

ENSF 614: Advanced System Analysis and Software Design
Fall 2023

**Flight Reservation System
Design Document**

Group 18

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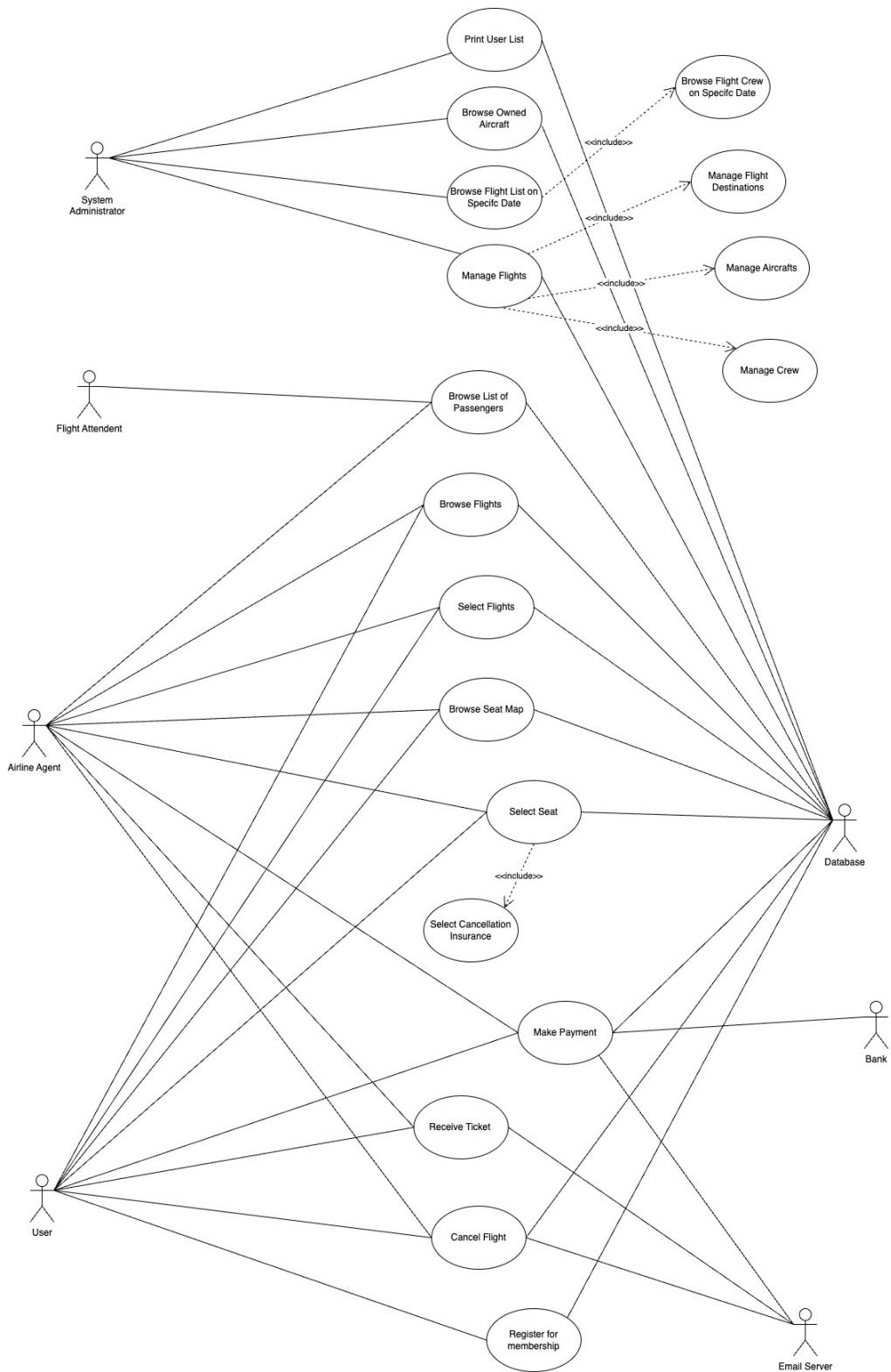
Brandon Phan

