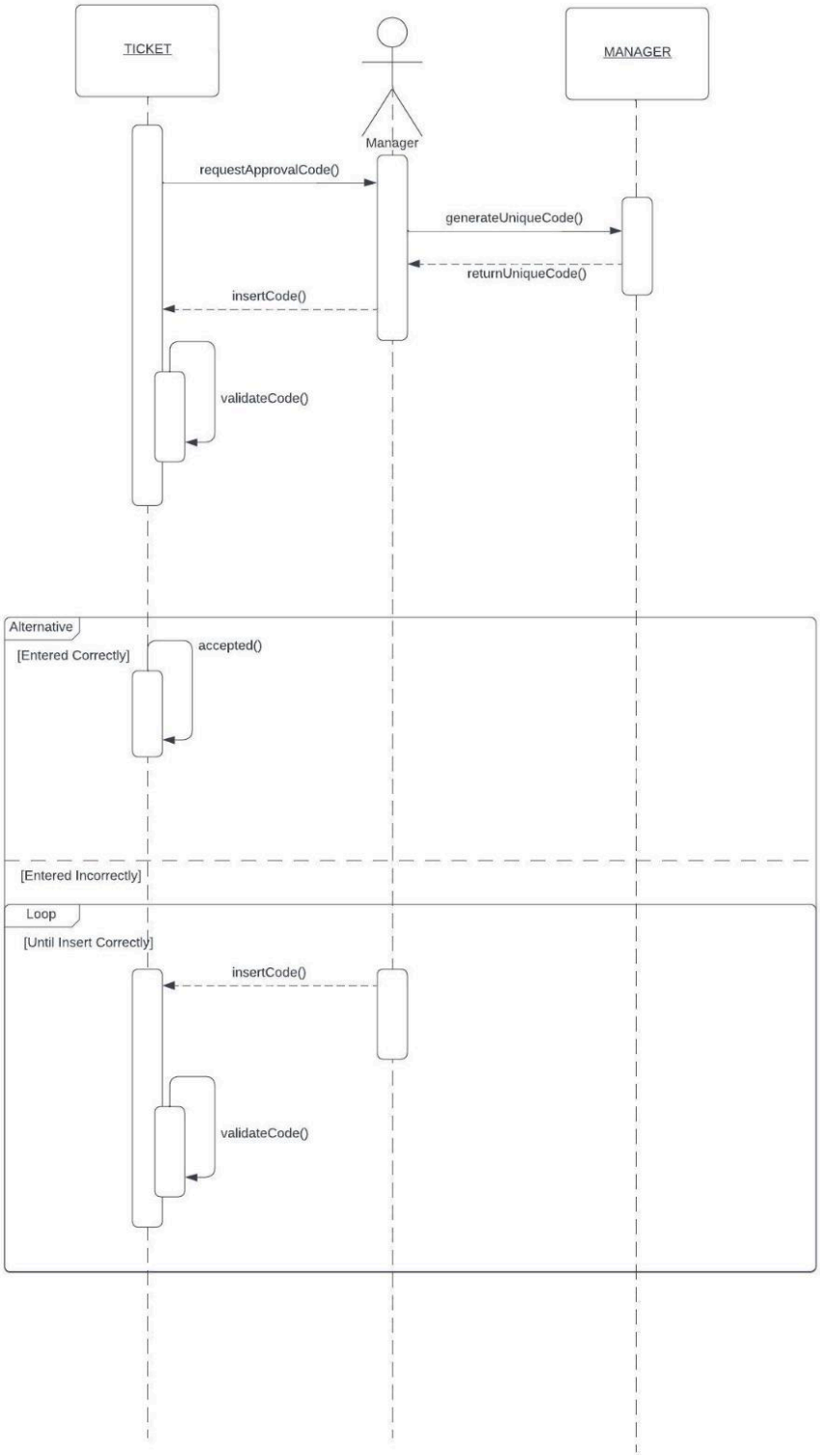
5.7. Class Diagram



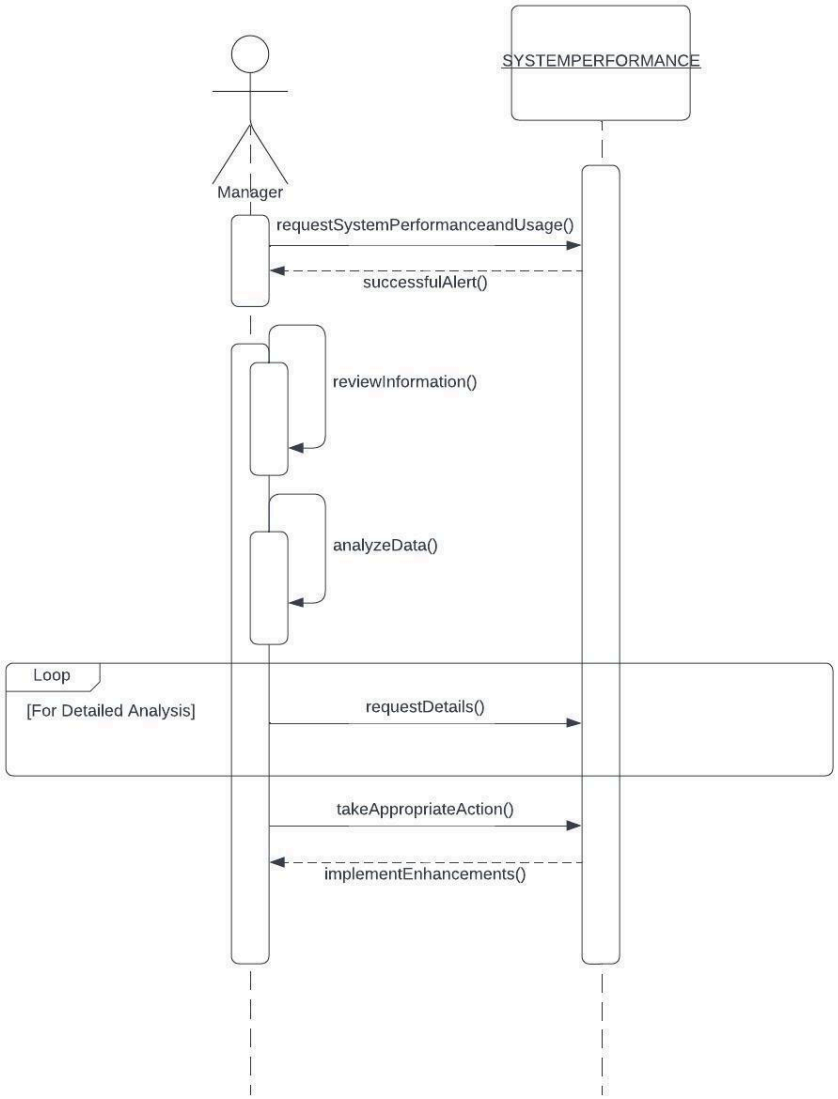
5.8. Sequence Diagram



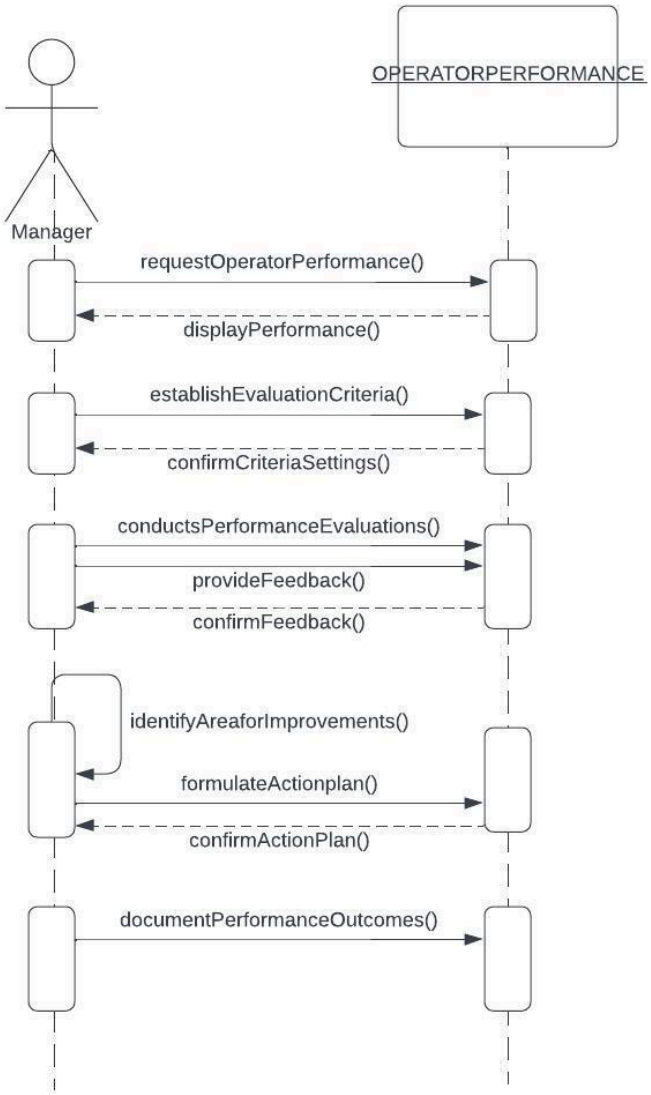
Generate Unique Code



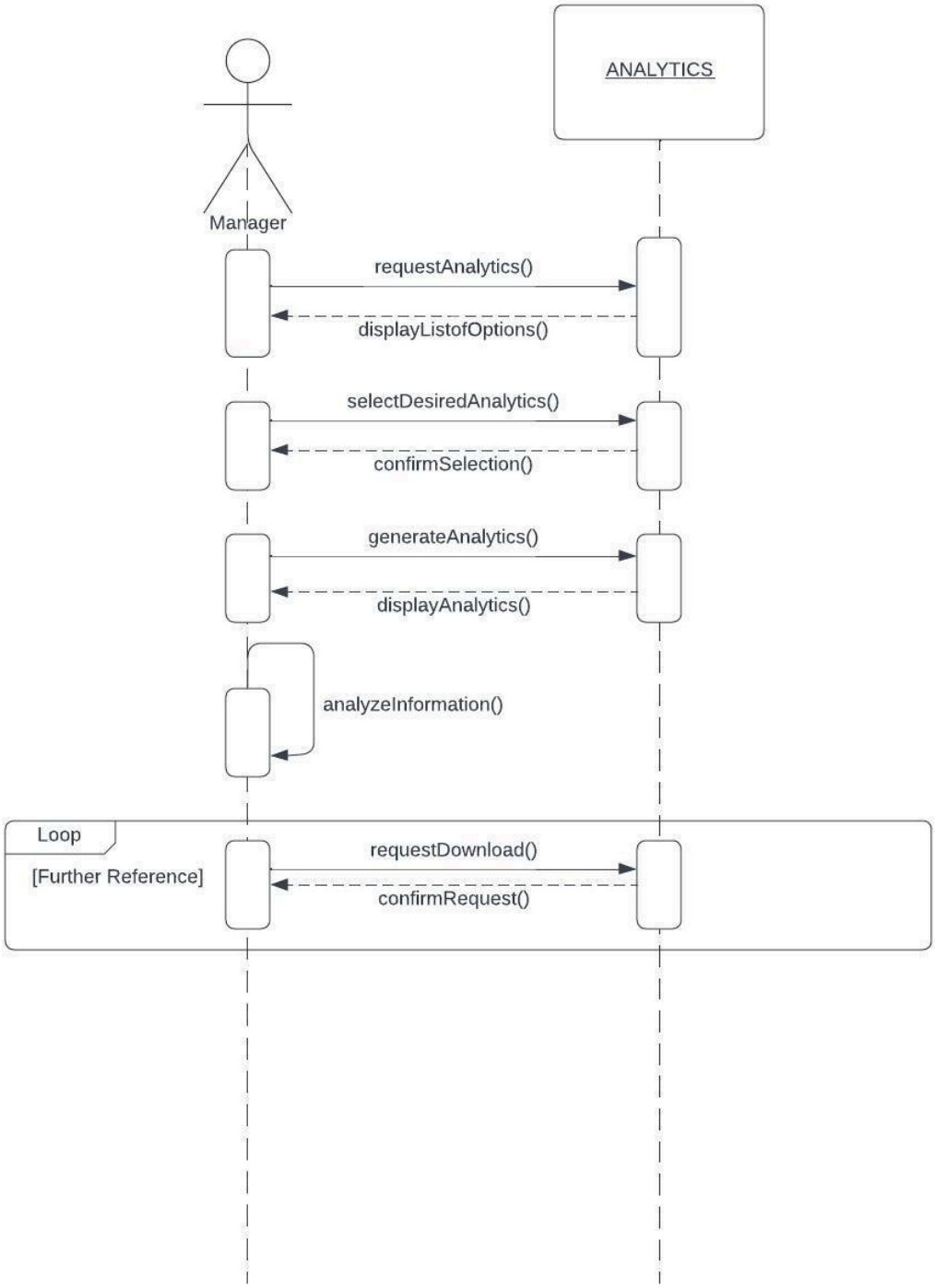
System Performance and Usage Monitoring



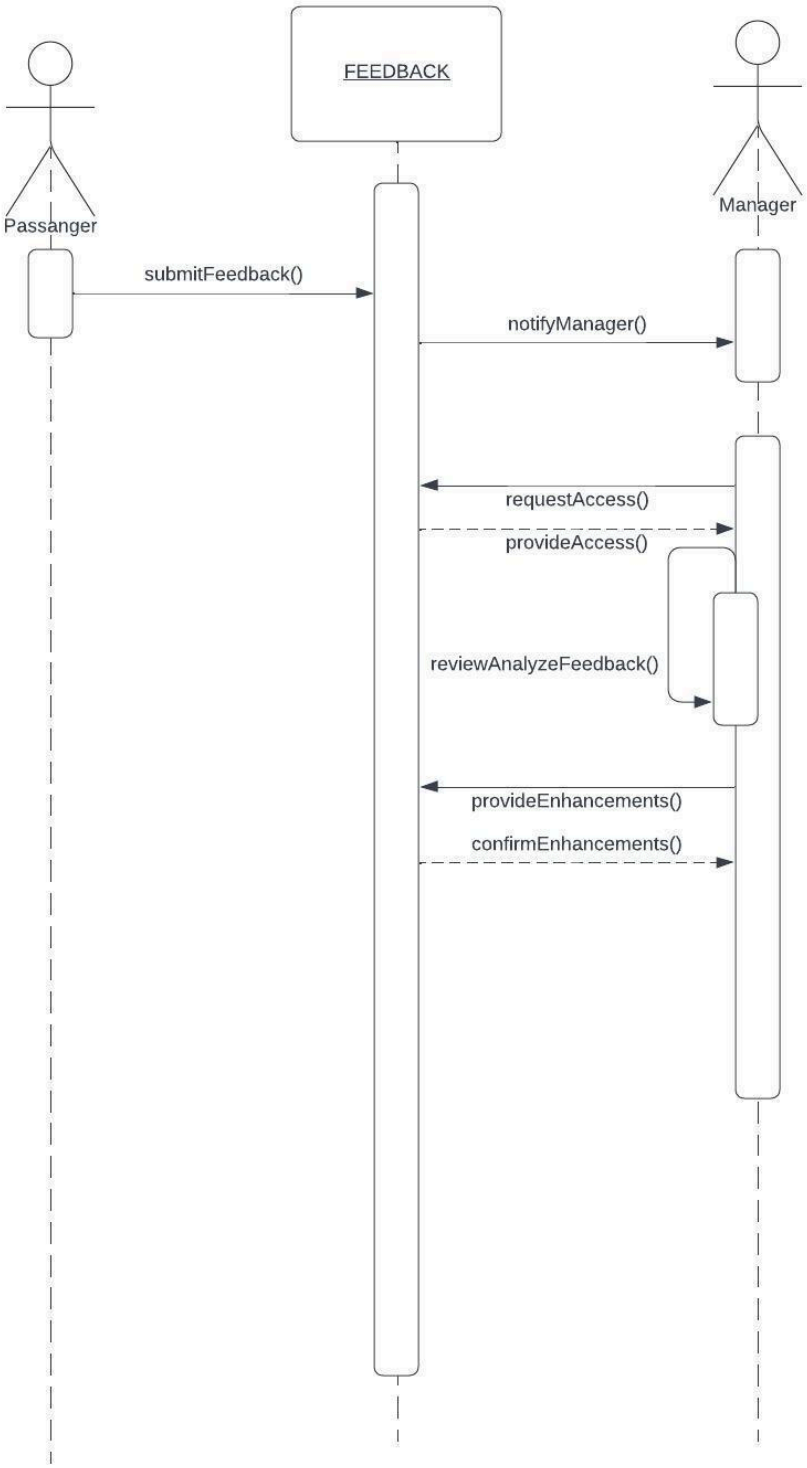
Staff (Operators) Performance Management