Part One - System Analysis

1. System Description

The objective is to design a flight reservation web application for an airline company. It is meant to be used by customers, tourism agents, airline agents and the system admins. The functional scope must include the customer trying to browse flights and then to purchase a ticket and performing any subsequent actions, such as canceling the purchase of the ticket. The functional scope should also include the tourism agents being able to browse passenger lists and system admins should be able to print the list of registered users, add and remove crews, planes, flight destinations, modify flight information as well as to simply browse through them. The final application should allow users to browse flights, select where they wish to sit, purchase the ticket, and issue tickets to the user via email.

2. System Use-Case Diagram



3. System Use-Case Scenarios

Browse Flights

Preconditions: User must be on the 'Flights' page of the airline website. User does not need to be logged in (can be a guest user).

John is on the 'Flights' page of the airline website. The system provides drop-down menus for the following information: date, origin, destination, and number of passengers. John selects the following from the available options: "12/13/2023", "Calgary", "Vancouver", and "2". The system queries the database and presents a list of available flights matching the specified criteria. John browses through the list of flights, viewing details for flights within each trip.

Postconditions: User or airline agent has an overview of available flights for the inputted criteria.

Select Flights

Preconditions: User or airline agent is viewing a list of flights on the airline website.

From the list of flights John is viewing on the 'Flights' page of the airline website, he selects the desired flight by clicking a 'Select' button. Once the button is clicked, the system redirects John to a seat selection page to select the number and class of seats on the flight.

Postconditions: User or airline agent is redirected to the seat map for the selected flight.

Browse Seat Map

Preconditions: User or airline agent has selected their desired flight.

After selecting his desired flight, John views a graphical representation of the aircraft's seat map for the selected flight. John views the available seat classes, Ordinary, Comfort, or Business-Class, their locations on the aircraft, and their respective prices. Available seats are highlighted, whereas unavailable seats are grayed out.

Postconditions: User or airline agent has an understanding of the available seats, their locations within the aircraft and their prices for the selected flight.

Select Seat

Preconditions: User or airline agent has successfully browsed the seat map for the selected flight and decided which seat(s) to select.

John has decided to go for Business-Class seats. He selects 2 seats, one for him and the other for his friend. Before clicking the 'Enter Passenger Details' button, the website provides a selection-box for cancellation insurance. John selects cancellation insurance for his trip. The system calculates and displays the total amount, including the flights, seats and cancellation insurance. John clicks on the 'Enter Passenger Details' button and is redirected to the "Passenger Details" page where he is prompted to enter the passenger names for each seat selected. He

enters ‘John Doe’ for one seat and for the other seat, ‘Jane Doe’. He then clicks the ‘Pay’ button and is redirected to the ‘Payment’ page.

Postconditions: The seat(s) is selected by the user or airline agent, total amount is calculated, and they are redirected to the payment page.

Make Payment

Preconditions: User or airline agent has selected their desired seat(s) or has initiated flight cancellation or membership registration, and the payment amount has already been calculated by the system.

John is on the “Payment” page. He is given the option to check out as a guest or log in to his account to check out as a registered user if he is one. John inputs his credit card information, name on card, card number, expiry date, and CVC. Since John is a guest user, he is prompted to enter his email in order to receive the payment receipt and purchased tickets. He enters “john.doe@example.com”. He then clicks the ‘Pay’ button to make the payment. The Credit Card Processor confirms the payment information with the bank. If the payment is declined, John is notified of the error and is able to re-input different credit card information. If the payment is successfully processed, the system updates the database based on the source of the payment (flight/seat selection, flight cancellation, or membership registration) and John is redirected to a “Payment Confirmation” page. The system triggers 2 emails to be sent - one with the receipt and the other with the ticket/cancellation confirmation.