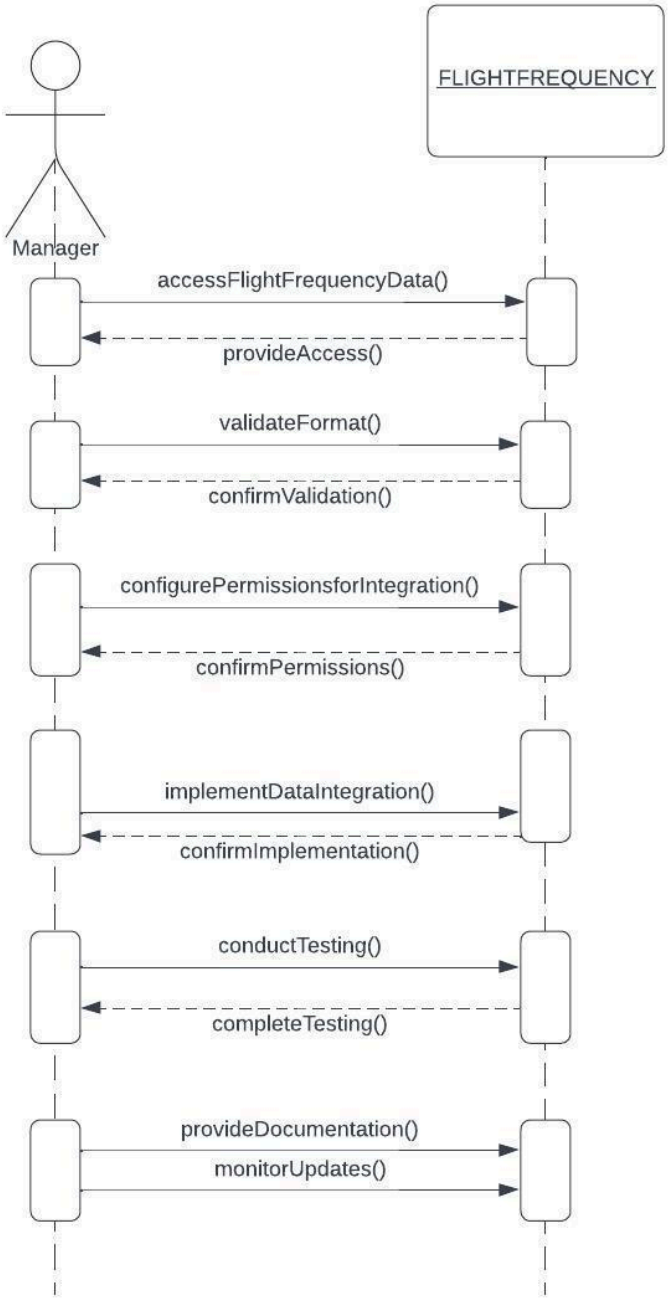
Analytics Access



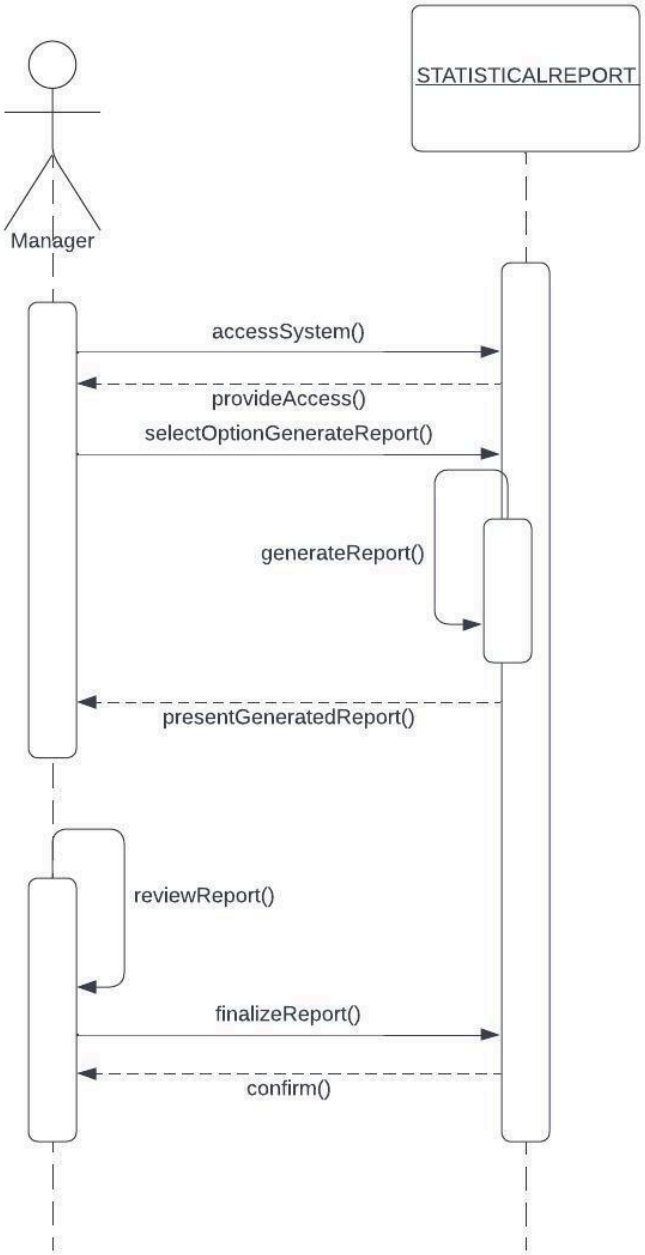
Incorporate Client Feedback



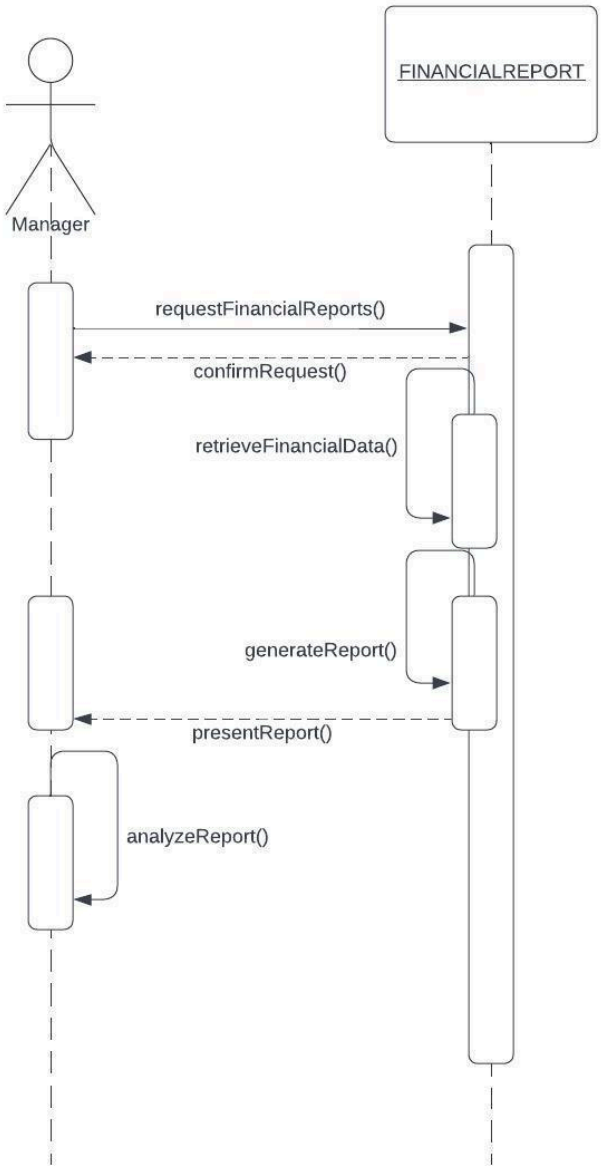
Include Flight Frequency Data



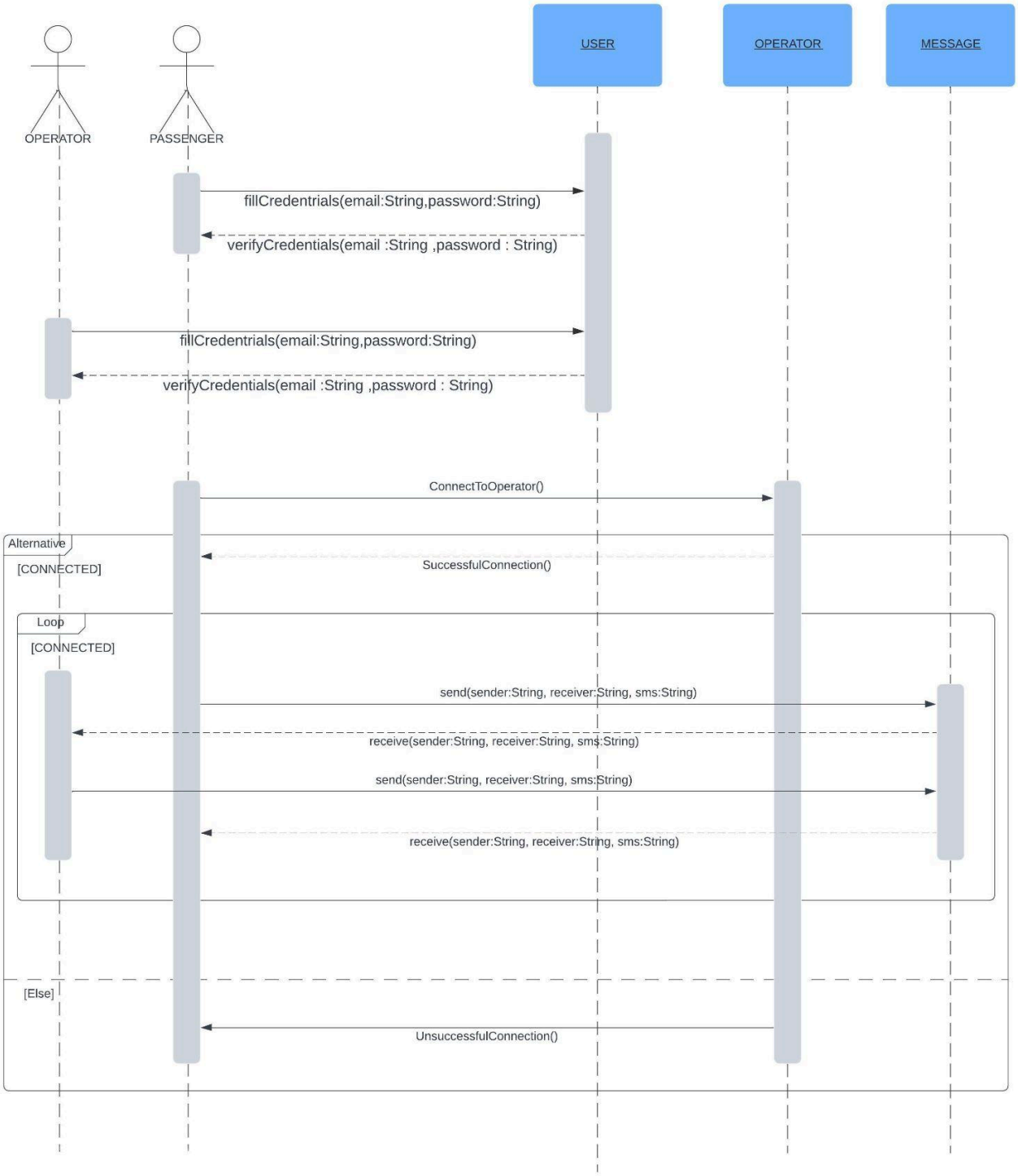
Generate Monthly Statistical Reports



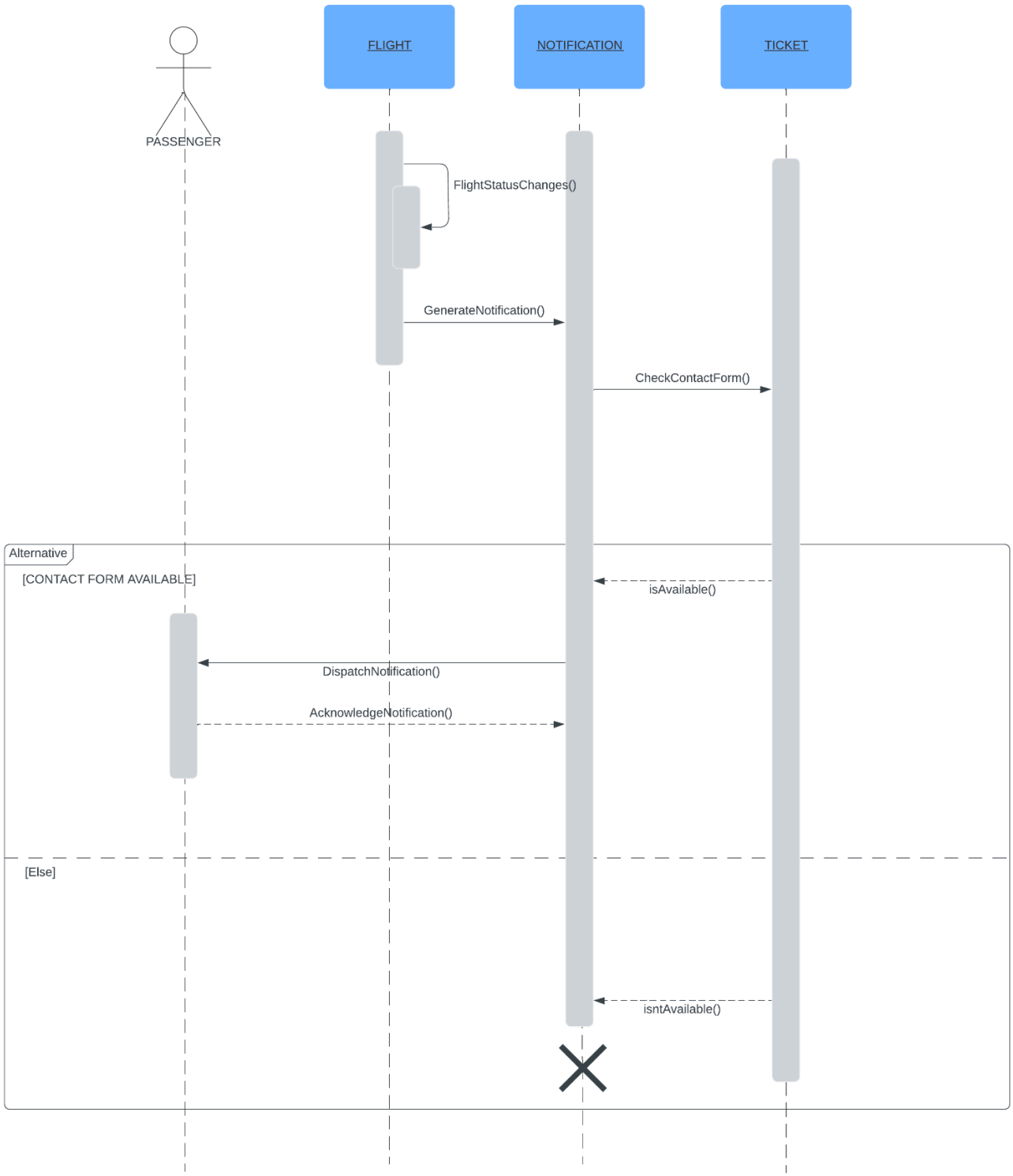
Financial Reports



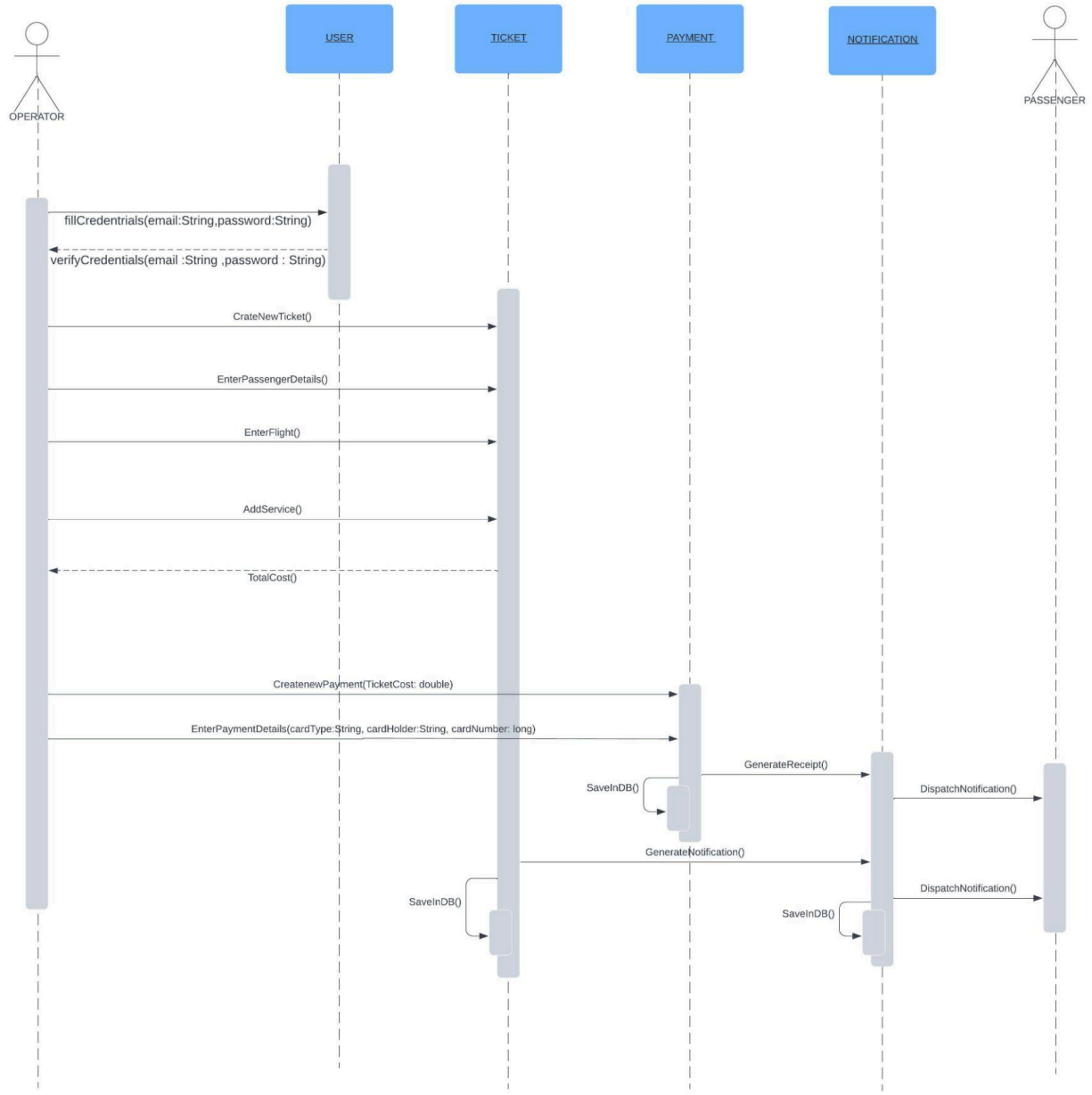
UC 701 - LIVE CHAT COMMUNICATION

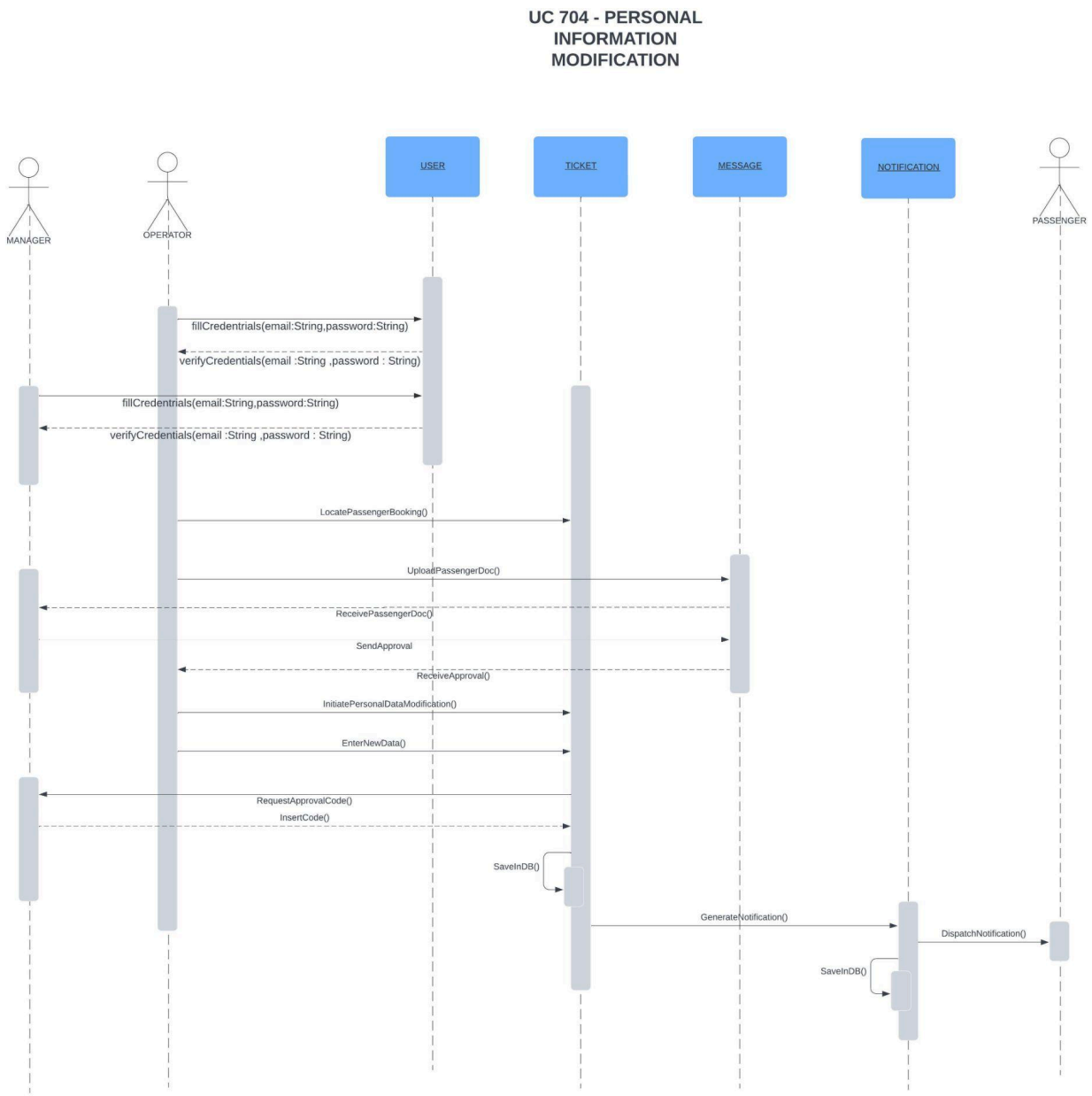


UC 702 - BOOKING UPDATE NOTIFICATION

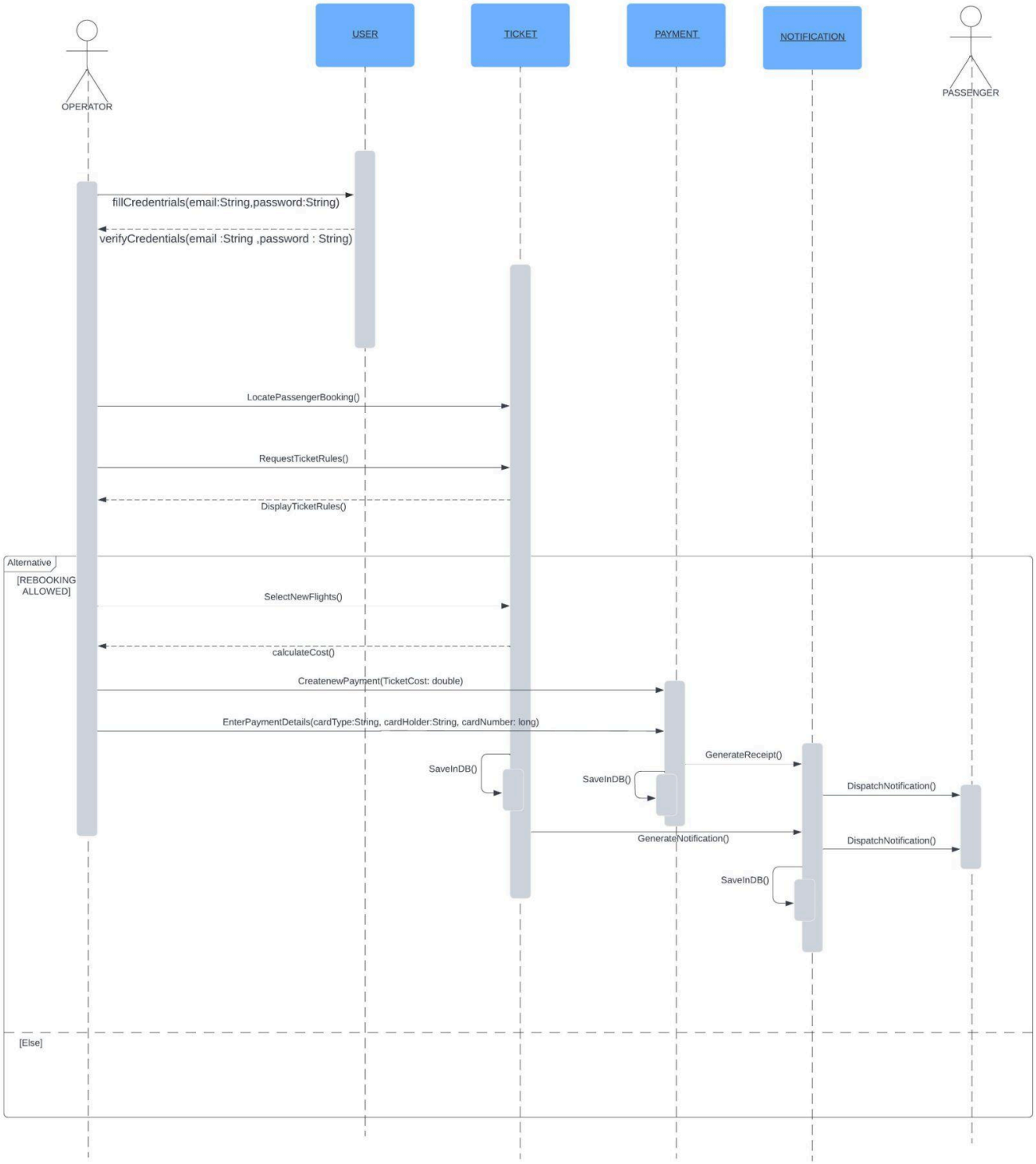


UC 703 - CUSTOMER SERVICE NEW BOOKING

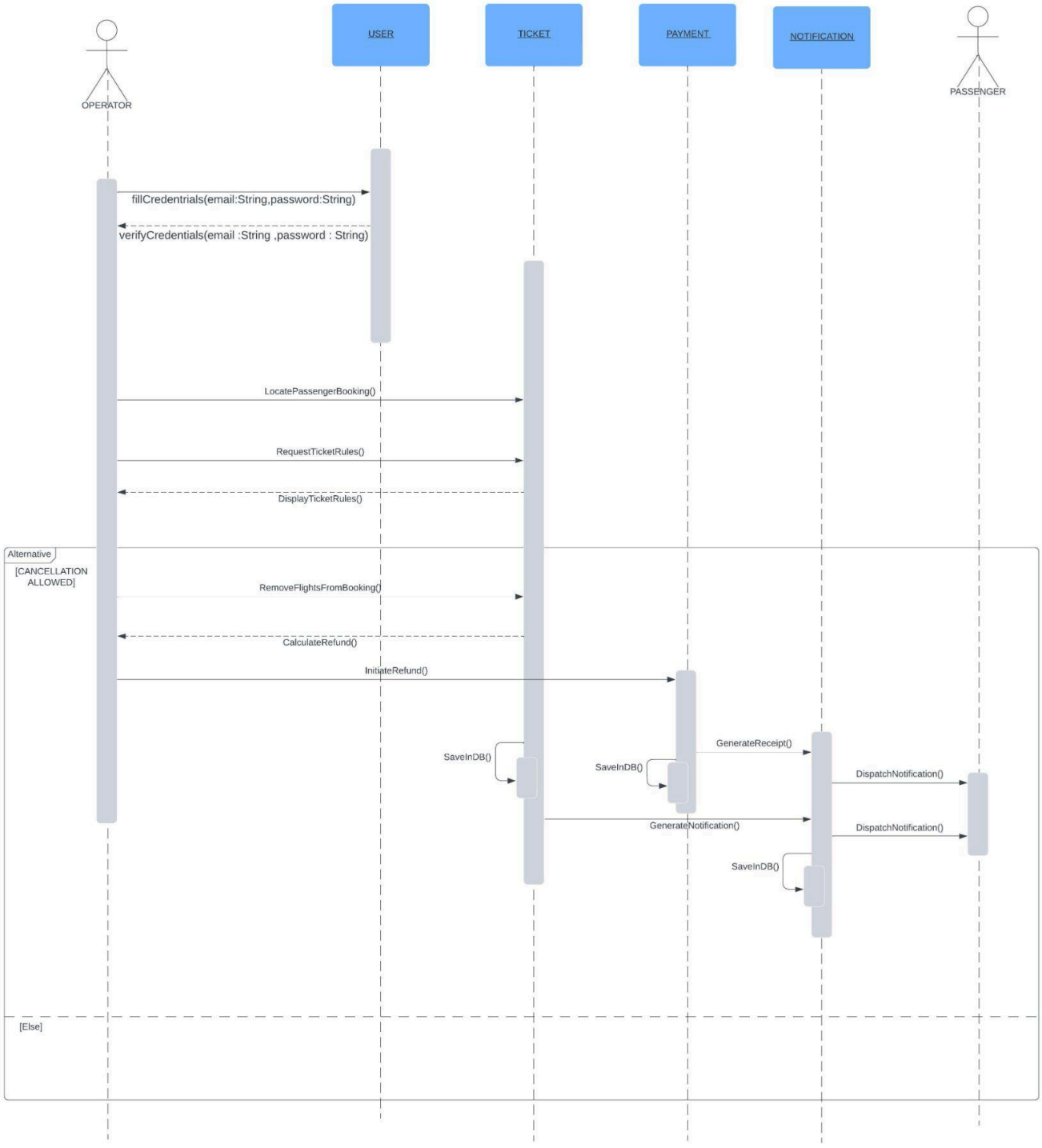


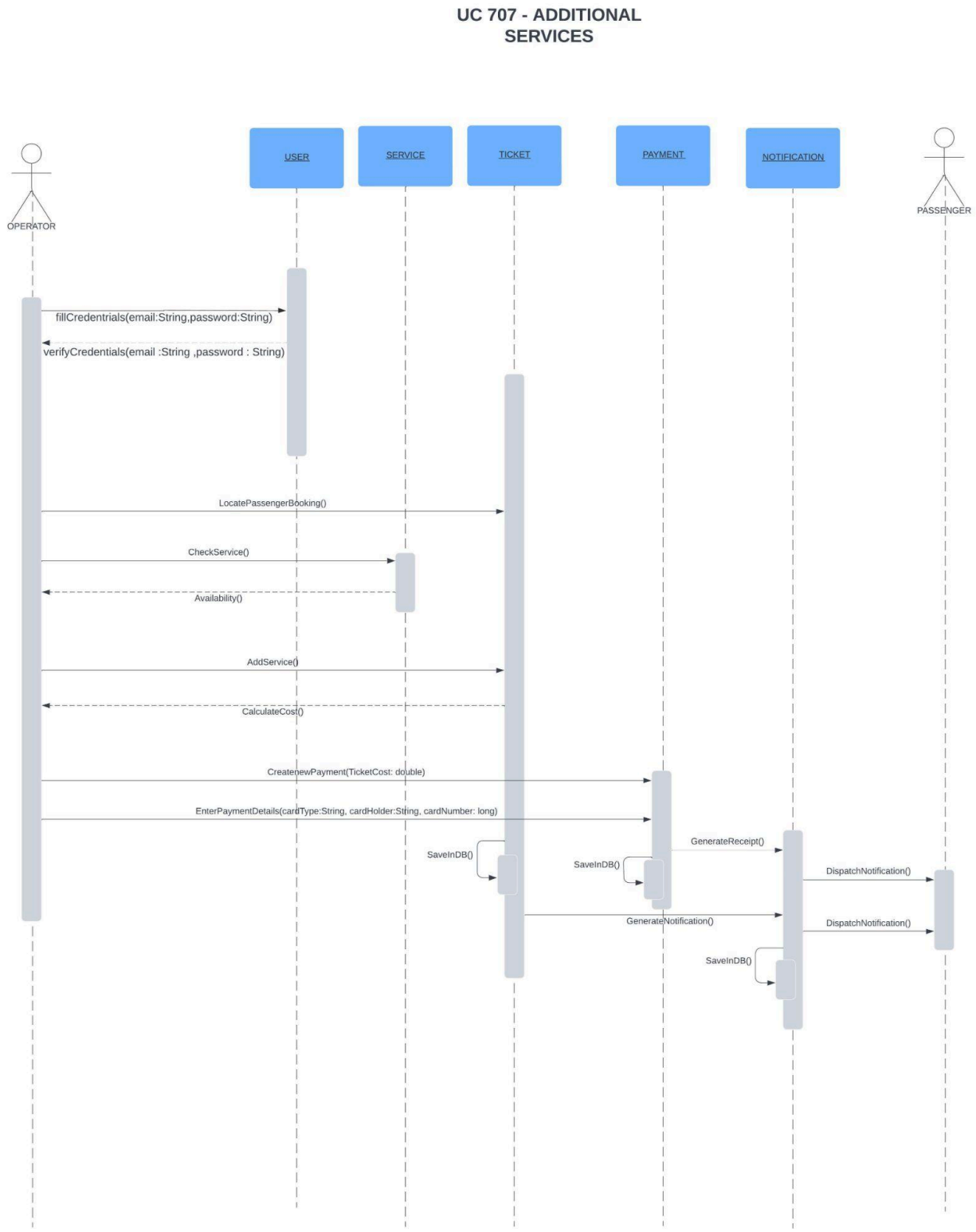

UC 704 - PERSONAL INFORMATION MODIFICATION
MANAGER
OPERATOR
USER
TICKET
MESSAGE
NOTIFICATION
PASSENGER
fillCredentrials(email:String,password:String)
verifyCredentials(email :String ,password : String)
fillCredentrials(email:String,password:String)
verifyCredentials(email :String ,password : String)
LocatePassengerBooking()
UploadPassengerDoc()
ReceivePassengerDoc()
SendApproval
ReceiveApproval()
InitiatePersonalDataModification()
EnterNewData()
RequestApprovalCode()
InsertCode()
SaveInDB()
GenerateNotification()
DispatchNotification()
SaveInDB()

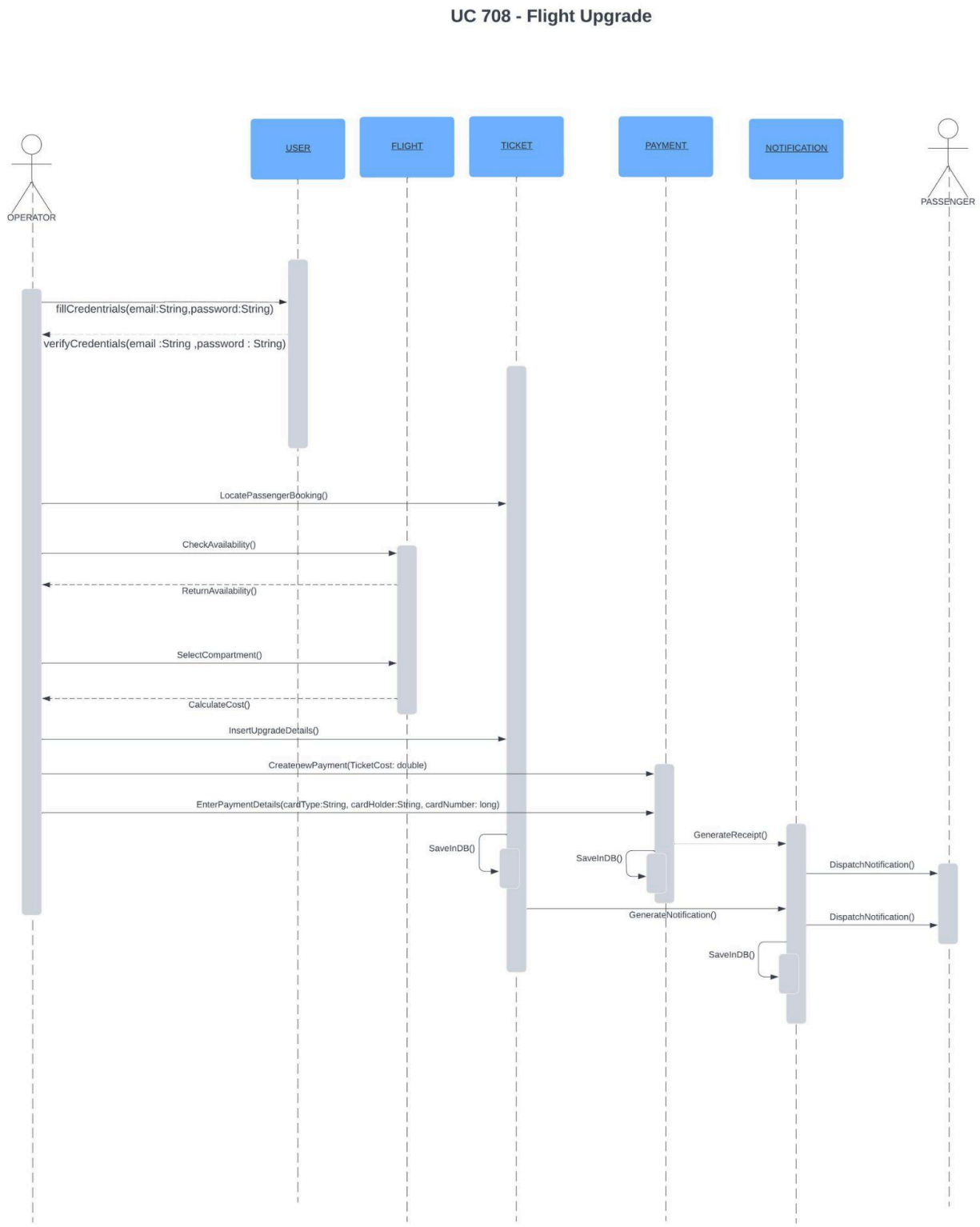
UC 705 - REBOOKING



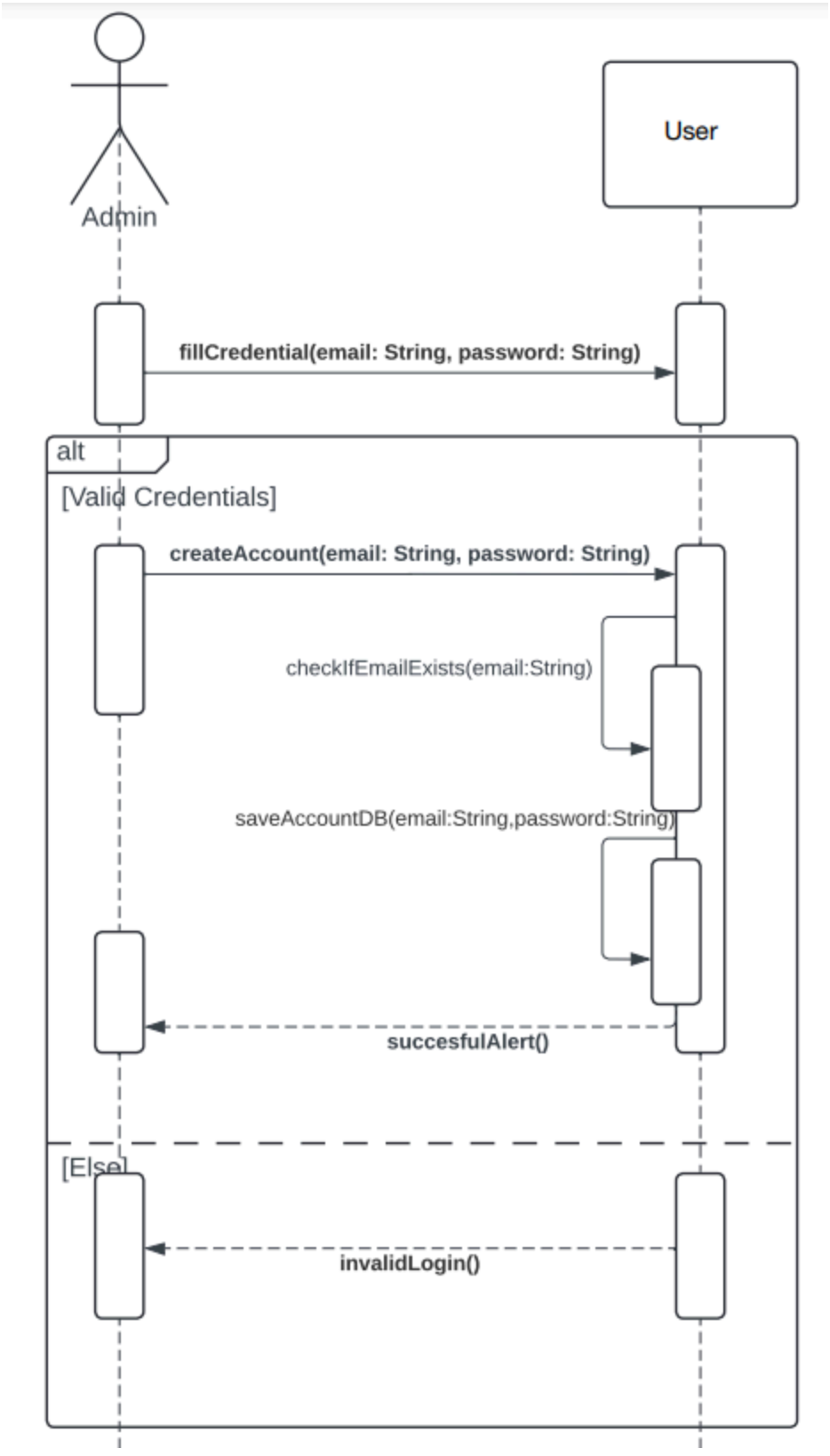
UC 706 - CANCELLATION



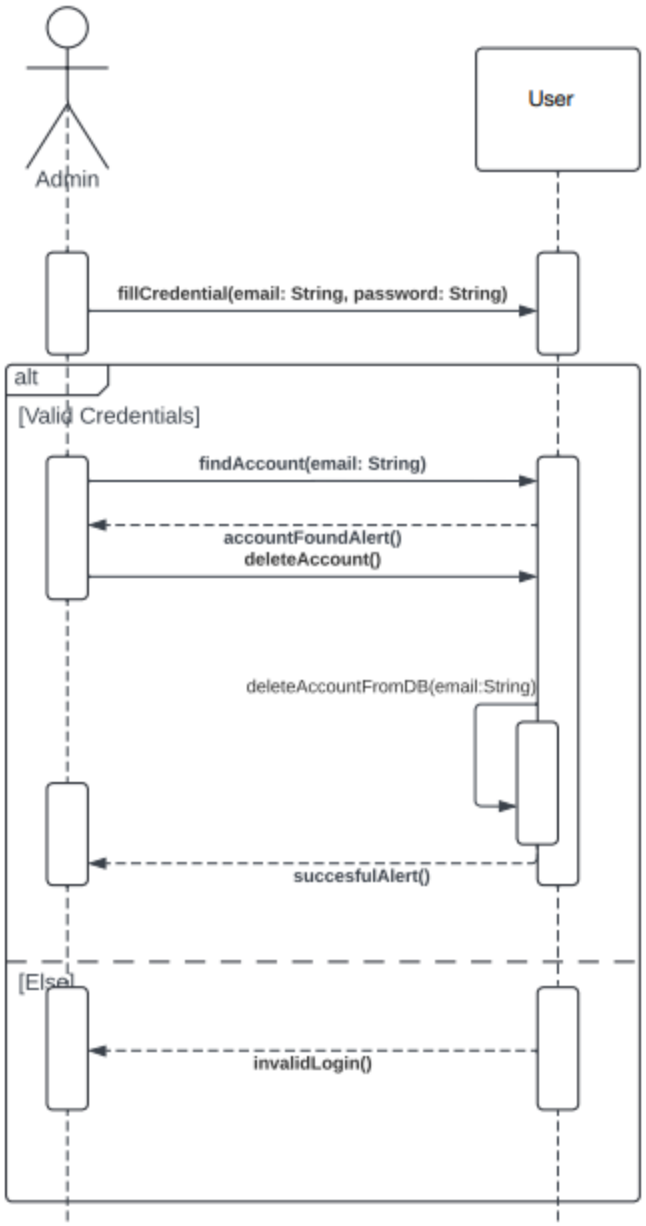

UC 707 - ADDITIONAL SERVICES
OPERATOR
USER
SERVICE
TICKET
PAYMENT
NOTIFICATION
PASSENGER
fillCredentrials(email:String,password:String)
verifyCredentials(email :String ,password : String)
LocatePassengerBooking()
CheckService()
Availability()
AddService()
CalculateCost()
CreatenewPayment(TicketCost: double)
EnterPaymentDetails(cardType:String, cardHolder:String, cardNumber: long)
SaveInDB()
SaveInDB()
GenerateReceipt()
DispatchNotification()
GenerateNotification()
DispatchNotification()
SaveInDB()



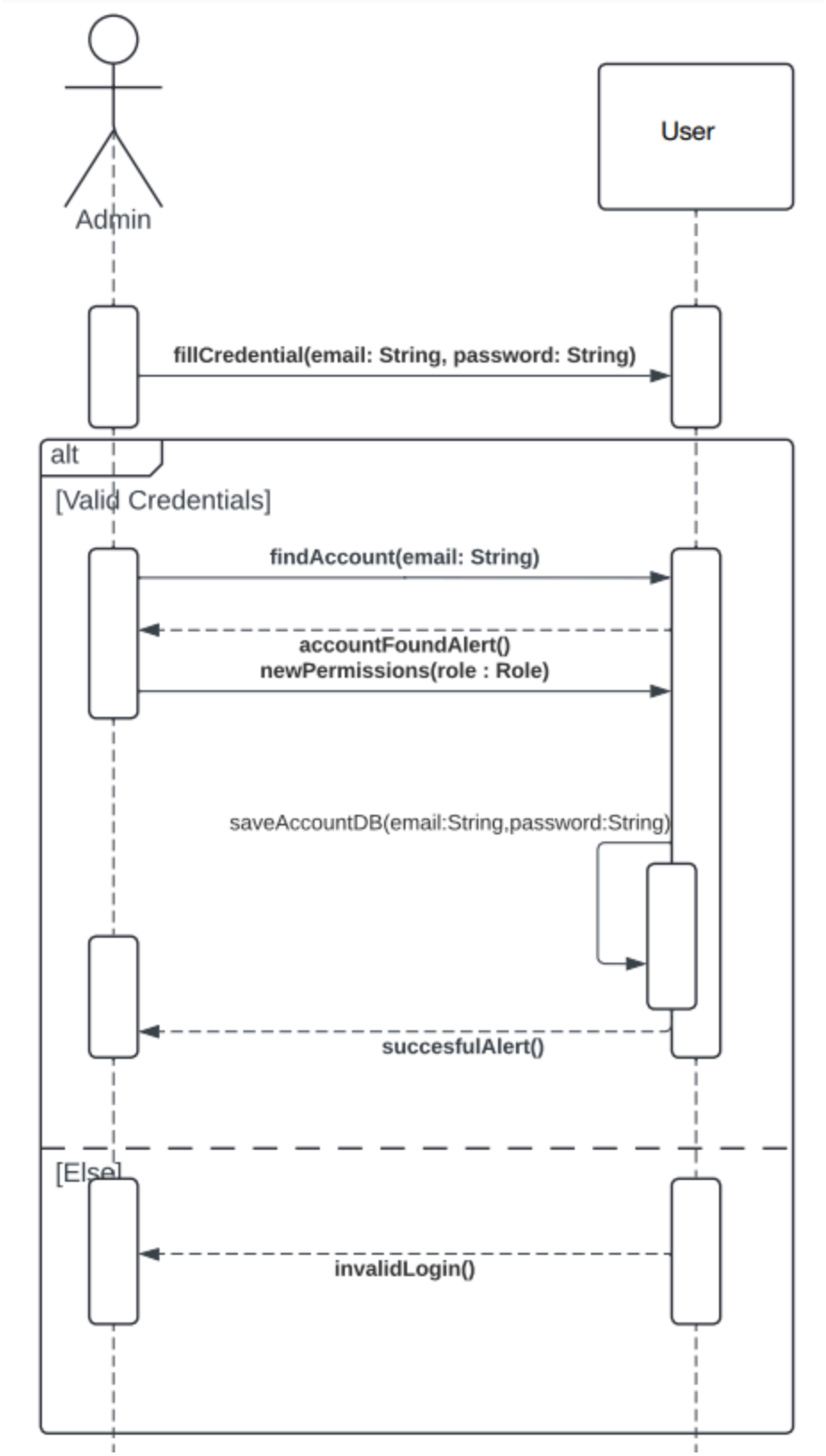
AdminCreateAccount



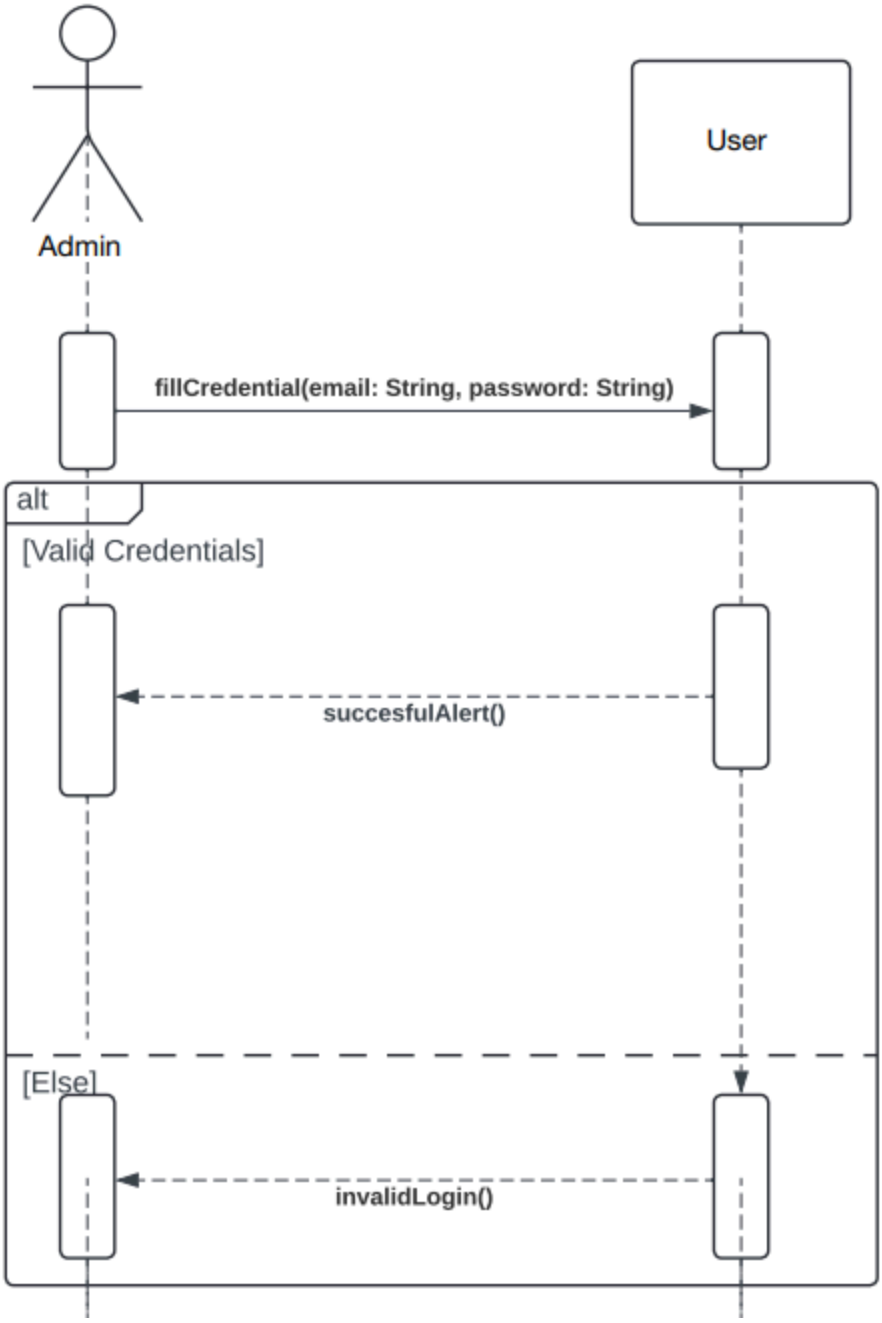
AdminDeleteAccount



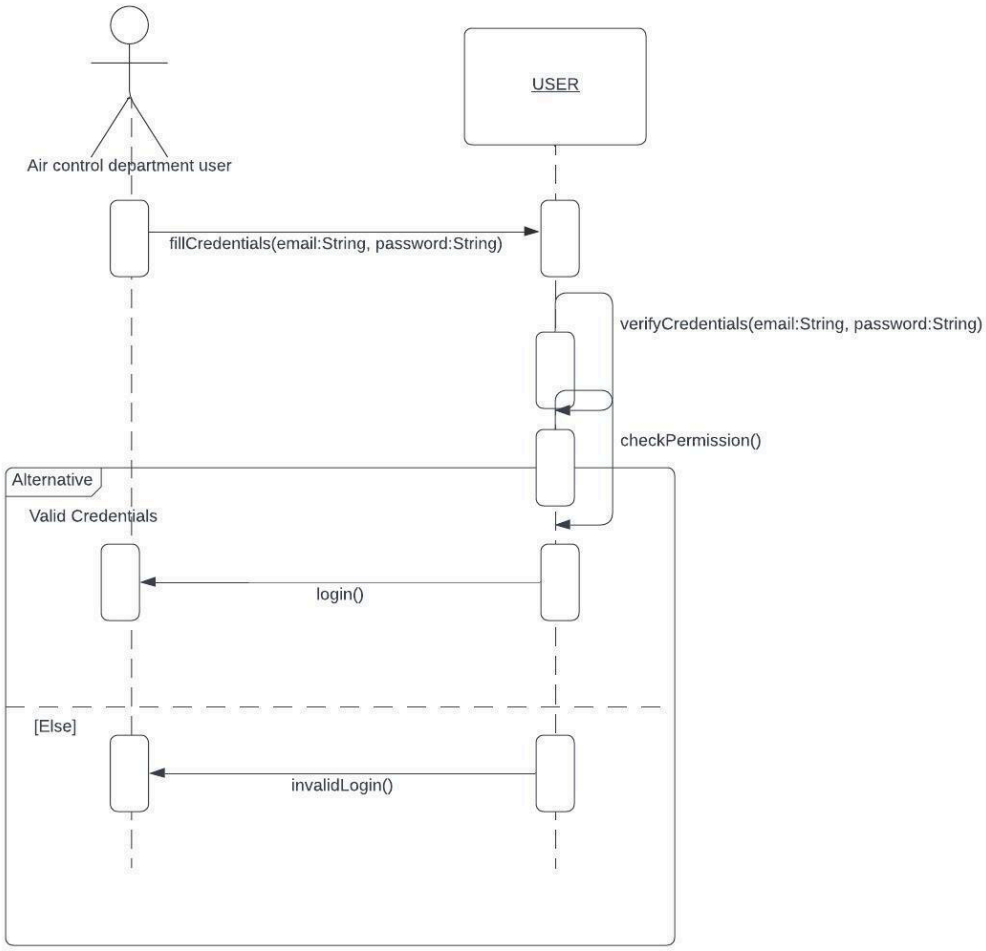
AdminEditAccount


Admin
User
fillCredential(email: String, password: String)
alt
[Valid Credentials]
findAccount(email: String)
accountFoundAlert()
newPermissions(role : Role)
saveAccountDB(email:String,password:String)
succesfulAlert()
[Else]
invalidLogin()

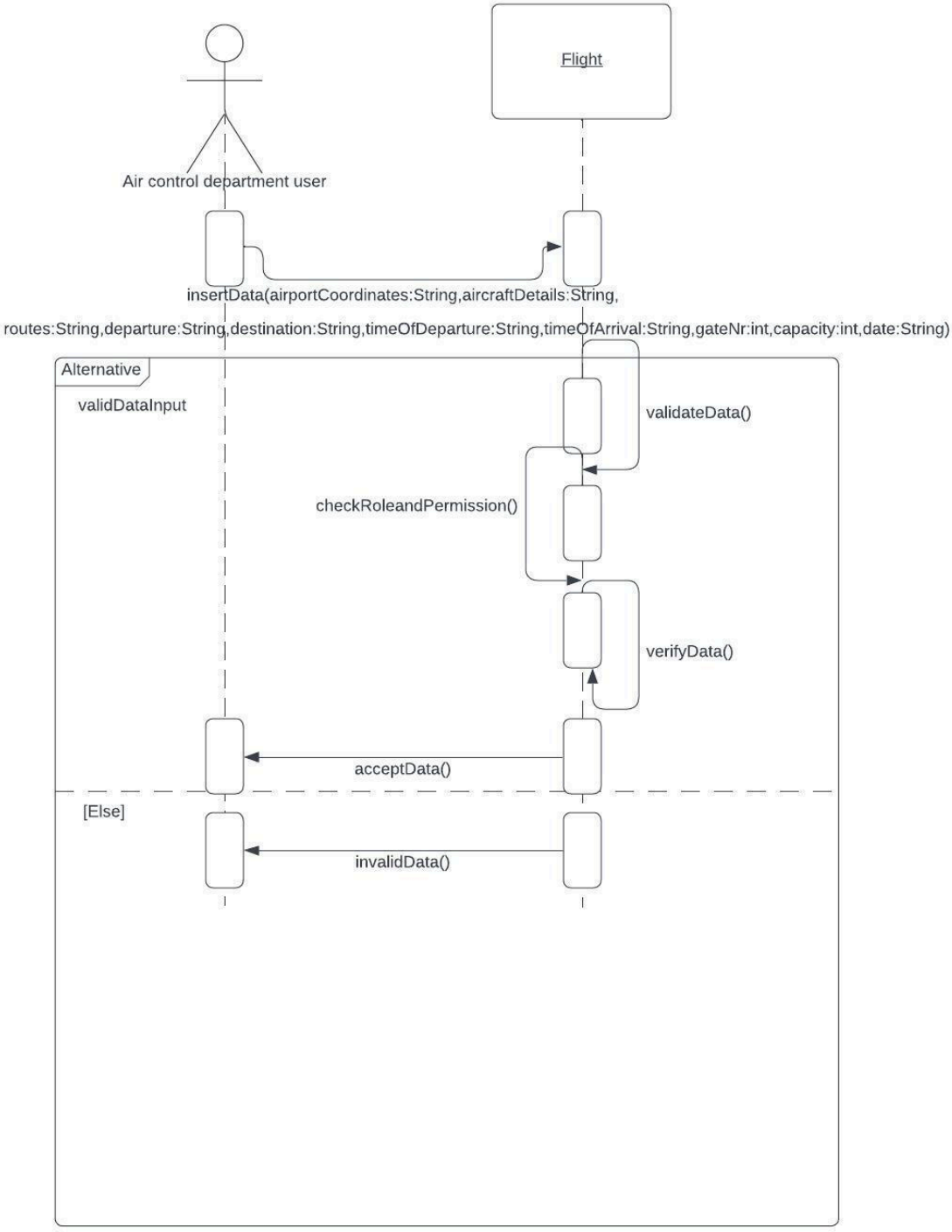
AdminLogin


Admin
User
fillCredential(email: String, password: String)
alt
[Valid Credentials]
succesfulAlert()
[Else]
invalidLogin()

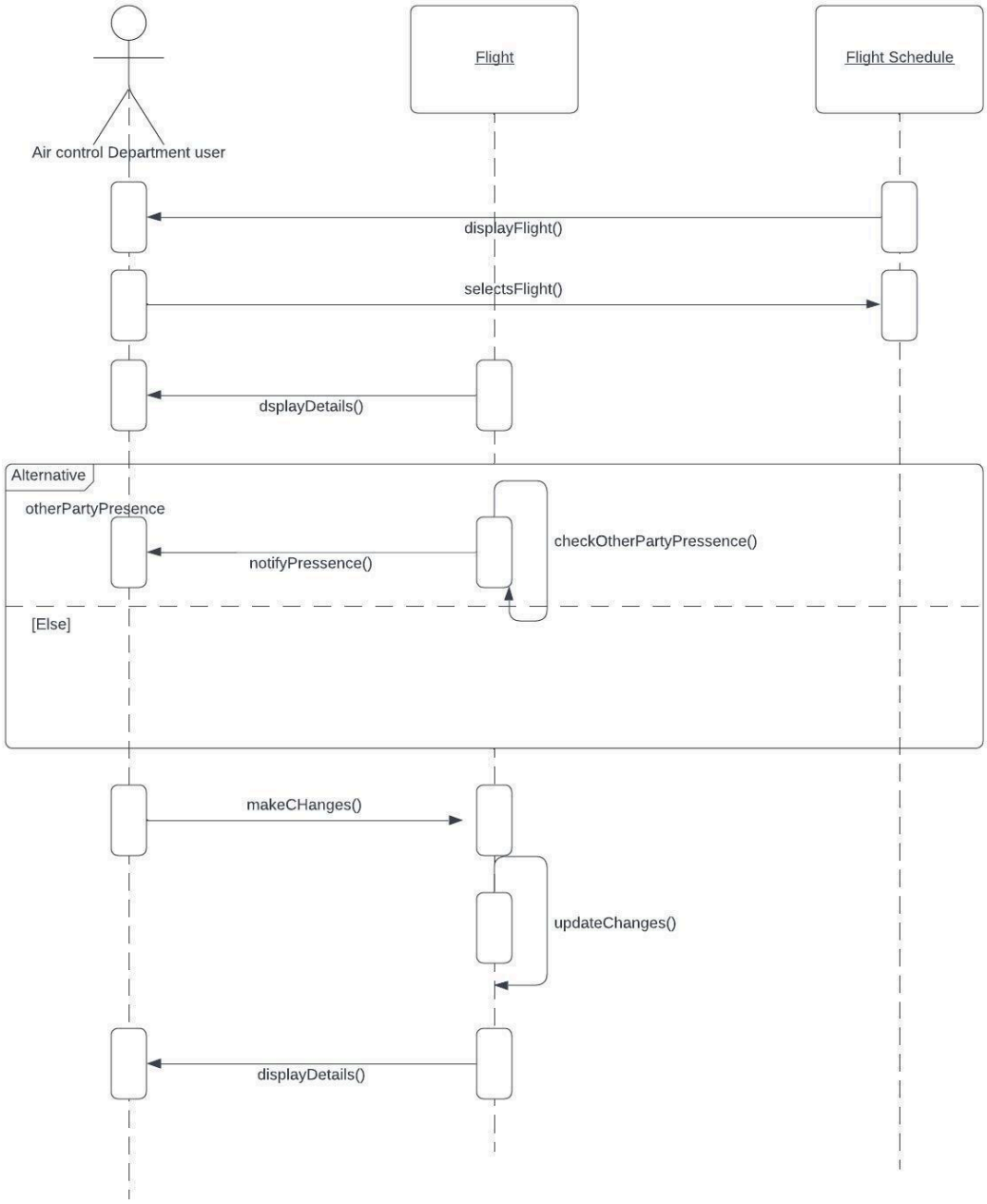
UC-501


USER
Air control department user
fillCredentials(email:String, password:String)
verifyCredentials(email:String, password:String)
checkPermission()
Alternative
Valid Credentials
login()
[Else]
invalidLogin()