Postconditions: User or airline agent payment is made and a receipt and email confirmation are sent to them.

Receive Ticket

Preconditions: User or airline agent has successfully paid for their ticket(s).

John has selected his desired flight, seats, cancellation insurance and has paid for them. He has been redirected to a “Payment Confirmation” page. An electronic ticket with flight and seat information and a booking confirmation code is generated. The system sends the generated ticket to John’s email.

Postconditions: User or airline agent receives an email with the electronic ticket.

Cancel Flight

Preconditions: Regular/guest user has successfully paid for their booking and has received an email with their e-ticket, containing the booking confirmation code. If user is a registered user or airline agent, they must be logged into their account.

Anne is a registered user and is logged in. She goes to the “Bookings” page on the website and selects the ticket she wants to cancel. She clicks the cancel button. The cancellation is processed and the seat that was selected on the ticket is reset to available and the passengers are removed

from the passengers list in the database. Since she does not have cancellation insurance for her ticket, she does not receive a refund, but she does receives a cancellation notification by email.

John, on the other hand, is not a registered user. He goes to the ‘Cancel Ticket’ page and inputs his name and booking code/ticket id which he got from the email he received containing his ticket. The ticket is then displayed to him. He clicks the ‘Cancel’ button and is notified of the cancellation. The cancellation is processed and the seat that was selected on the ticket is reset to available and the passengers are removed from the passengers list in the database. Since he has cancellation insurance for his ticket, he receives a full refund and receives a cancellation/refund notification by email.

Postconditions: Ticket is canceled and seat and passenger databases are updated accordingly. User or airline agent receives an email confirming cancellation and is refunded depending on if they have cancellation insurance.

Register for Membership

Preconditions: User must not be a registered member.

John navigates to the ‘Register for Membership’ page. On this page, information about the membership is displayed. John decides to register for the membership and clicks the ‘Become a Member’ button. This redirects him to the “Registration” page which has 4 input fields for first name, last name, email, password, and home address. John enters “John”, “Doe”, “john.doe@example.com”, “example123”, and “40 Everwillow Dr”. He then reads a disclaimer that explains that he will be automatically subscribed to monthly promotional newsletters by registering as a member. He also clicks a selection box at the bottom of the registration form to apply for a company credit card. John then clicks the ‘Register’ button. His information used to register for his membership is added to the list of registered users in the database.

Postconditions: User is successfully registered as a member.

Print User List

Preconditions: System admin must be logged into their account on the website.

David navigates to the ‘Admin’ page. On this page, he clicks the ‘Manage Users’ tab, which queries the database and generates a list of the registered users. From here, David prints the list of users.

Postconditions: A list of registered users is generated and printed.

Manage Aircrafts

Preconditions: System admin must be logged into their account on the website.

David navigates to the ‘Admin’ page and clicks the ‘Manage Aircraft’ tab. On this page, a list of all the aircrafts owned by the airline company is displayed. To delete an aircraft, David clicks the aircraft and clicks the ‘Delete’ button, which removes the aircraft from the database. To add an

aircraft, David enters information for the ‘Aircraft Model’, ‘Seat Rows’, and ‘Seat Columns’ and clicks the ‘Add’ button, adding the new aircraft information to the database. The ‘Manage Aircrafts’ page now displays the updated aircraft list.

Postconditions: System admin has an overview of aircrafts owned by the airline and has the option to add or delete aircrafts from the database.

Manage Flights

Preconditions: System admin must be logged into their account on the website.

David navigates to the ‘Manage Flights’ tab on the ‘Admin’ page. On this page, David can either add a flight or browse existing flights. To add a flight, David enters flight information, “Flight Code”, “Date”, “Destination”, “Origin”, and “Time”. He then clicks the ‘Add’ button, which adds the new flight to the database. To browse existing flights, David is prompted to select a destination to get a list of all flights to that destination, which can be further filtered by date, or enter a specific flight number. The system queries the database and presents a list of flights matching the specified criteria, showing flight details including departure and arrival dates and times and ticket prices. David clicks on the flight he wants to edit, and clicks the ‘Update’ button to update flight information, or the ‘Delete’ button to remove the flight completely, updating the database accordingly.