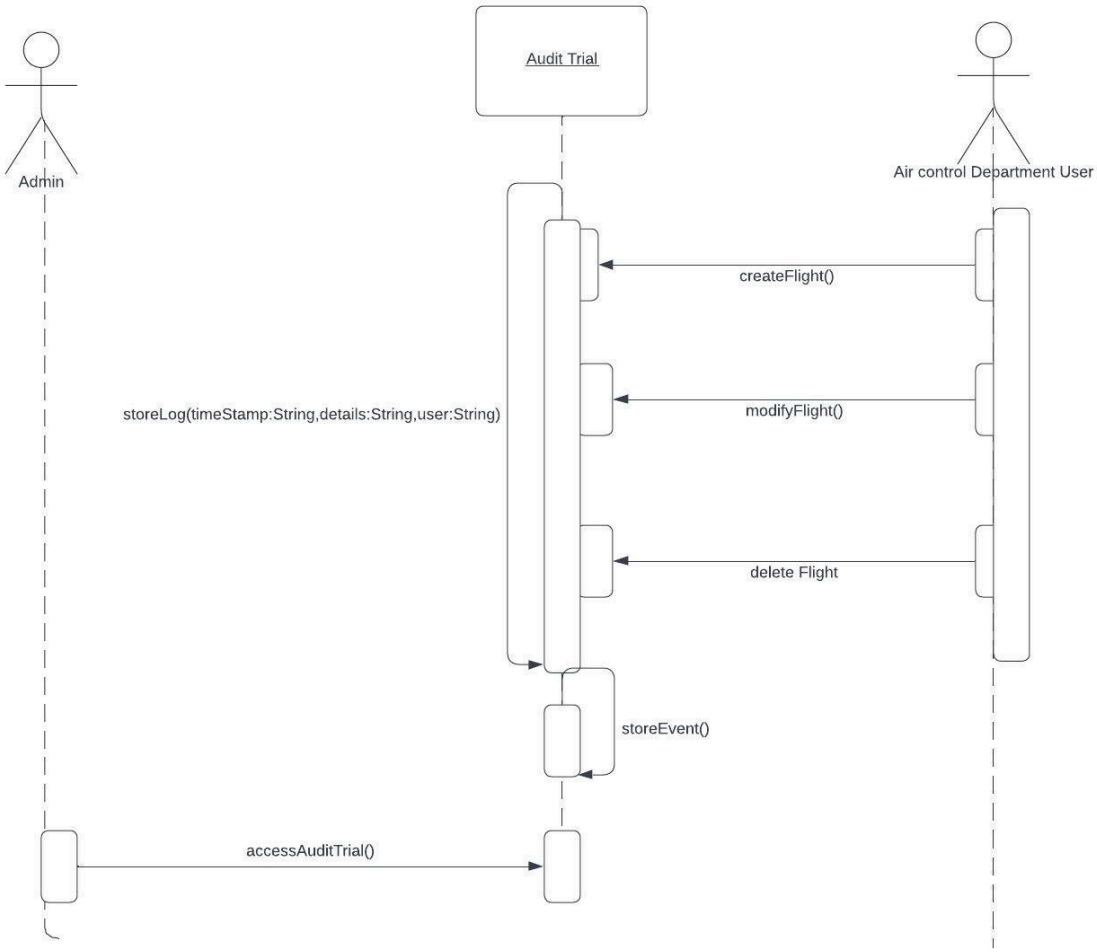
UC-502


Flight
Air control department user
insertData(airportCoordinates:String,aircraftDetails:String,
routes:String,departure:String,destination:String,timeOfDeparture:String,timeOfArrival:String,gateNr:int,capacity:int,date:String)
Alternative
validDataInput
validateData()
checkRoleandPermission()
verifyData()
acceptData()
[Else]
invalidData()

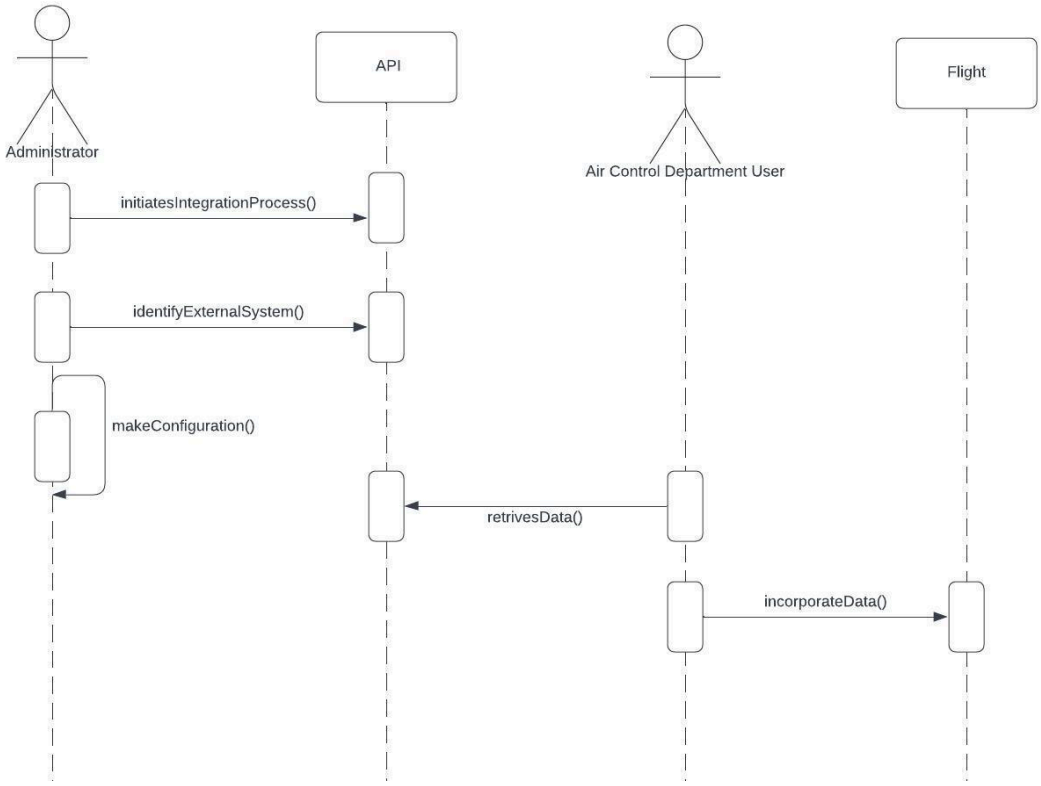
UC-503


Flight
Flight Schedule
Air control Department user
displayFlight()
selectsFlight()
dsplayDetails()
Alternative
otherPartyPresence
notifyPressence()
checkOtherPartyPressence()
[Else]
makeCHanges()
updateChanges()
displayDetails()

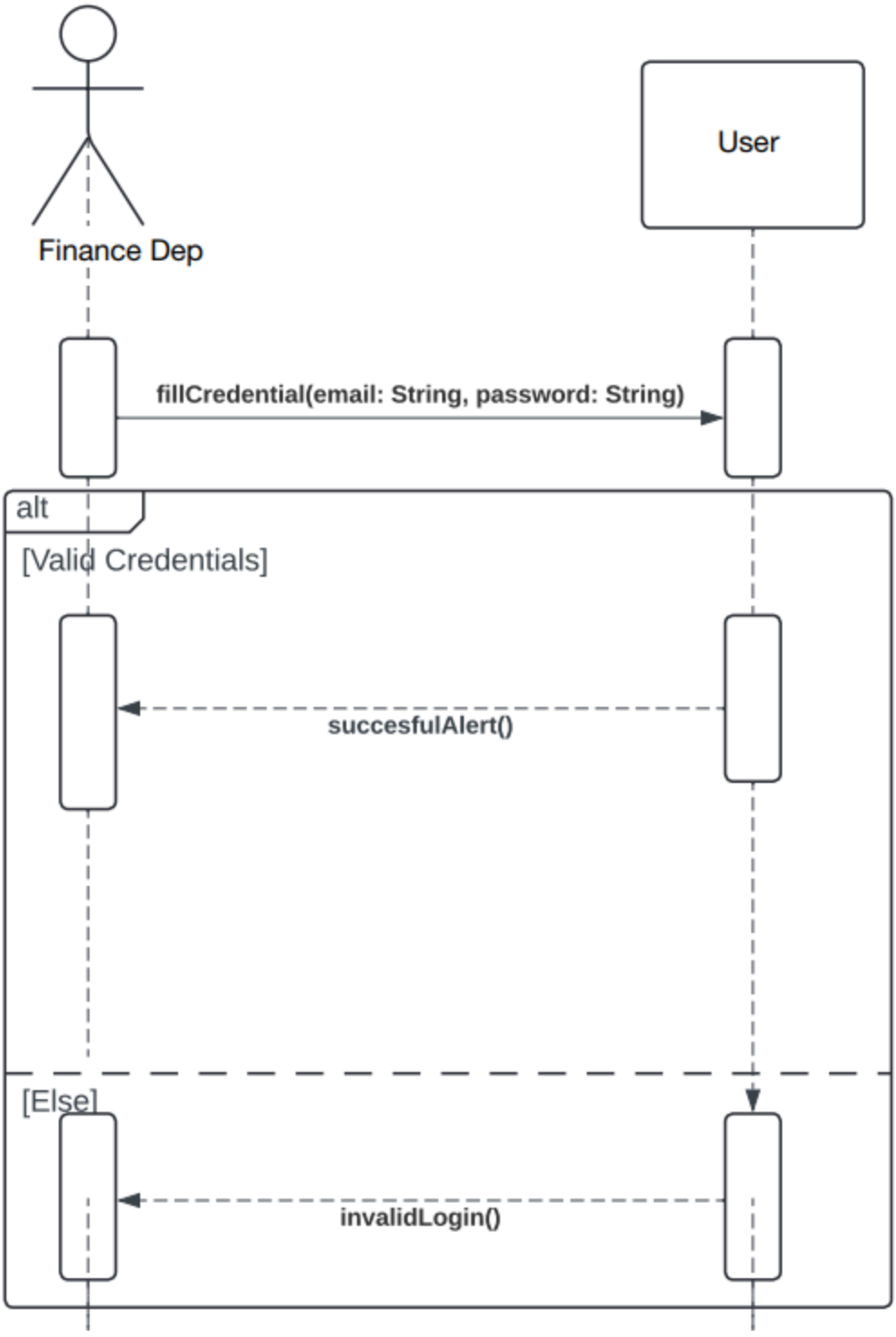
UC-505


Audit Trial
Admin
Air control Department User
createFlight()
storeLog(timeStamp:String,details:String,user:String)
modifyFlight()
delete Flight
storeEvent()
accessAuditTrial()

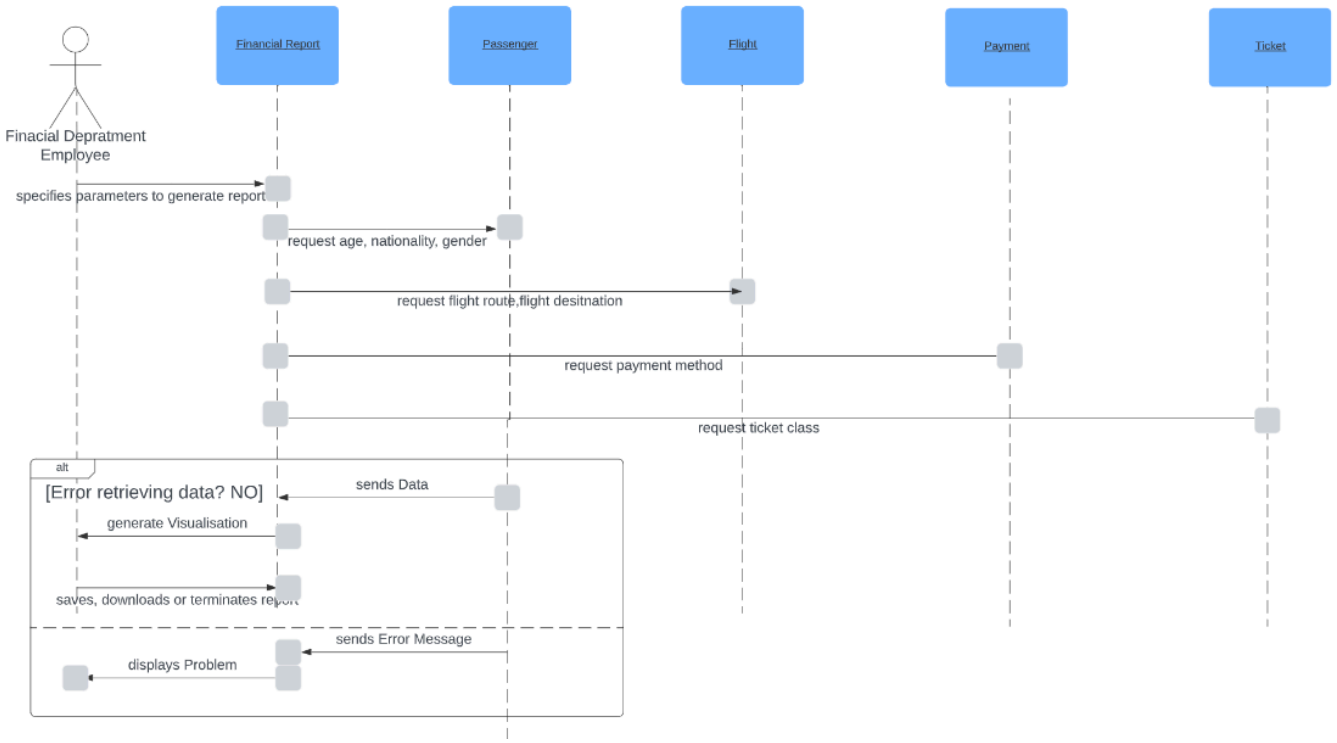
UC-506



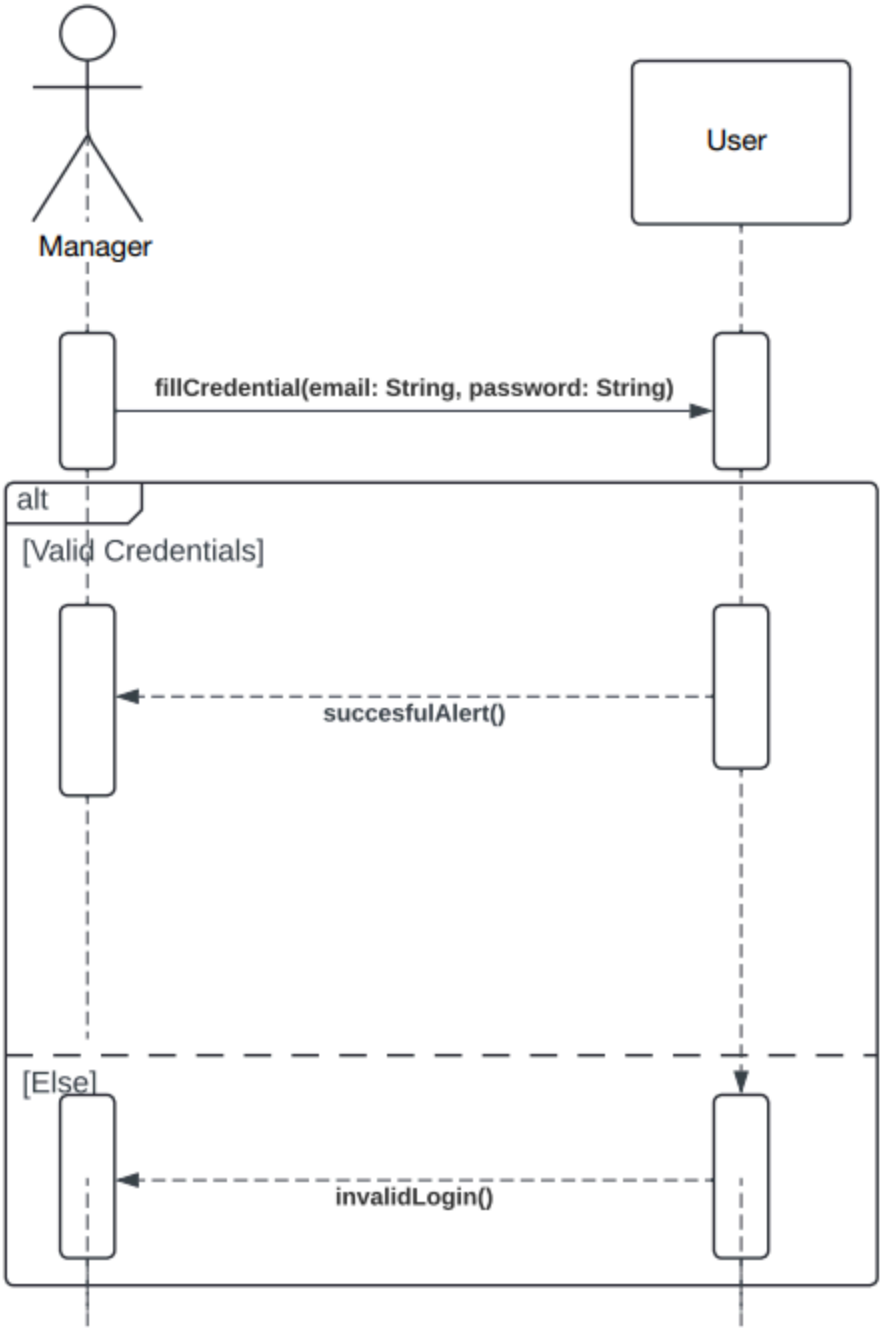
FinanceLogIn



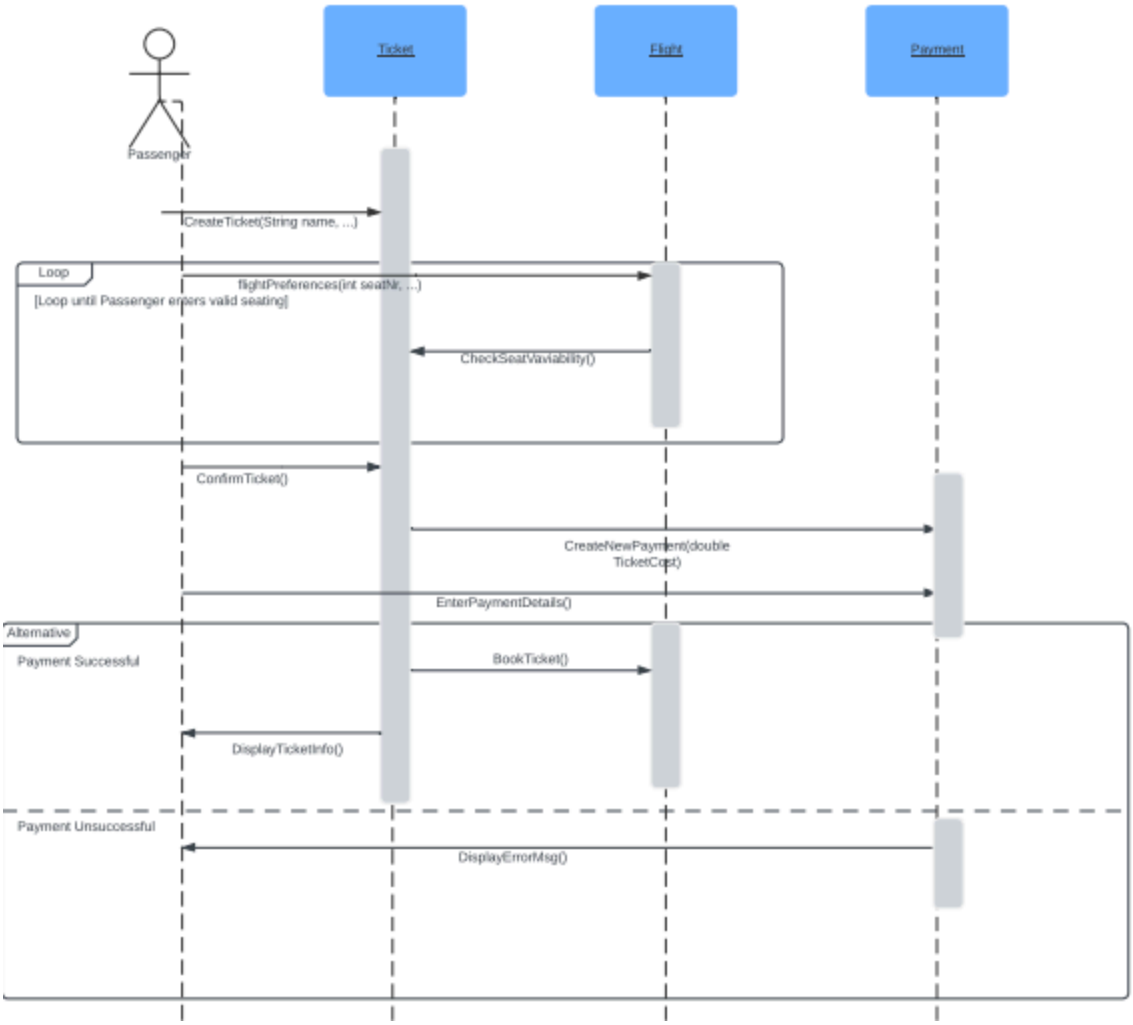
Finance Sequence

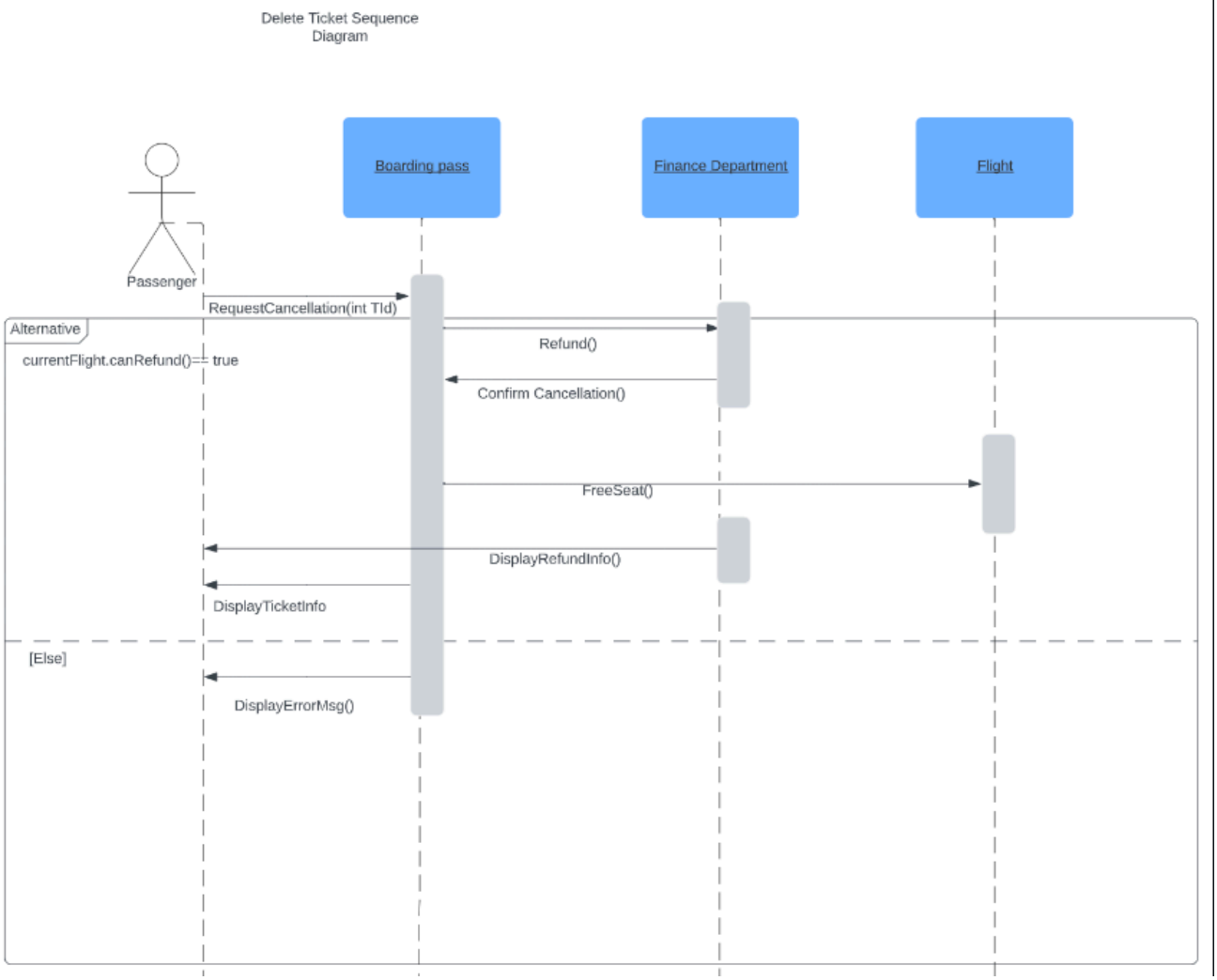


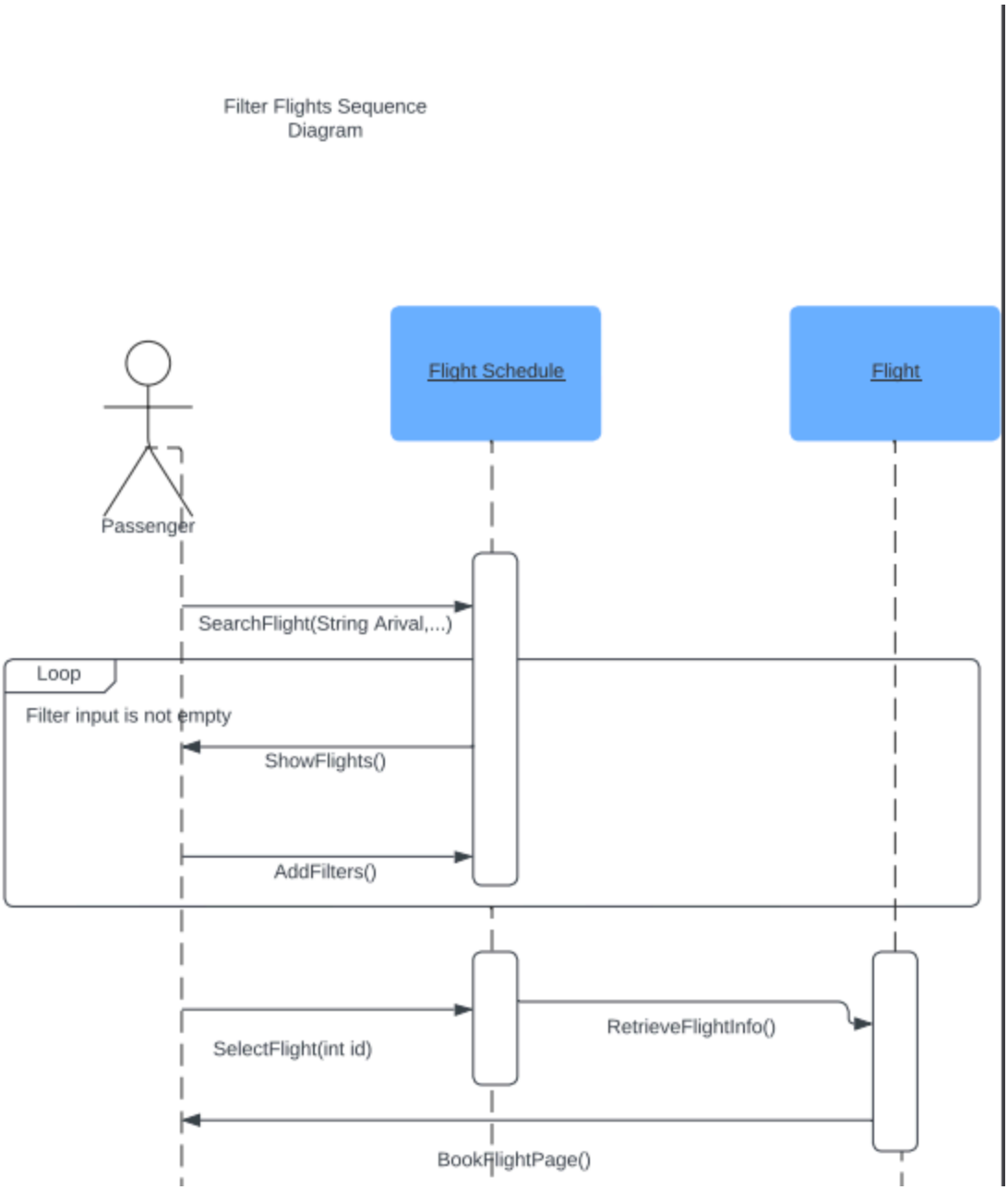
ManagerLogIn


Manager
User
fillCredential(email: String, password: String)
alt
[Valid Credentials]
succesfulAlert()
[Else]
invalidLogin()