Postconditions: System admin has an overview of airline flights, which can be edited or deleted, or to which new flights can be added.

Manage Crew

Preconditions: System admin must be logged into their account on the website.

David navigates to the ‘Admin’ page then to the ‘Manage Crew’ tab. On this page, he can either add a new crew member or view existing crew. To browse existing crew, David enters a specific flight number. The system queries the database and presents a list of the crew for that flight. Once a flight’s crew list is displayed, David can add crew to the flight by selecting additional crew members from the list of all the crew members and clicking the ‘Assign’ button, updating the database accordingly. If he wants to remove a crew member from a flight’s crew list, he selects the crew member and clicks the ‘Remove’ button, updating the database accordingly.

Postconditions: System admin has an overview of the airline crew and assign or remove crew members from flights.

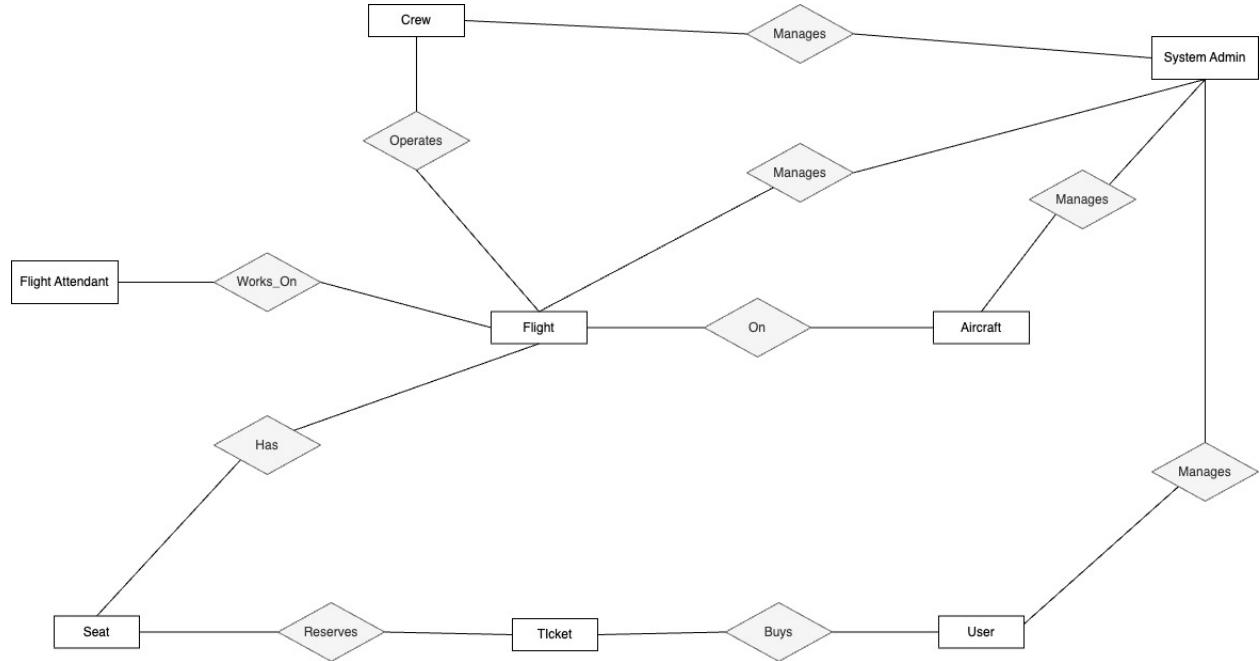
Browse Manifest

Preconditions: Flight attendant must be logged into their account on the website.

Once logged in, Brooke navigates to the ‘Manifest’ page. She inputs the ‘Flight Code’ and ‘Date’ and clicks the ‘Search’ button. The passenger list for the flight is generated, displaying the passenger names and their seats.

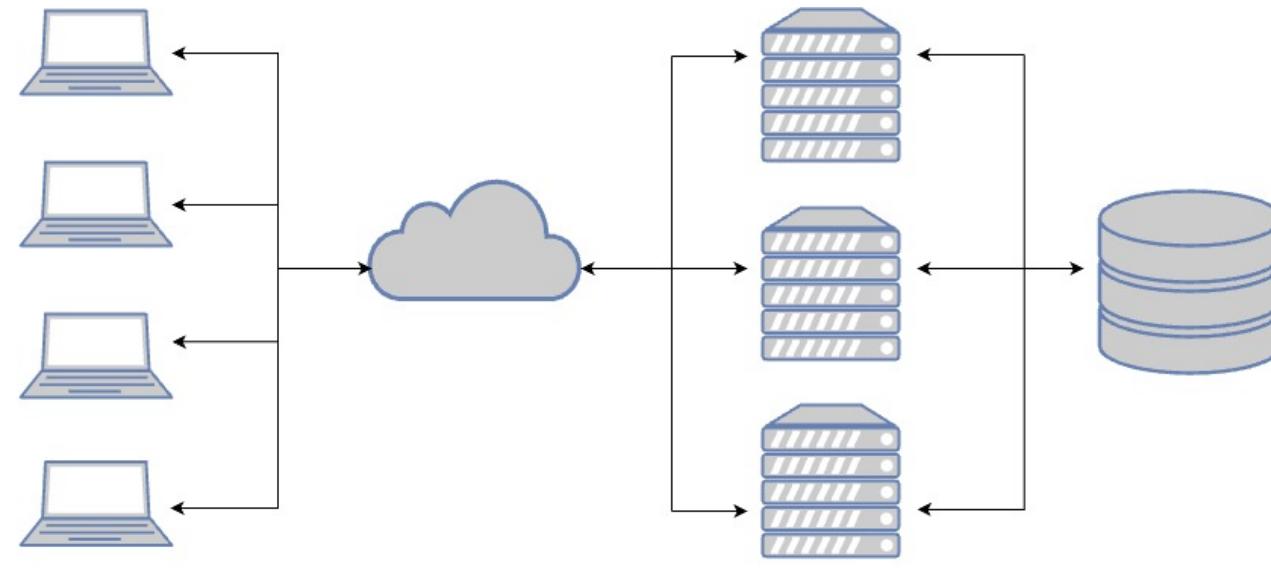
Postconditions: Flight attendant has an overview of the passengers on their assigned flights.

4. System Conceptual Model



Part Two - Domain Diagrams

1. Highlights of the System's Architecture



Client
(Browser)