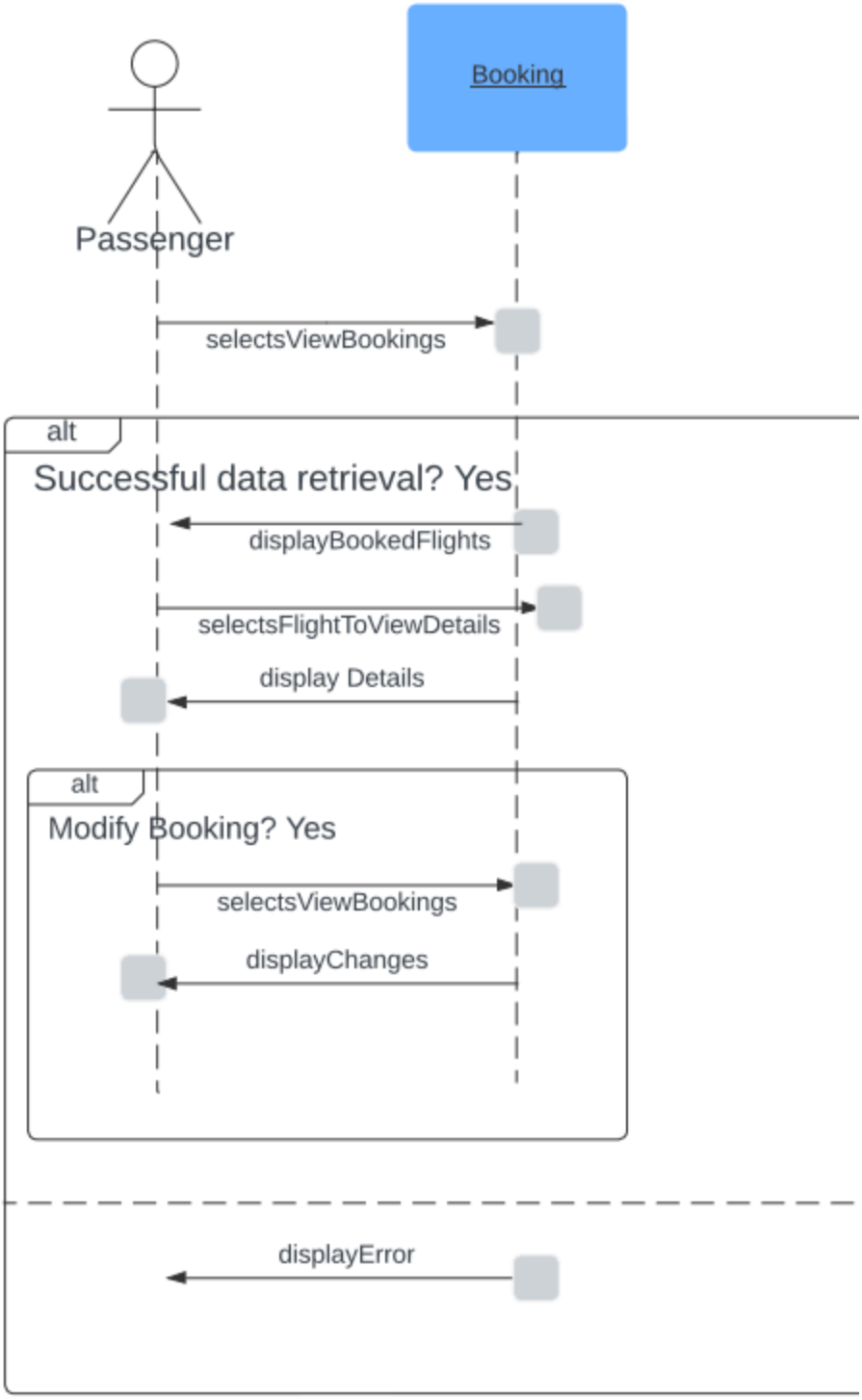
Book Flights Sequence Diagram



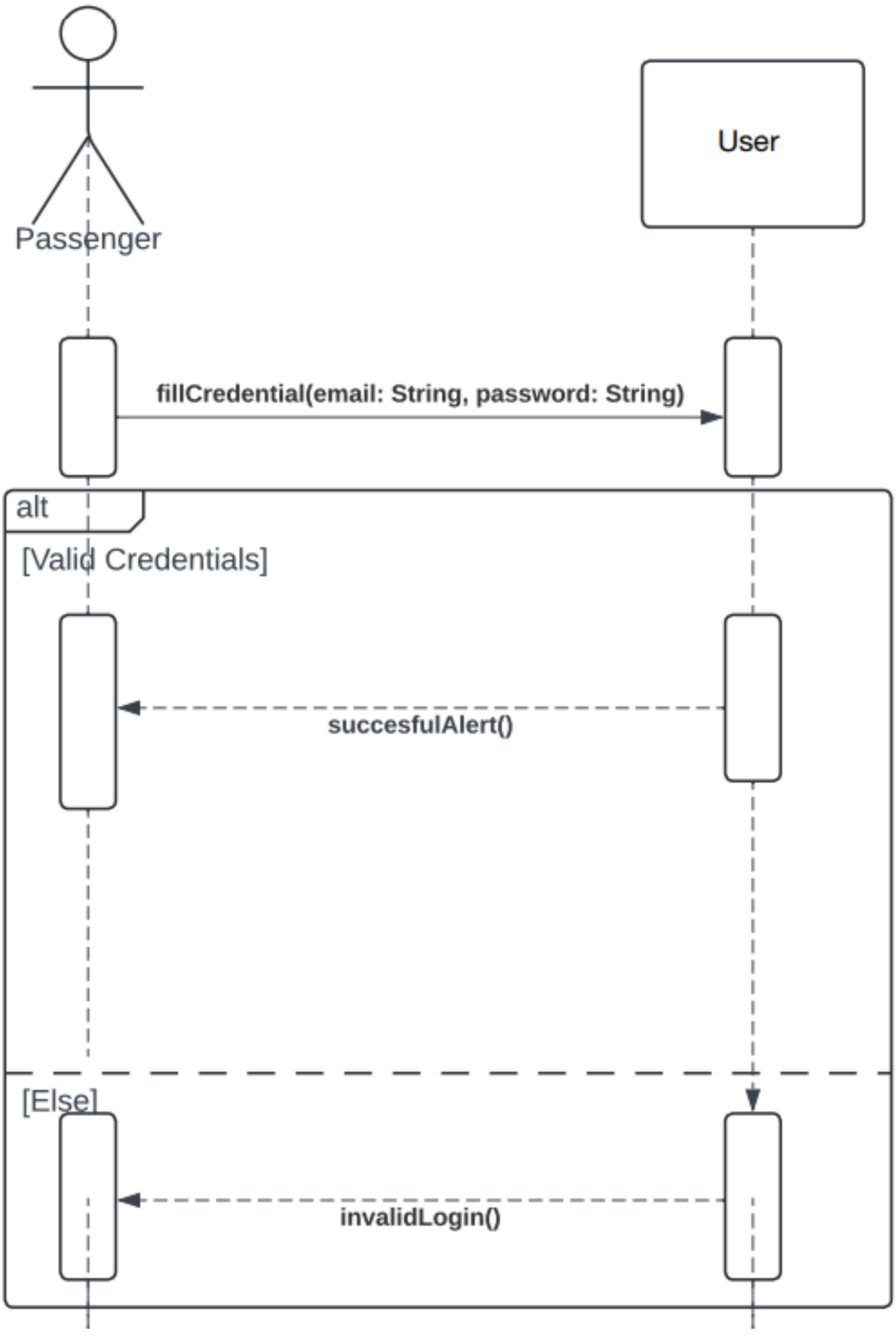

Delete Ticket Sequence Diagram
Boarding pass
Finance Department
Flight
Passenger
RequestCancellation(int TId)
Alternative
currentFlight.canRefund()== true
Refund()
Confirm Cancellation()
FreeSeat()
DisplayRefundInfo()
DisplayTicketInfo
[Else]
DisplayErrorMsg()



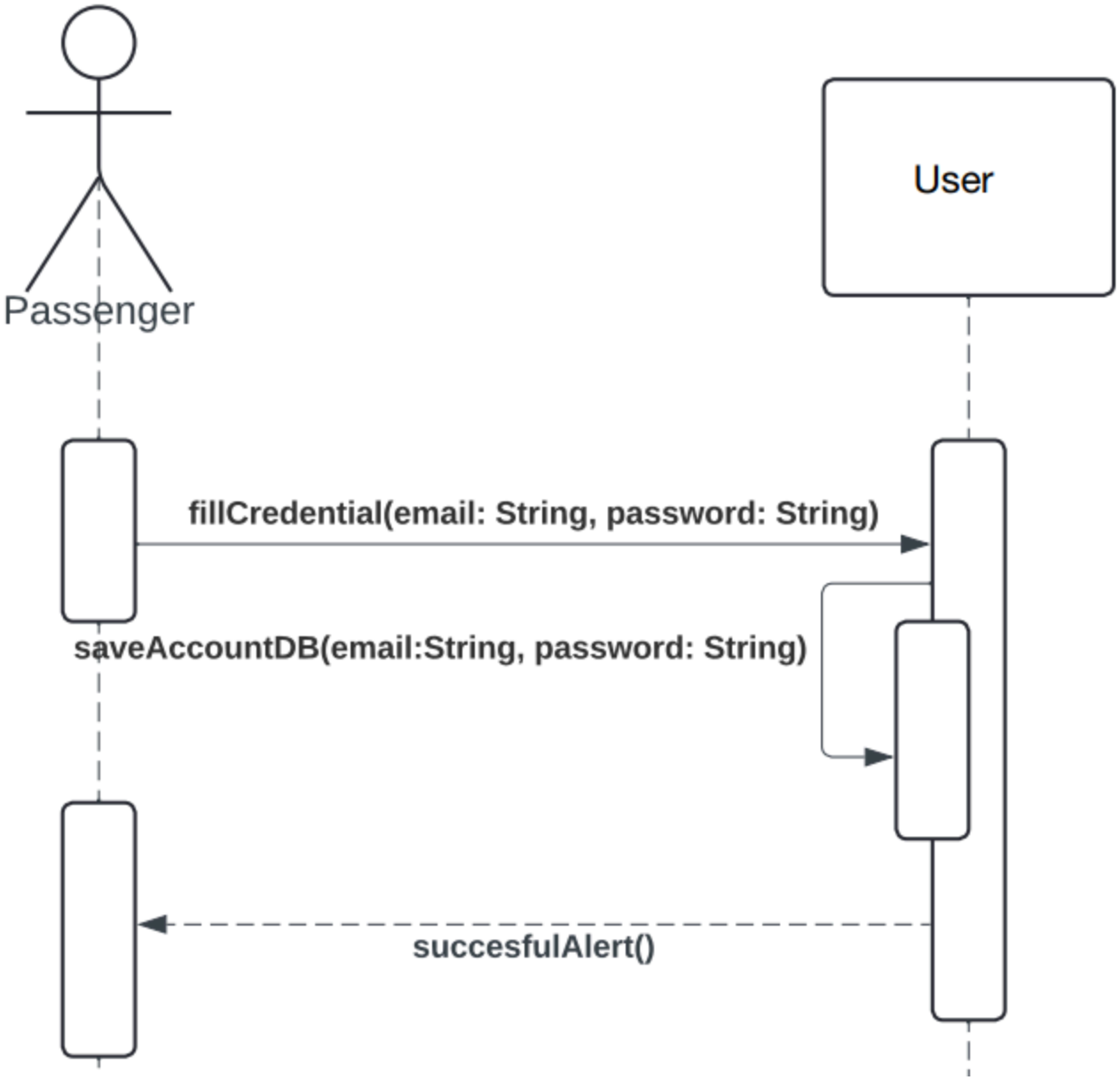
ManageBooking



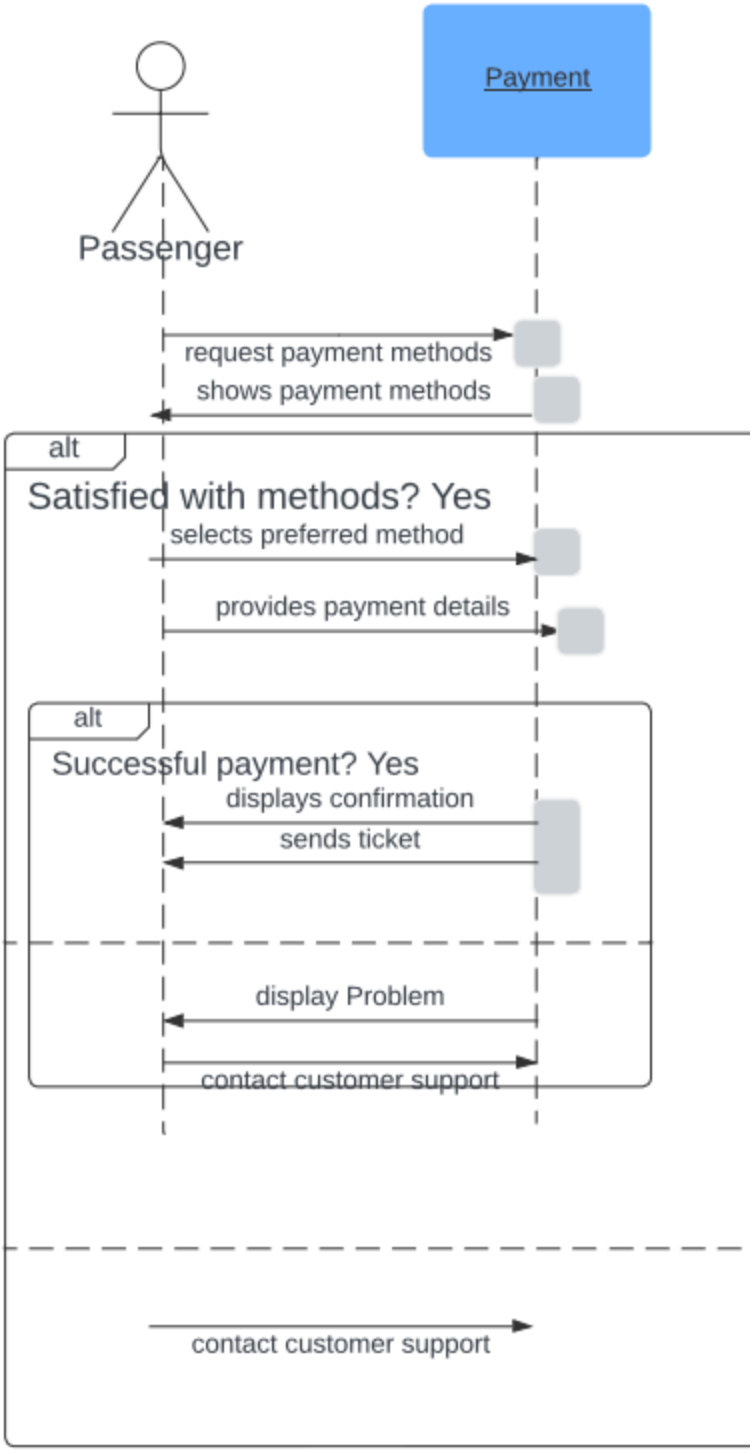
PassangerLogIn



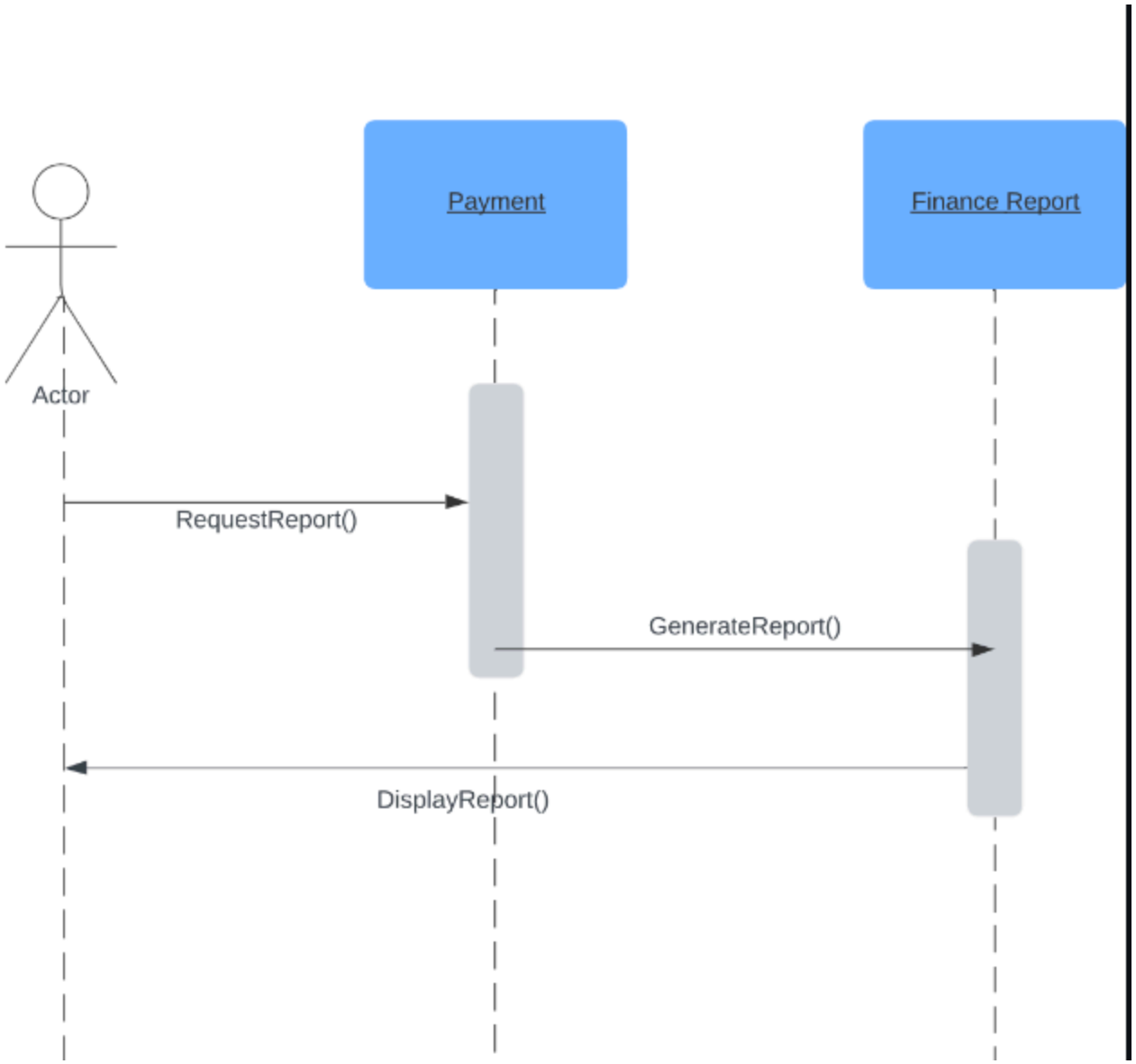
PassangerSignIn



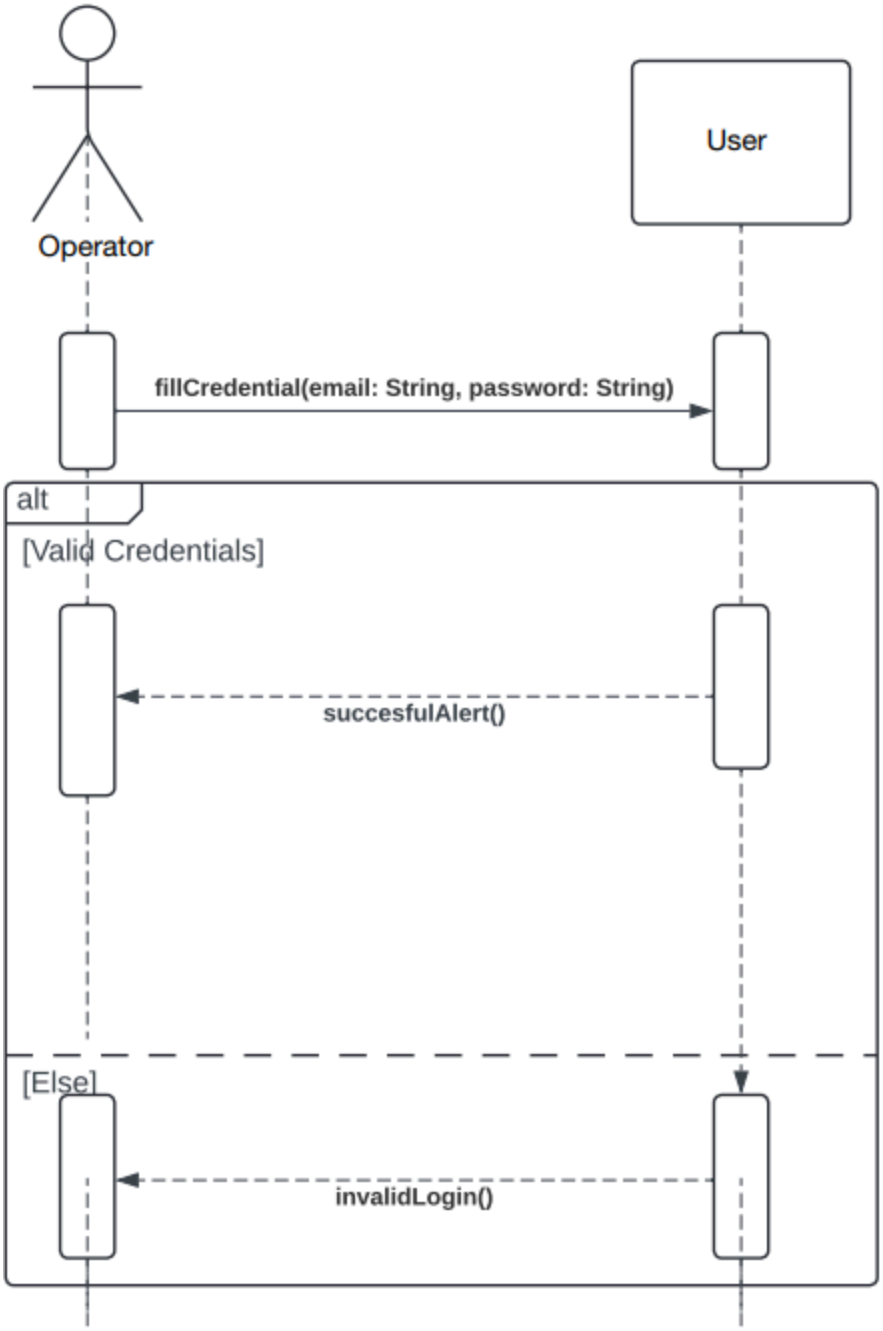
Payment Sequence



Transaction History Sequence

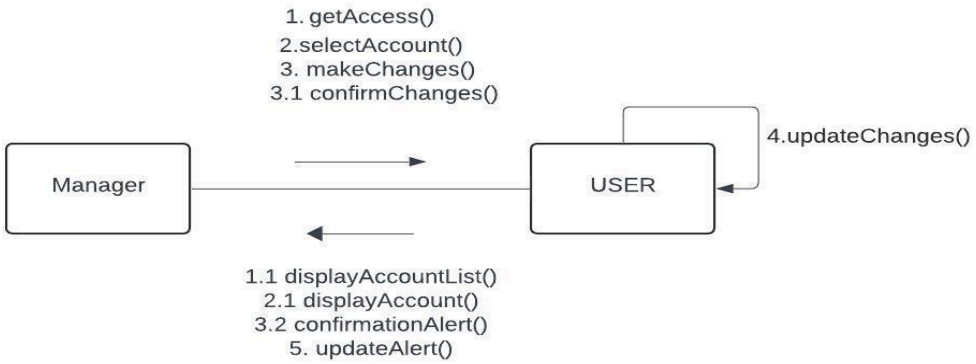


Operator LogIn

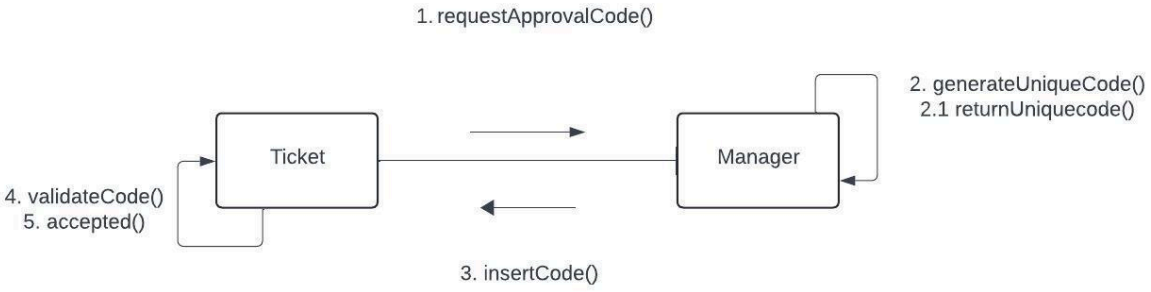

Operator
User
fillCredential(email: String, password: String)
alt
[Valid Credentials]
succesfulAlert()
[Else]
invalidLogin()

5.9. Collaboration Diagram

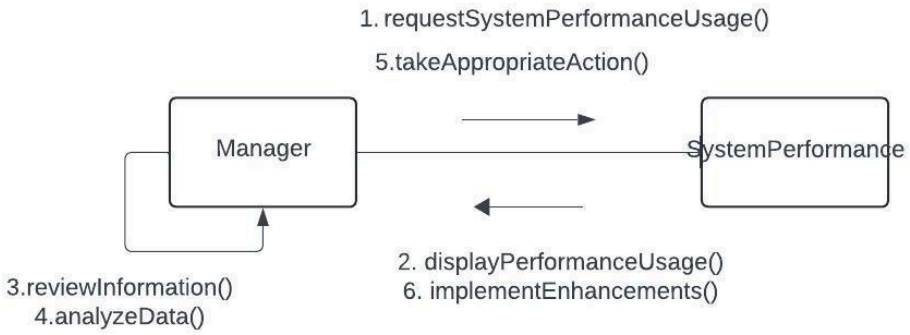
User Account and Permission Management (Excluding Admins)



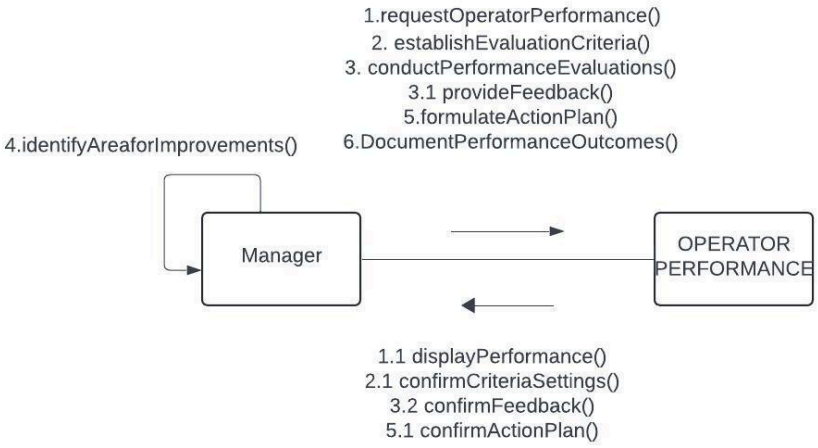
Generate Unique Code



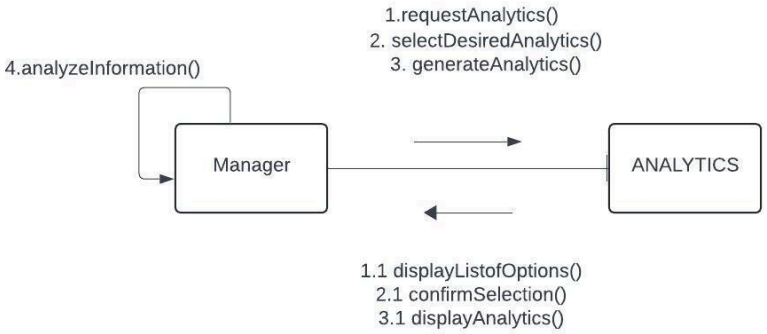
System Performance and Usage Monitoring



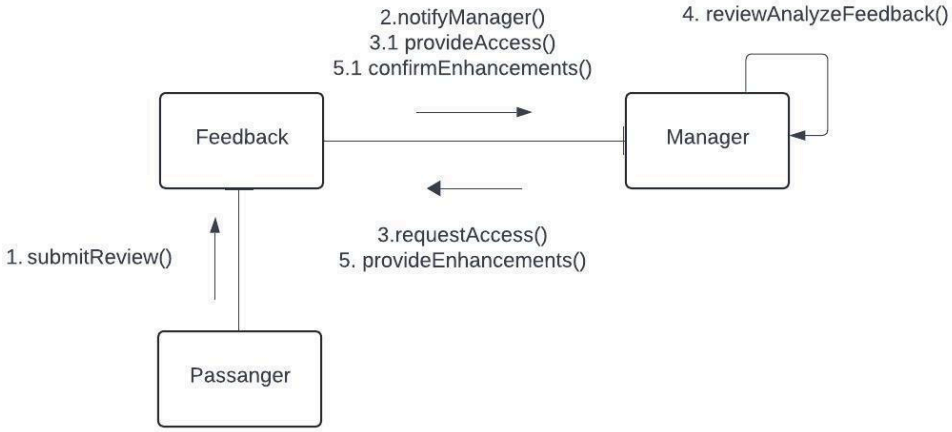
Staff (Operators) Performance Management



Analytics Access

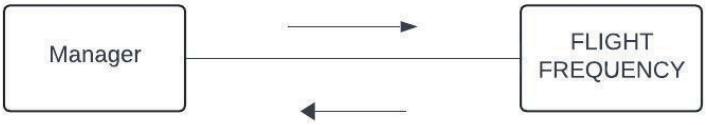


Incorporate Client Feedback



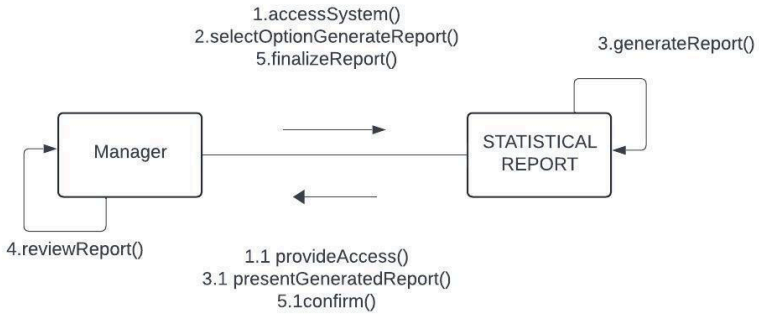
Include Flight Frequency Data

1.accessFlightfrequencyData()
2.validateFormat()
3.configurePermissionsforIntegration()
4.implmentDataIntegration()
5.conductTesting()
6.provideDocumentation()
7.monitorUpdates()



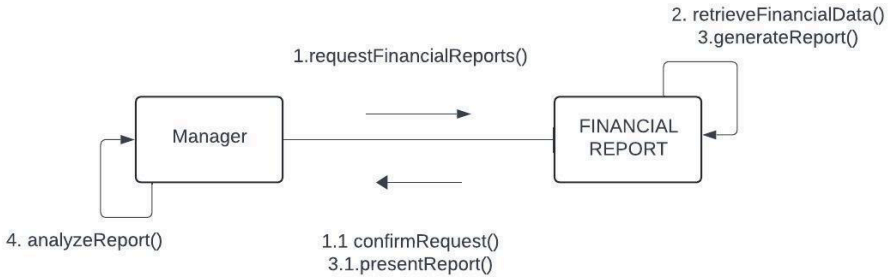
1.1 provideAccess()
2.1 confirmValidation()
3.1 confirmPermissions()
4.1.confirmImplementation()
5.1 completeTesting()

Generate Monthly Statistical Reports

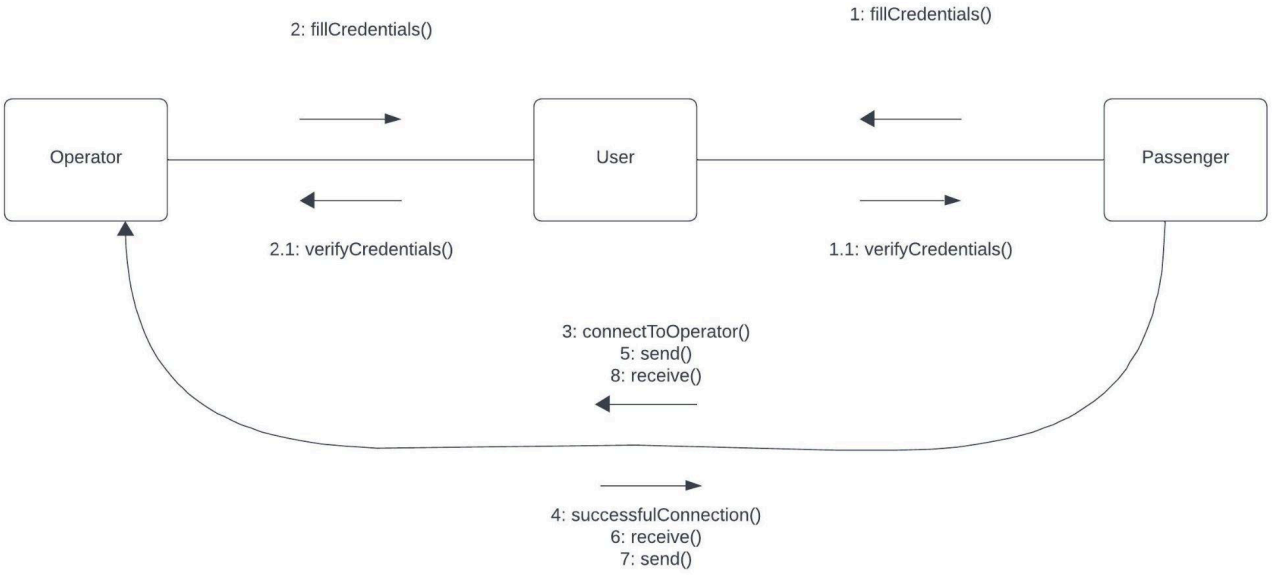


Financial Reports

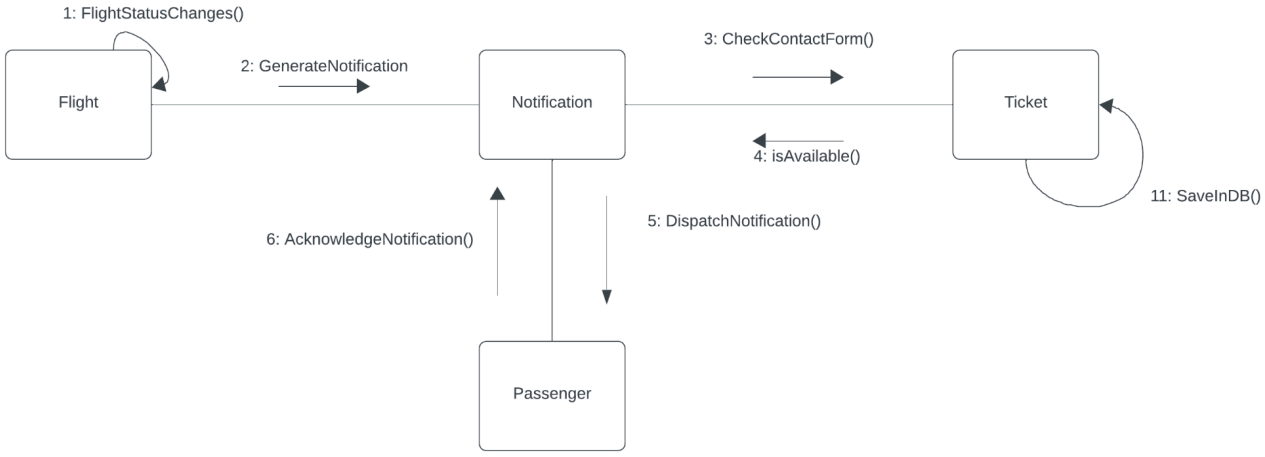
)



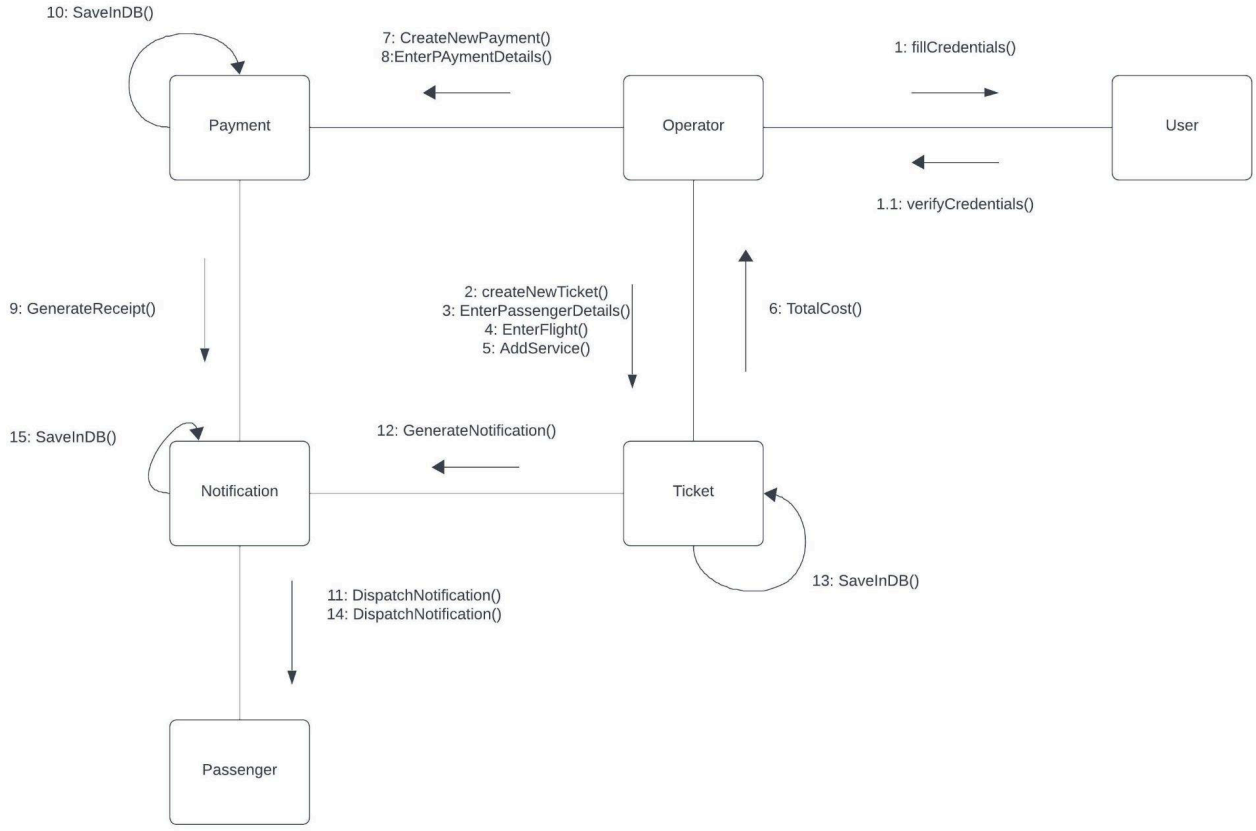
UC 701 - Live Chat Communication



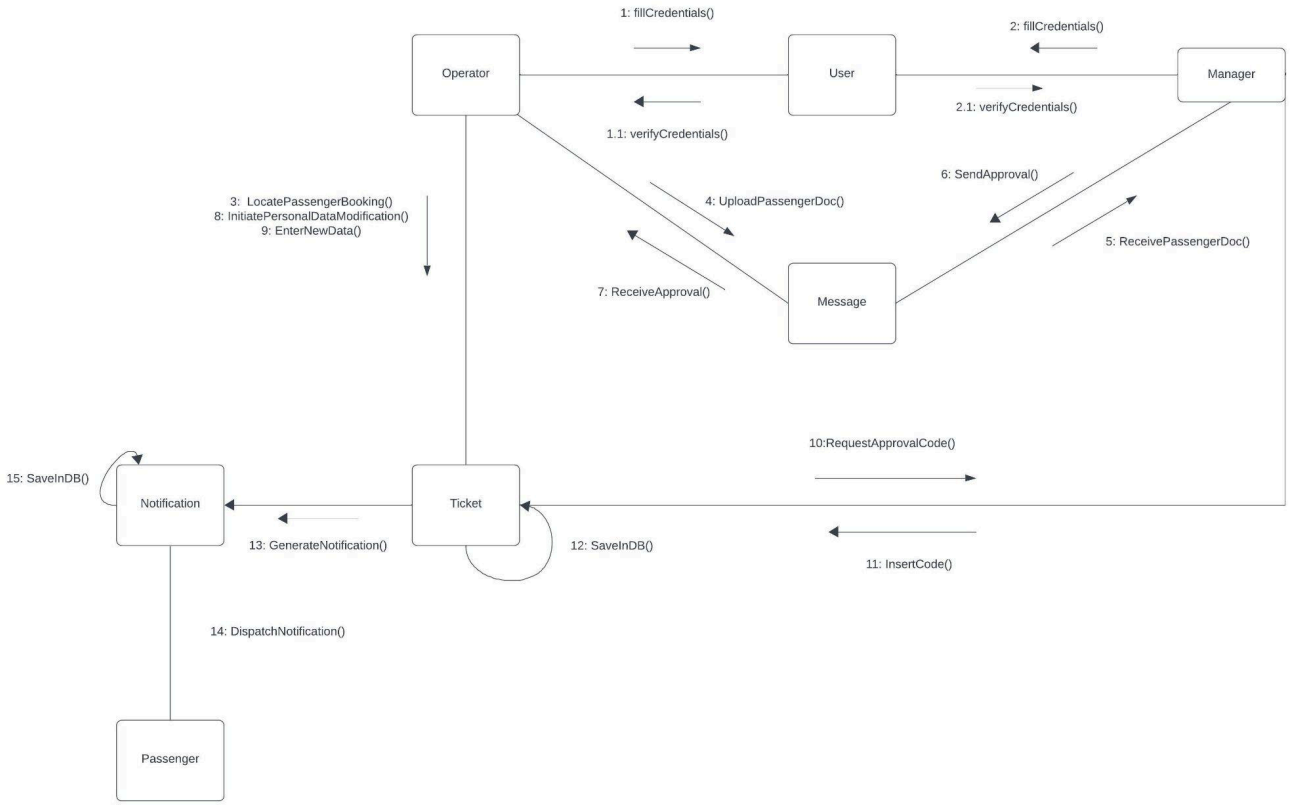
UC 702 - BOOKING UPDATE NOTIFICATION



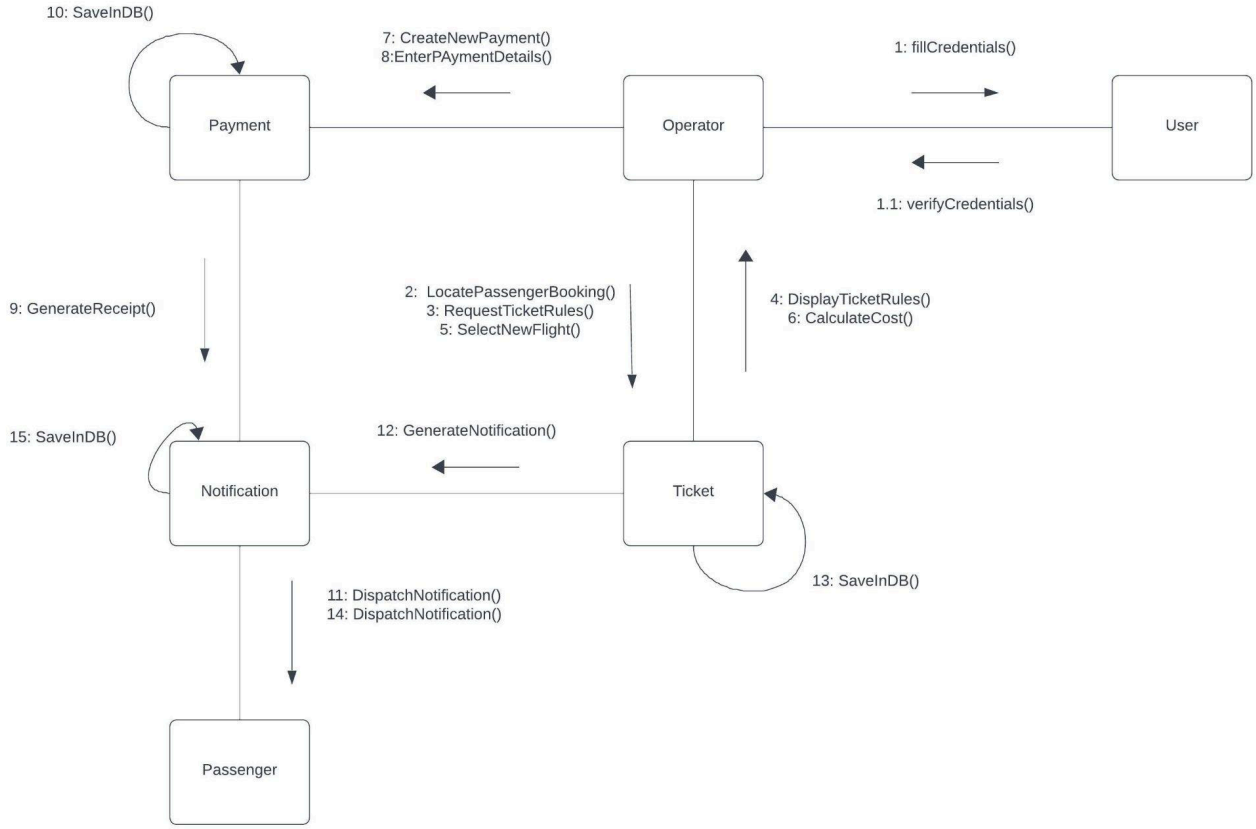
UC 703 - CUSTOMER SERVICE NEW BOOKING



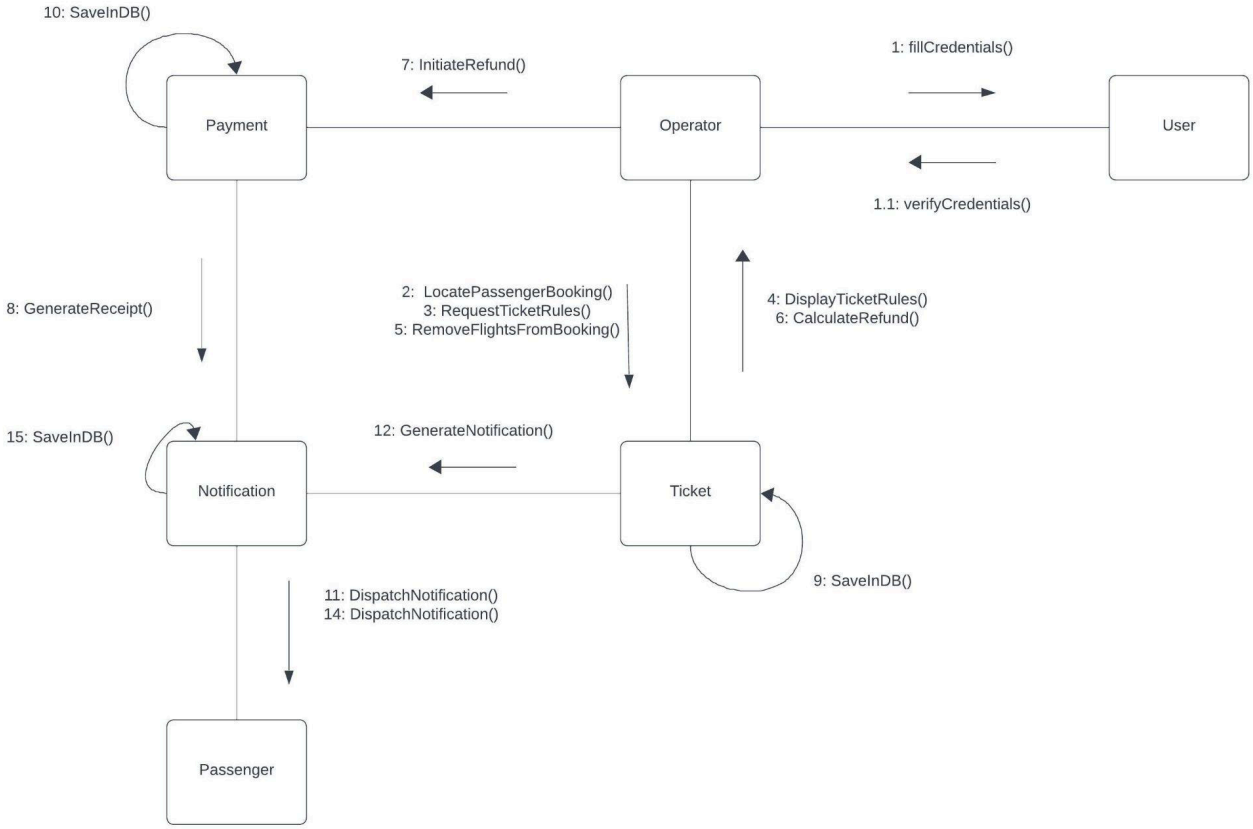
UC 704 - PERSONAL INFORMATION MODIFICATION



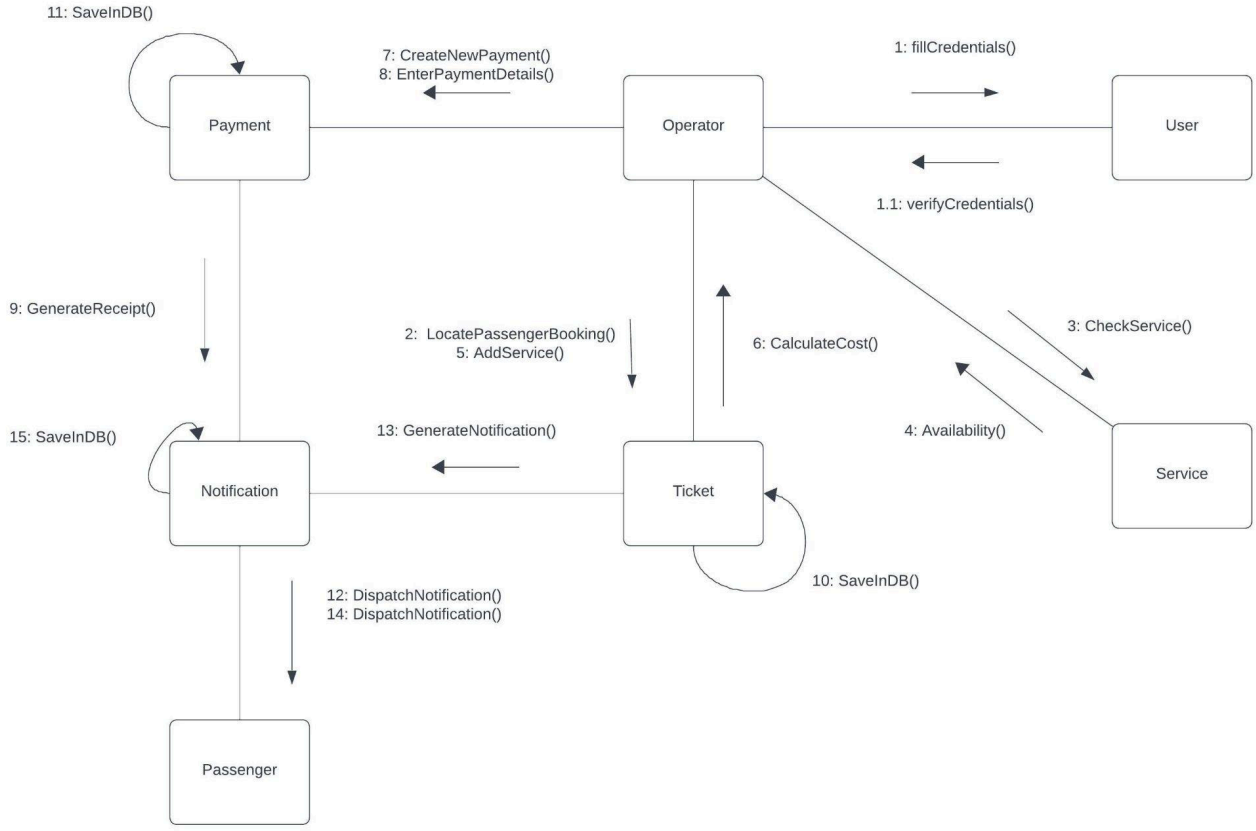
UC 705 - Rebooking

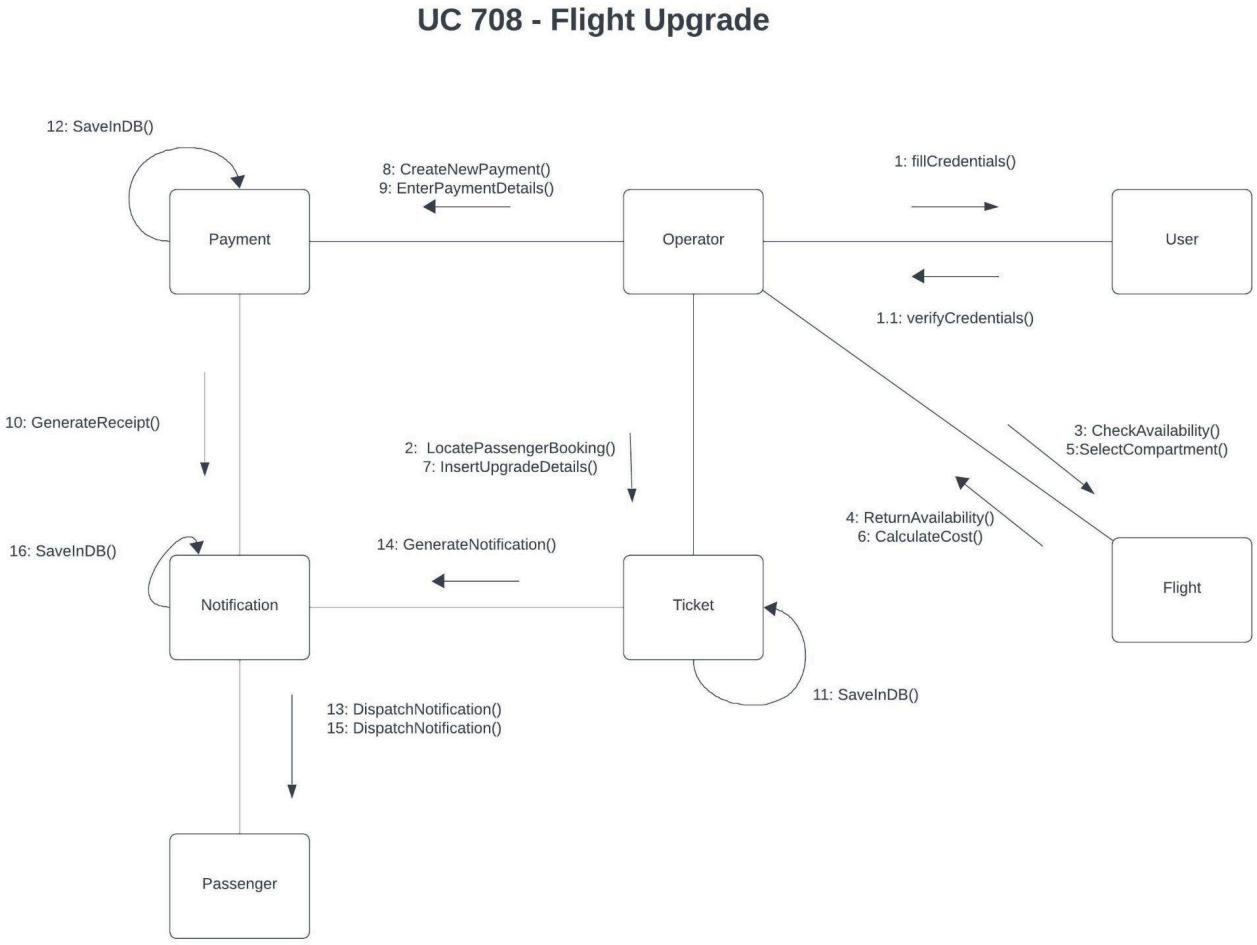


UC 706 - CANCELLATION

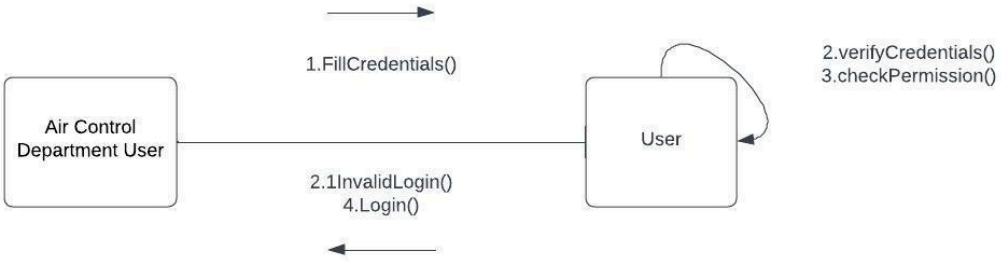


UC 707 - ADDITIONAL SERVICES

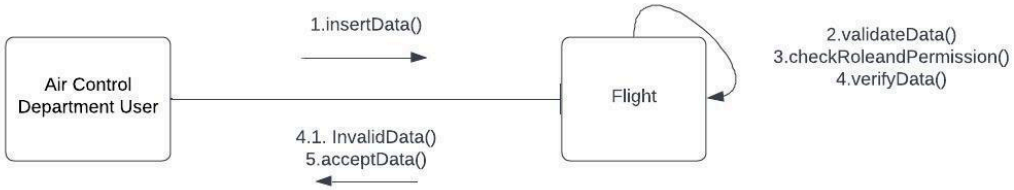



UC 708 - Flight Upgrade
12: SaveInDB()
8: CreateNewPayment()
9: EnterPaymentDetails()
1: fillCredentials()
Payment
Operator
User
1.1: verifyCredentials()
10: GenerateReceipt()
2: LocatePassengerBooking()
7: InsertUpgradeDetails()
3: CheckAvailability()
5:SelectCompartment()
4: ReturnAvailability()
6: CalculateCost()
16: SaveInDB()
14: GenerateNotification()
Notification
Ticket
Flight
11: SaveInDB()
13: DispatchNotification()
15: DispatchNotification()
Passenger

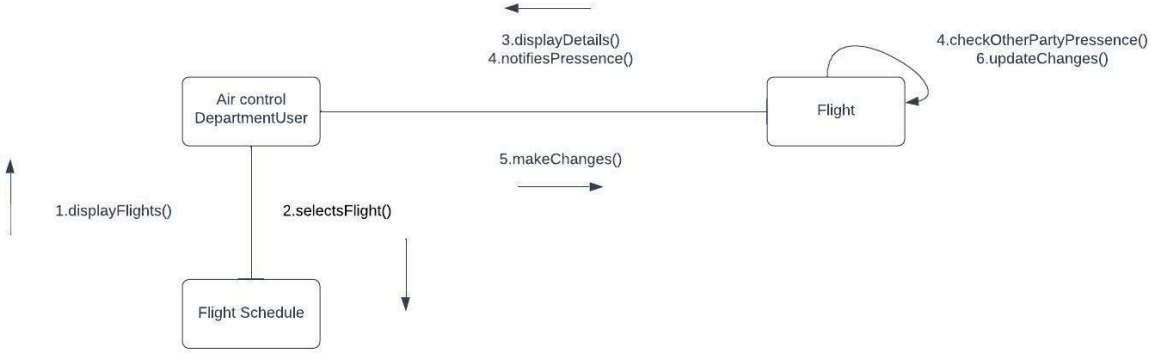
UC-501


1.FillCredentials()
2.verifyCredentials()
3.checkPermission()
Air Control
Department User
User
2.1InvalidLogin()
4.Login()

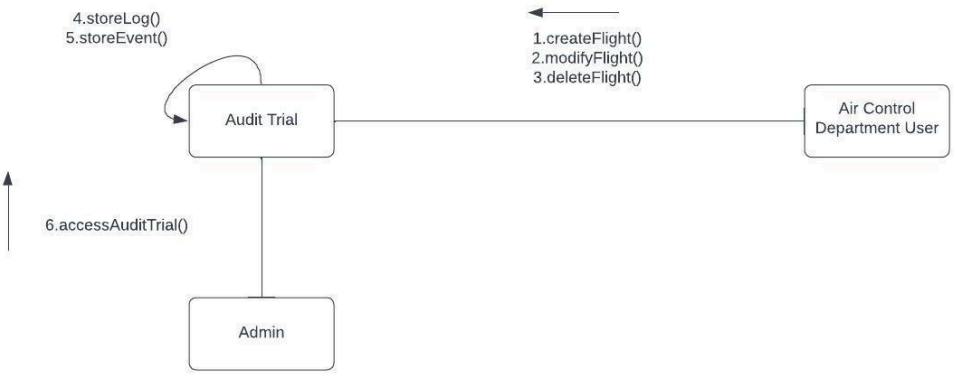
UC-502



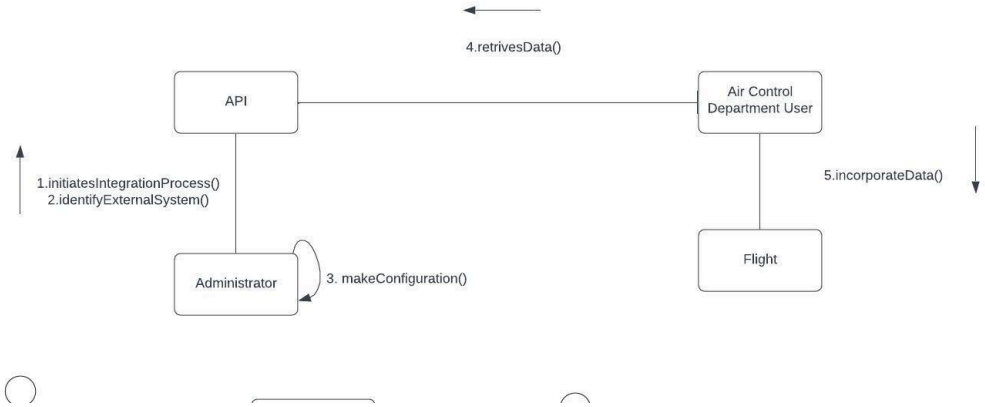
UC-503



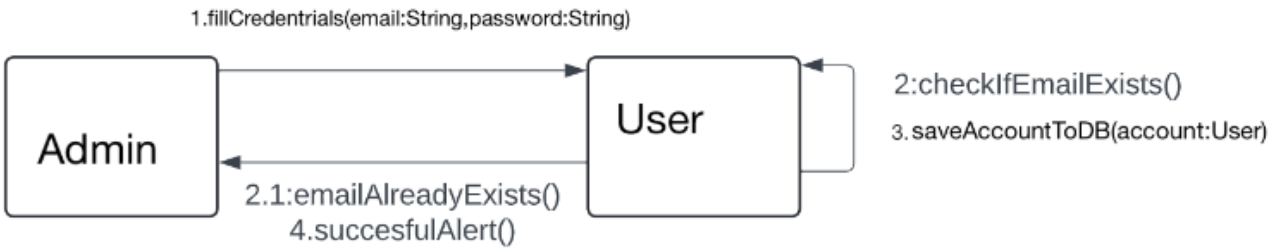
UC-505



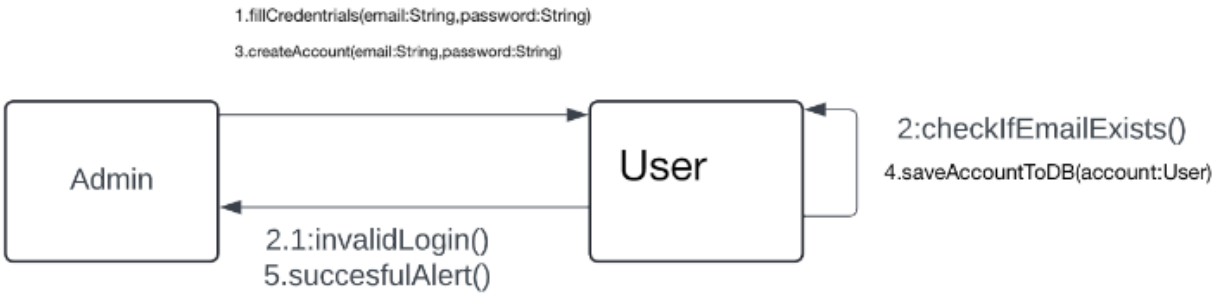
UC-506



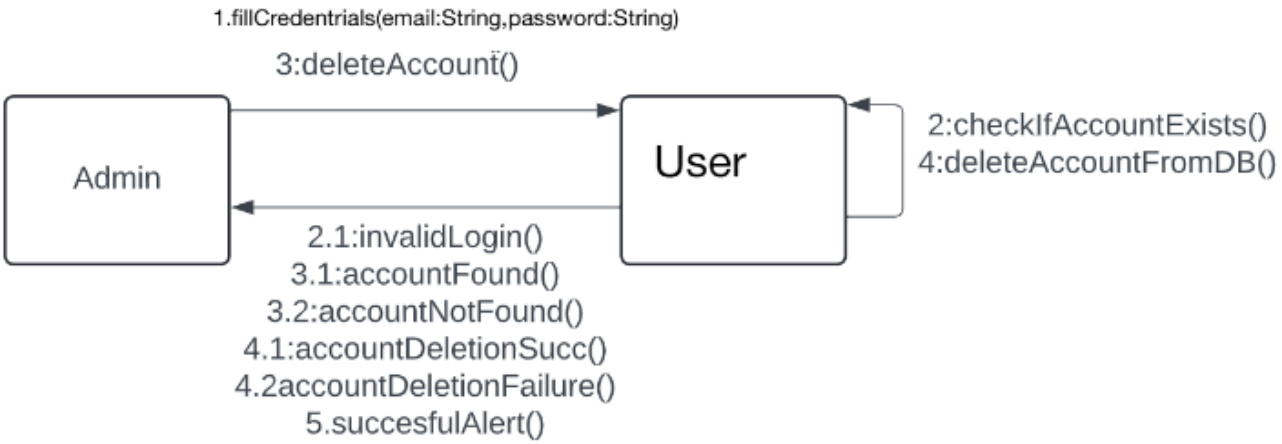
LogIn Admin



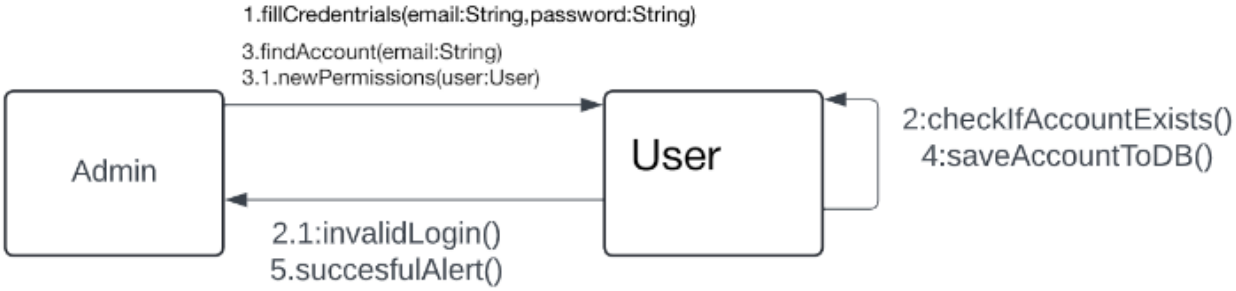
Create Account



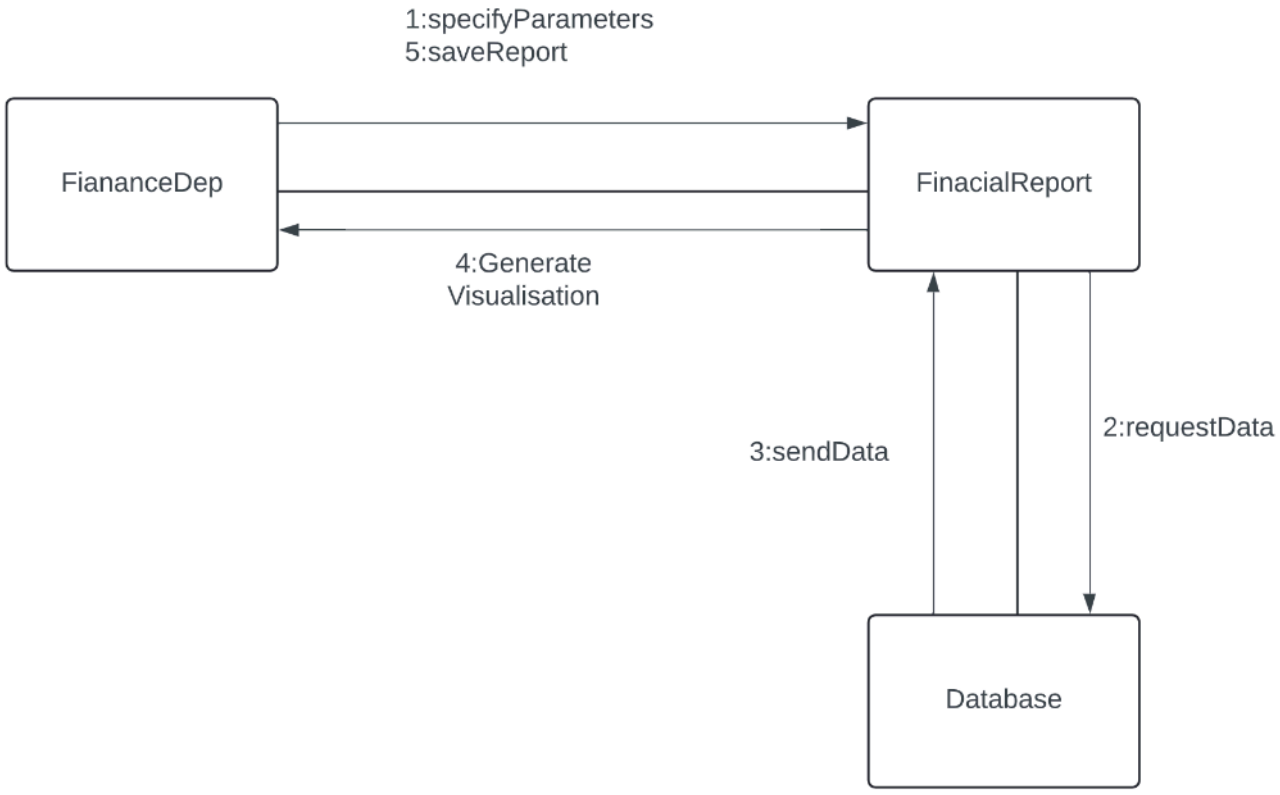
Create Account Admin

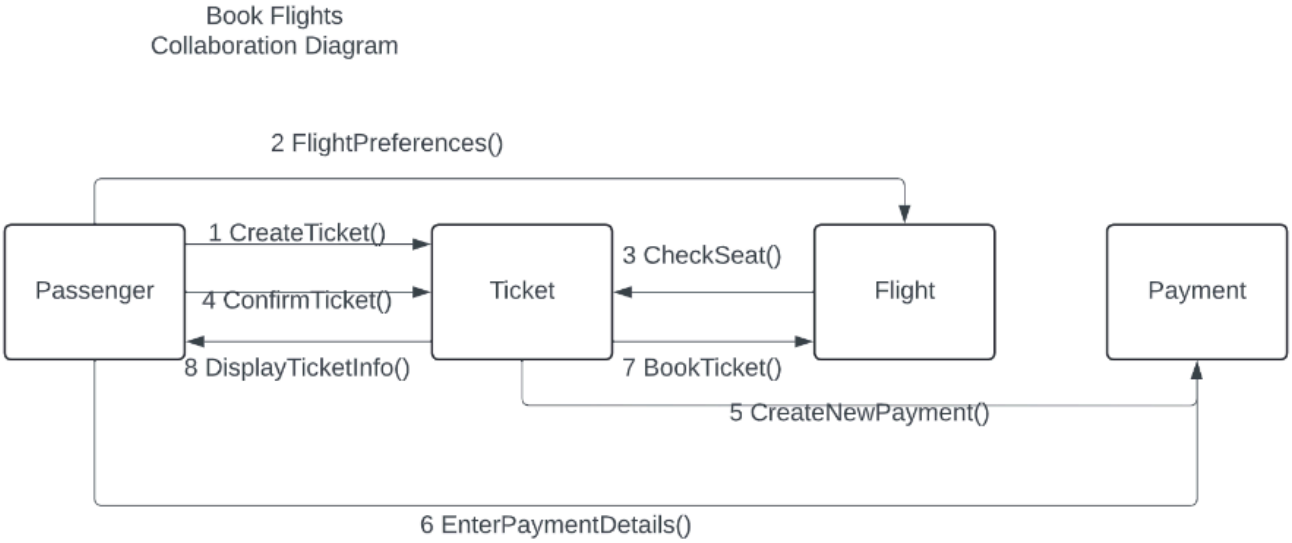


Edit Account Admin

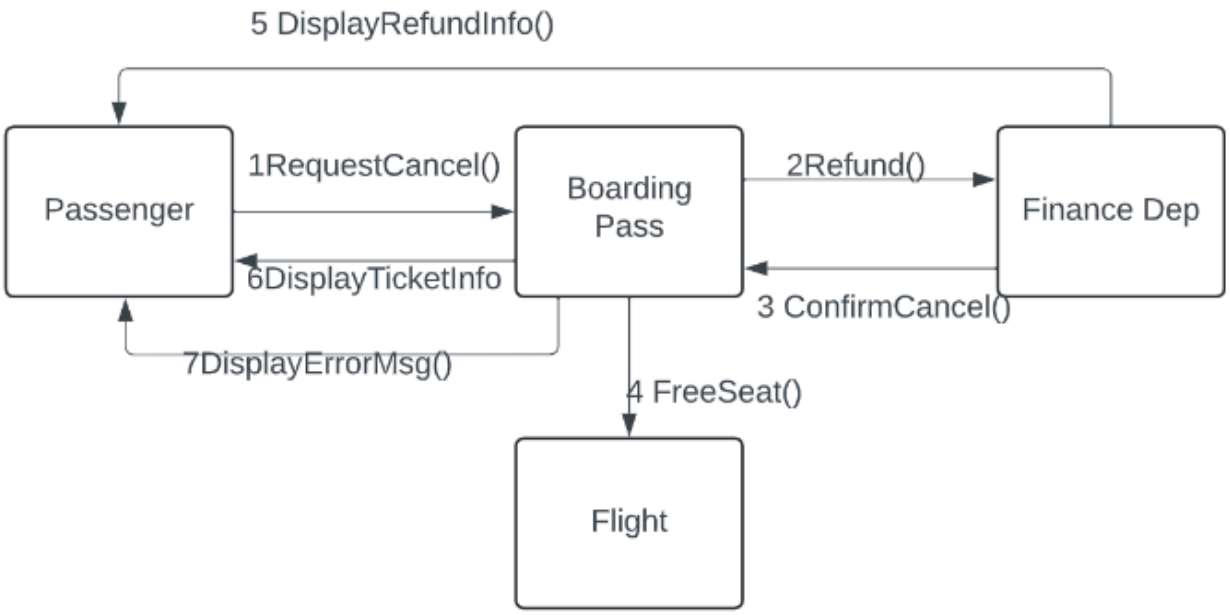


Financial Report

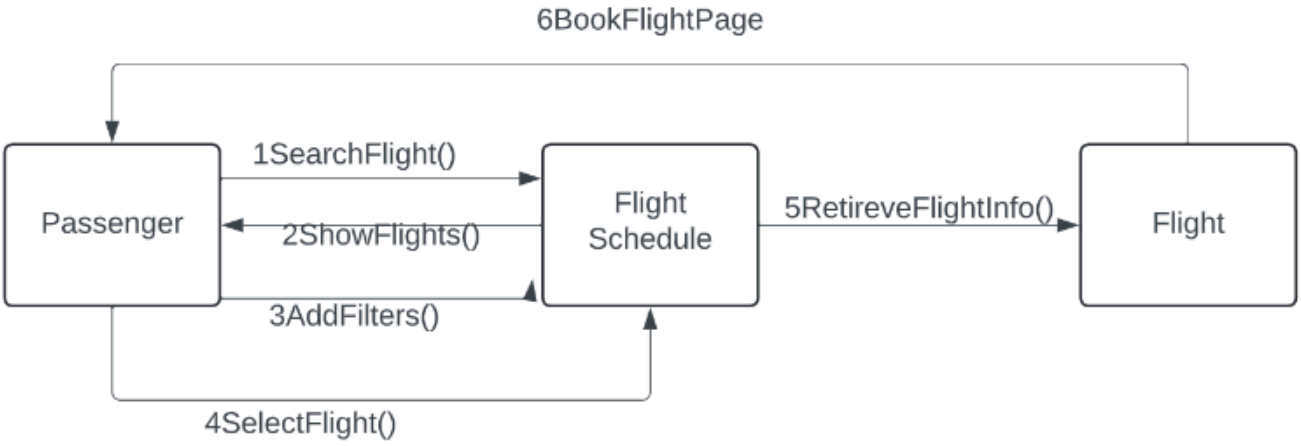

1:specifyParameters
5:saveReport
FiananceDep
FinacialReport
4:Generate
Visualisation
3:sendData
2:requestData
Database


Book Flights
Collaboration Diagram
2 FlightPreferences()
Passenger
1 CreateTicket()
4 ConfirmTicket()
8 DisplayTicketInfo()
Ticket
3 CheckSeat()
7 BookTicket()
Flight
Payment
5 CreateNewPayment()
6 EnterPaymentDetails()

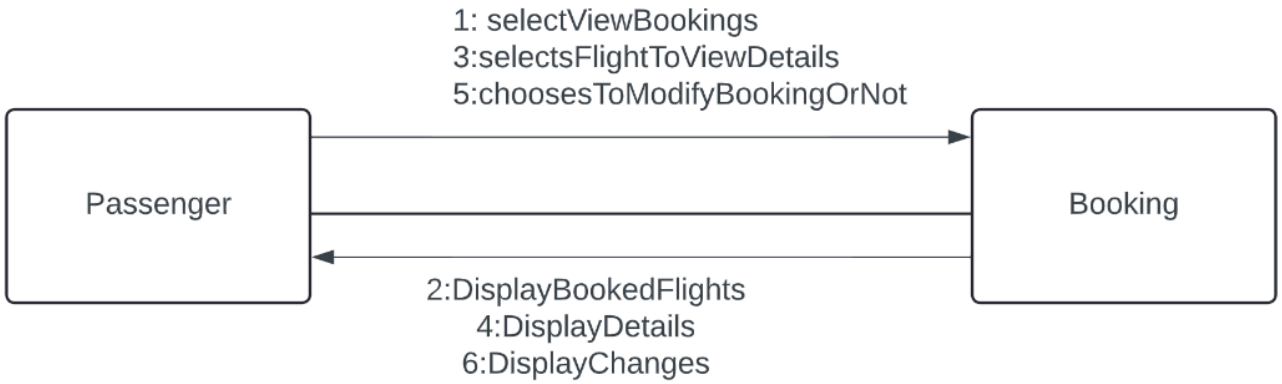
Delete Flights
Collaboration Diagram



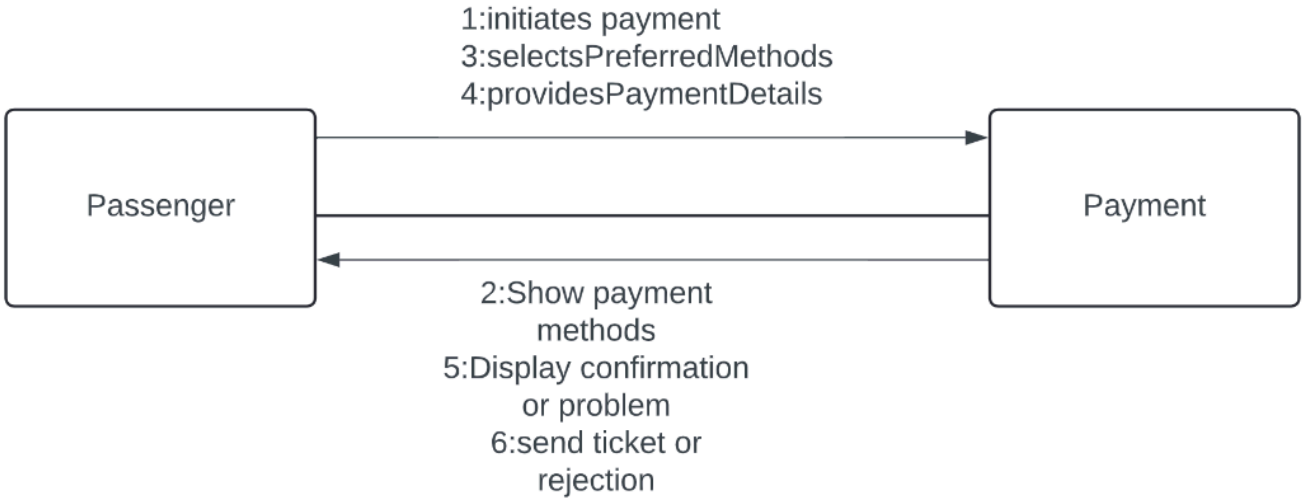
Filter Flights
Collaboration Diagram



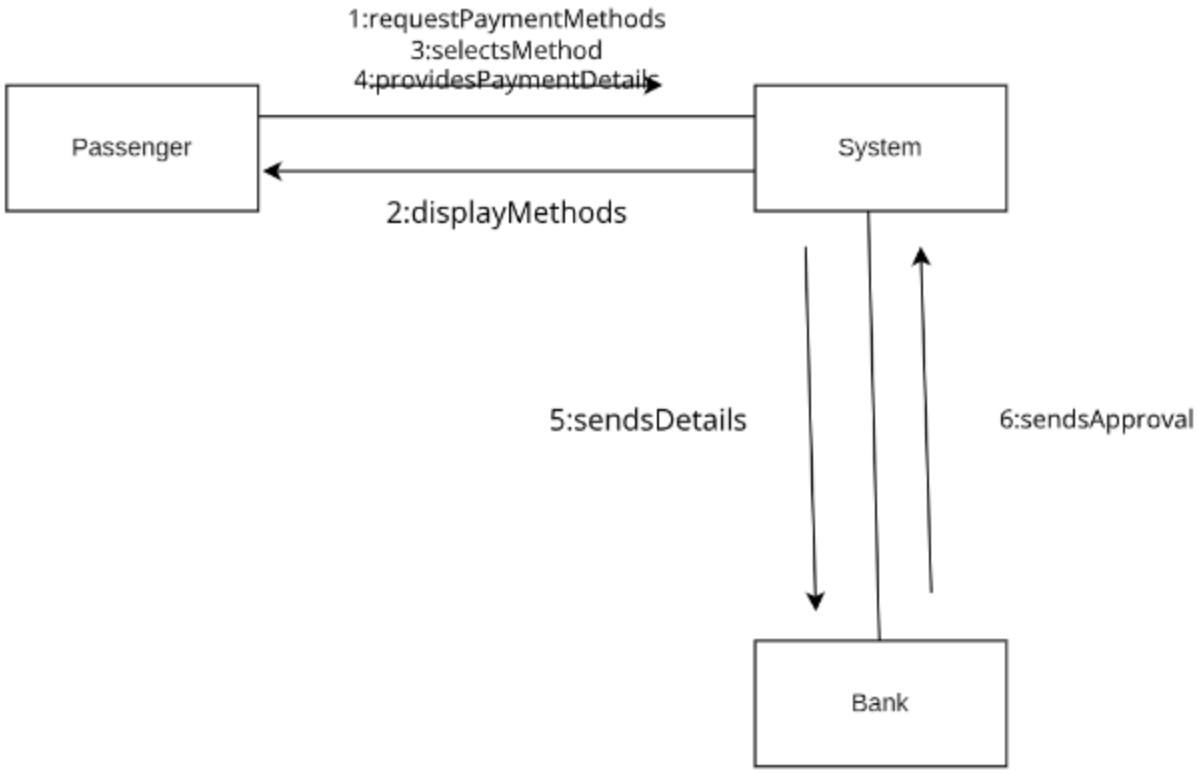
ManageBooking



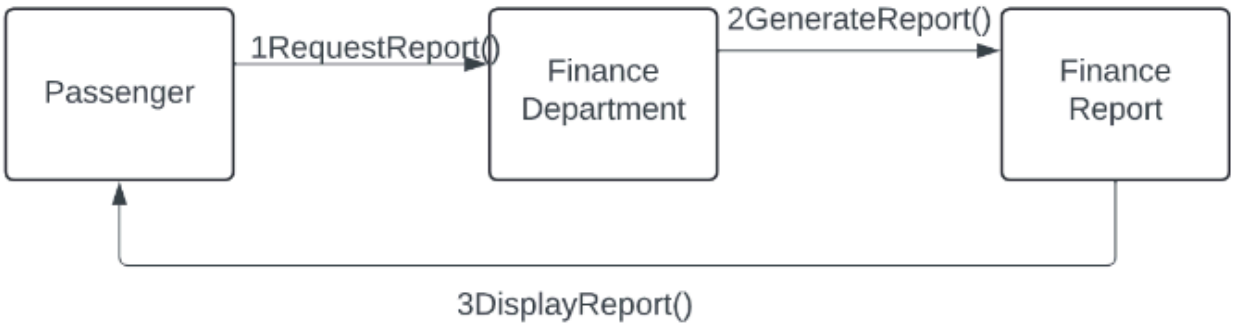
Payment



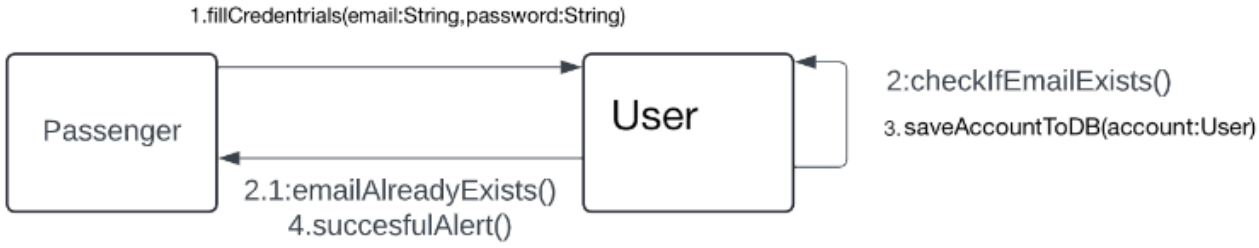
Ticket payment



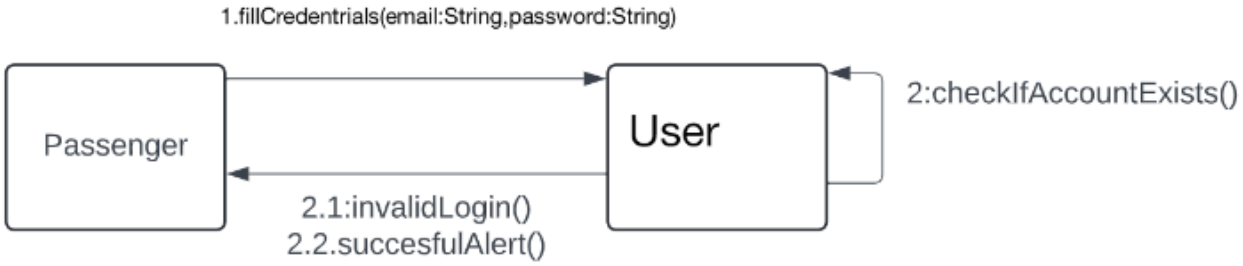
Transaction History
Collaboration Diagram



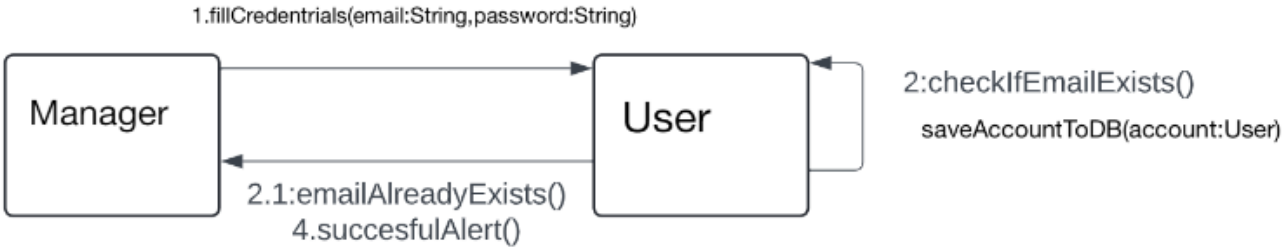
LogIn Passenger



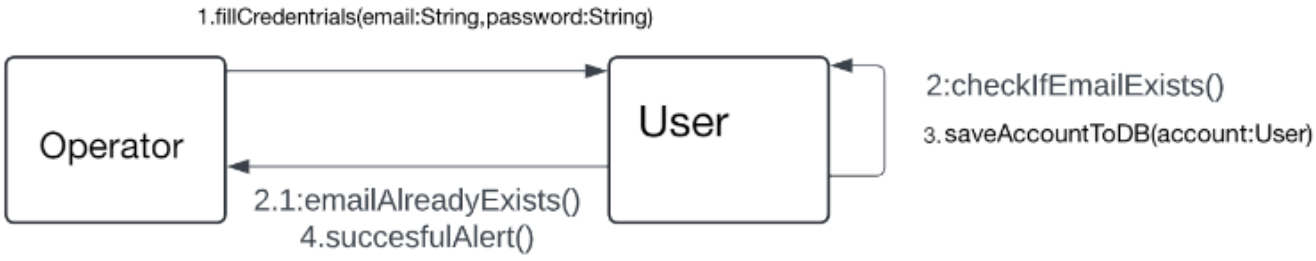
Signup Passenger



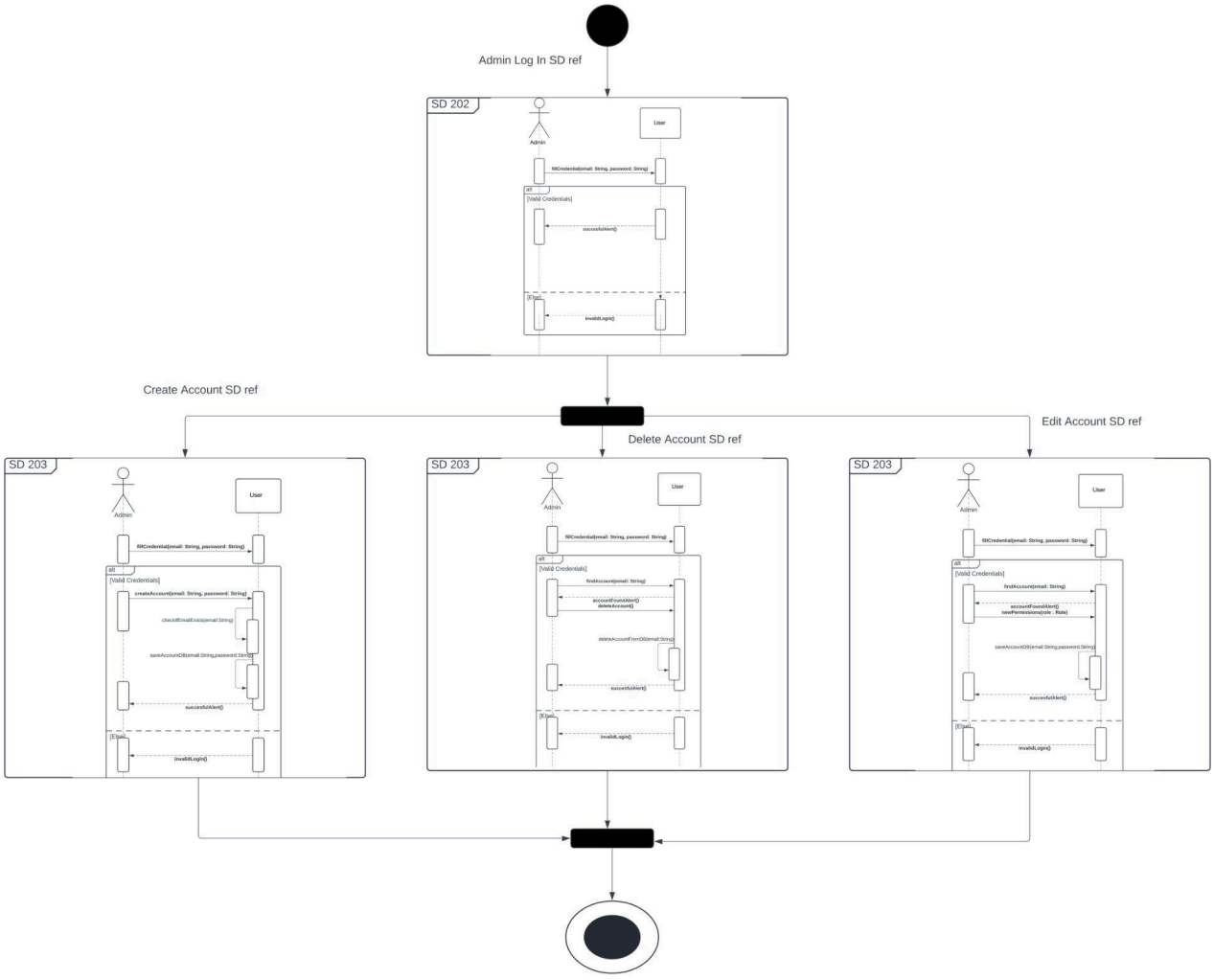
LogIn Manager

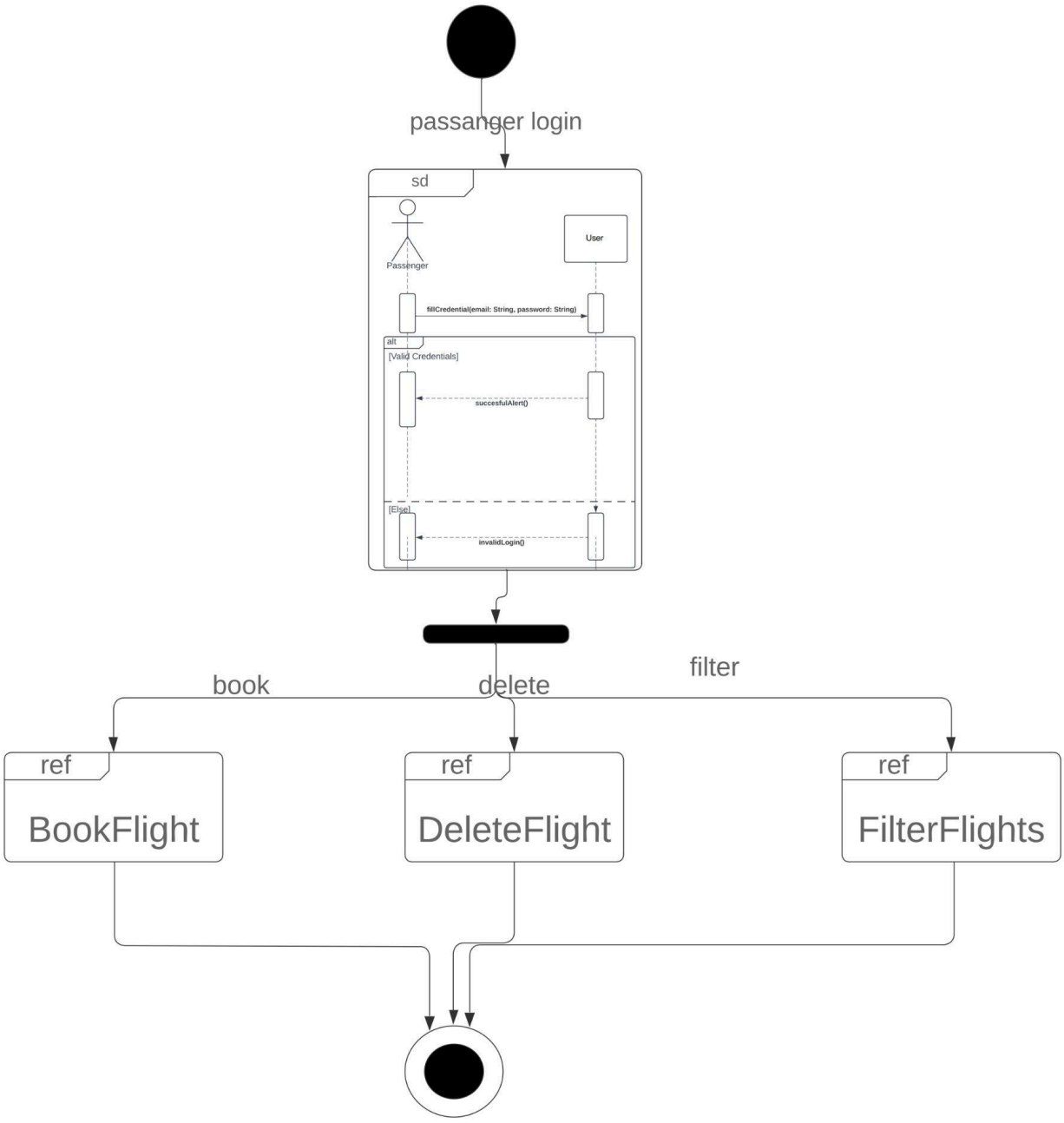


LogIn Operator



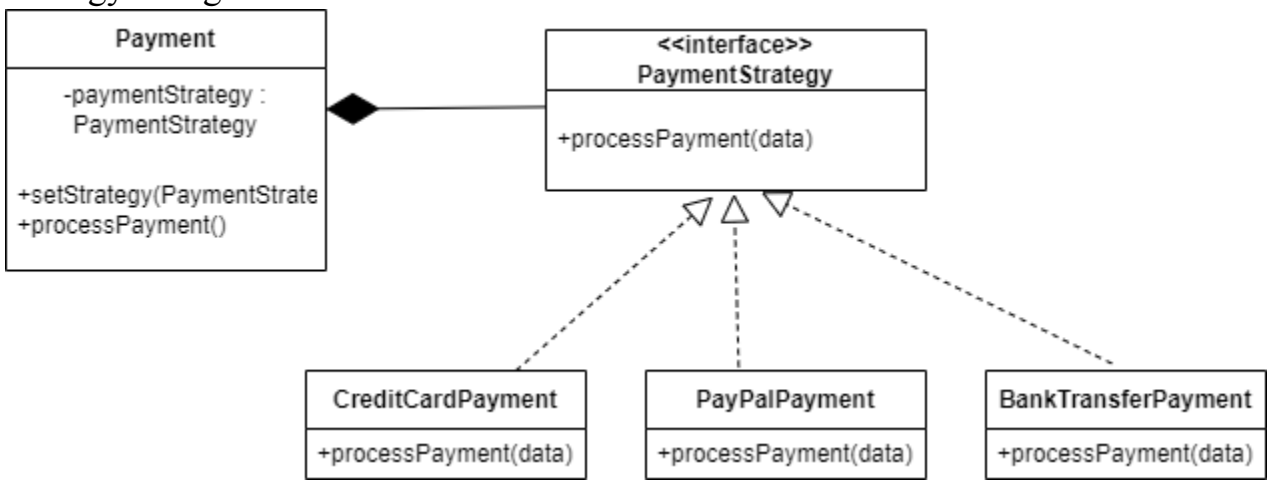
5.10. Interaction Overview Diagram

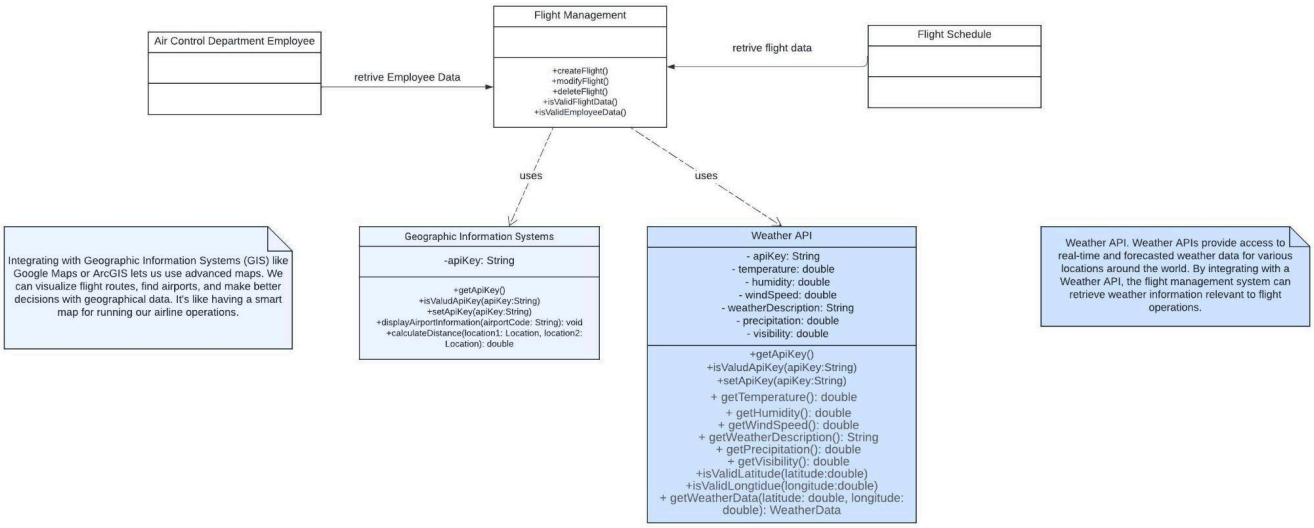


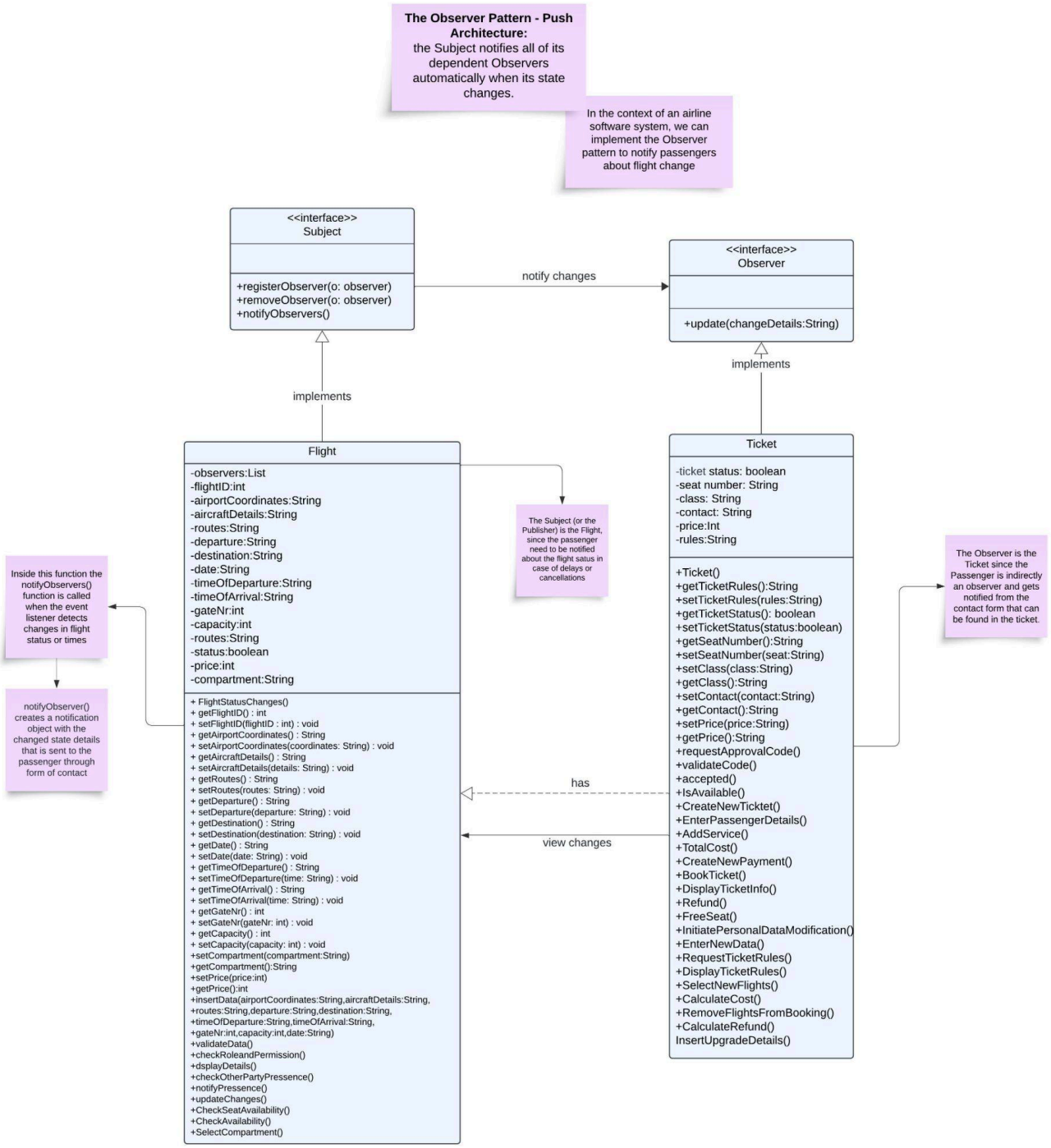

passanger login
sd
Passenger
User
fillCredential(email: String, password: String)
alt
[Valid Credentials]
succesfulAlert()
[Else]
invalidLogin()
book
delete
filter
ref
BookFlight
ref
DeleteFlight
ref
FilterFlights

5.11. Design Patterns Class Diagram

Strategy Design Pattern






The Observer Pattern - Push Architecture:
the Subject notifies all of its dependent Observers automatically when its state changes.
In the context of an airline software system, we can implement the Observer pattern to notify passengers about flight change
<<interface>>
Subject
+registerObserver(o: observer)
+removeObserver(o: observer)
+notifyObservers()
notify changes
<<interface>>
Observer
+update(changeDetails:String)
implements
implements
Flight
-observers:List
-flightID:int
-airportCoordinates:String
-aircraftDetails:String
-routes:String
-departure:String
-destination:String
-date:String
-timeOfDeparture:String
-timeOfArrival:String
-gateNr:int
-capacity:int
-routes:String
-status:boolean
-price:int
-compartment:String
+ FlightStatusChanges()
+ getFlightID() : int
+ setFlightID(flightID : int) : void
+ getAirportCoordinates() : String
+ setAirportCoordinates(coordinates: String) : void
+ getAircraftDetails() : String
+ setAircraftDetails(details: String) : void
+ getRoutes() : String
+ setRoutes(routes: String) : void
+ getDeparture() : String
+ setDeparture(departure: String) : void
+ getDestination() : String
+ setDestination(destination: String) : void
+ getDate() : String
+ setDate(date: String) : void
+ getTimeOfDeparture() : String
+ setTimeOfDeparture(time: String) : void
+ getTimeOfArrival() : String
+ setTimeOfArrival(time: String) : void
+ getGateNr() : int
+ setGateNr(gateNr: int) : void
+ getCapacity() : int
+ setCapacity(capacity: int) : void
+setCompartment(compartment:String)
+getCompartment():String
+setPrice(price:int)
+getPrice():int
+insertData(airportCoordinates:String,aircraftDetails:String,
+routes:String,departure:String,destination:String,
+timeOfDeparture:String,timeOfArrival:String,
+gateNr:int,capacity:int,date:String)
+validateData()
+checkRoleandPermission()
+dsplayDetails()
+checkOtherPartyPressence()
+notifyPressence()
+updateChanges()
+CheckSeatAvailability()
+CheckAvailability()
+SelectCompartment()
The Subject (or the Publisher) is the Flight, since the passenger need to be notified about the flight satus in case of delays or cancellations
Inside this function the notifyObservers() function is called when the event listener detects changes in flight status or times
notifyObserver() creates a notification object with the changed state details that is sent to the passenger through form of contact
Ticket
-ticket status: boolean
-seat number: String
-class: String
-contact: String
-price:Int
-rules:String
+Ticket()
+getTicketRules():String
+setTicketRules(rules:String)
+getTicketStatus(): boolean
+setTicketStatus(status:boolean)
+getSeatNumber():String
+setSeatNumber(seat:String)
+setClass(class:String)
+getClass():String
+setContact(contact:String)
+getContact():String
+setPrice(price:String)
+getPrice():String
+requestApprovalCode()
+validateCode()
+accepted()
+IsAvailable()
+CreateNewTicktet()
+EnterPassengerDetails()
+AddService()
+TotalCost()
+CreateNewPayment()
+BookTicket()
+DisplayTicketInfo()
+Refund()
+FreeSeat()
+InitiatePersonalDataModification()
+EnterNewData()
+RequestTicketRules()
+DisplayTicketRules()
+SelectNewFlights()
+CalculateCost()
+RemoveFlightsFromBooking()
+CalculateRefund()
InsertUpgradeDetails()
The Observer is the Ticket since the Passenger is indirectly an observer and gets notified from the contact form that can be found in the ticket.
has
view changes