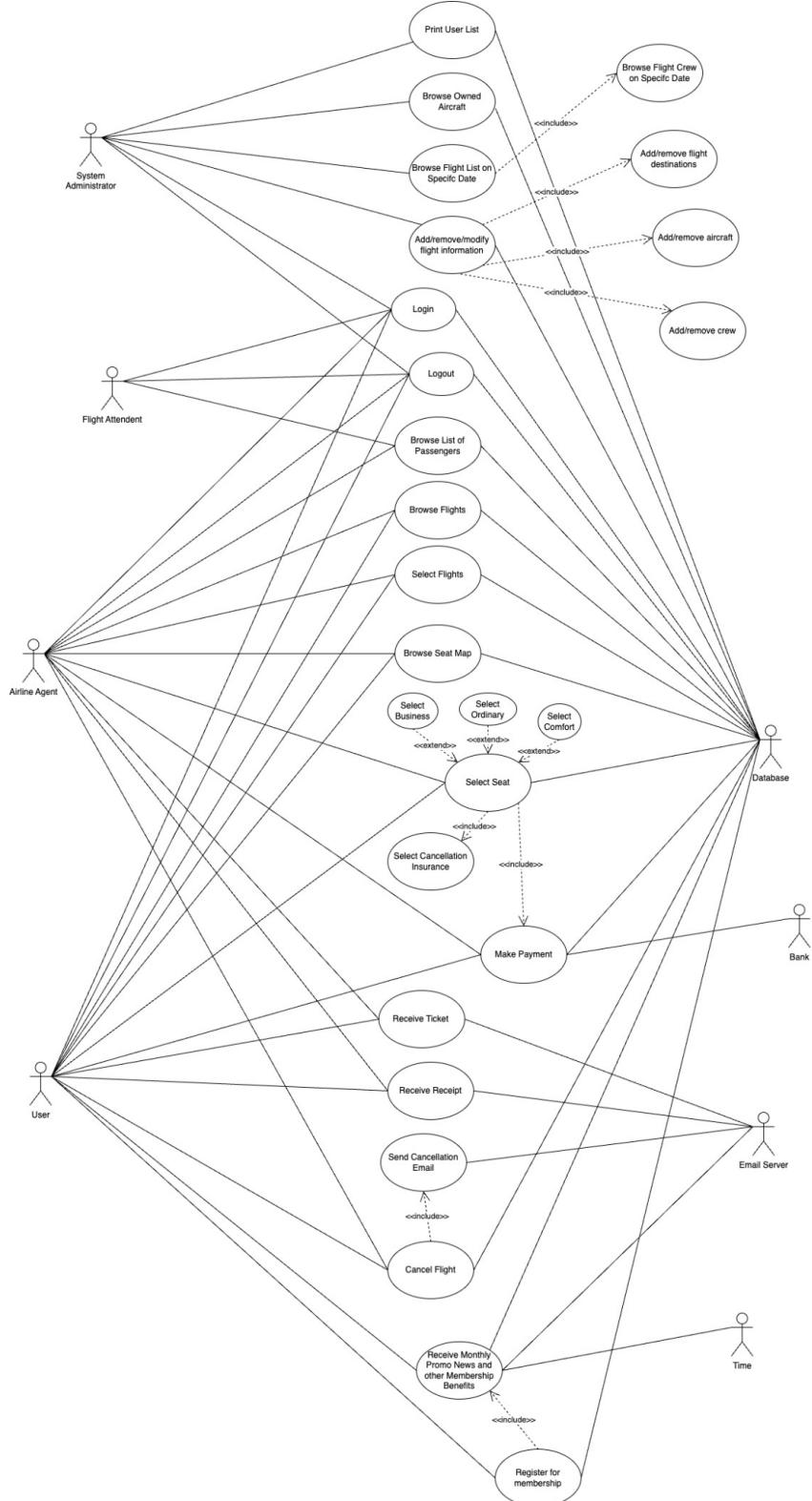
Internet
Network



Application
Server

Database

2. Updated Use Case Diagram



Additional Use Case Scenarios

Login

Preconditions: User must be a registered user.

Anne is a registered user. She navigates to the Login page of the website. The system provides two input fields, one for email and the other for password. She enters anne.apple@example.com and “example614” and clicks the “Login” button. The system validates the email and password with the database, and if validation is successful, Anne is redirected to the home page. Otherwise, an error message, “Invalid email or password”, is displayed.

Postconditions: Registered user is successfully logged into the website.

Logout

Preconditions: Registered user must be logged into their account on the website.

Anne is a registered user and is logged into her account on the website. She clicks the ‘Logout’ button, which is located in the header of the website so that it appears on every page the user is on. The system logs Anne out and redirects her to the Login page.

Postconditions: Registered user is successfully logged out of their account.

Receive Receipt

Preconditions: User or airline agent has successfully paid for their ticket.

Anne has paid for her ticket. The payment was successful and she is now on the “Payment Confirmation” page. Since she is a registered user and had logged in before she made the payment, when she clicks the “Receive Receipt” button, the system retrieves her email from the database. The system sends the payment receipt to Anne’s email.

Postconditions: User or airline agent receives an email with the payment receipt.

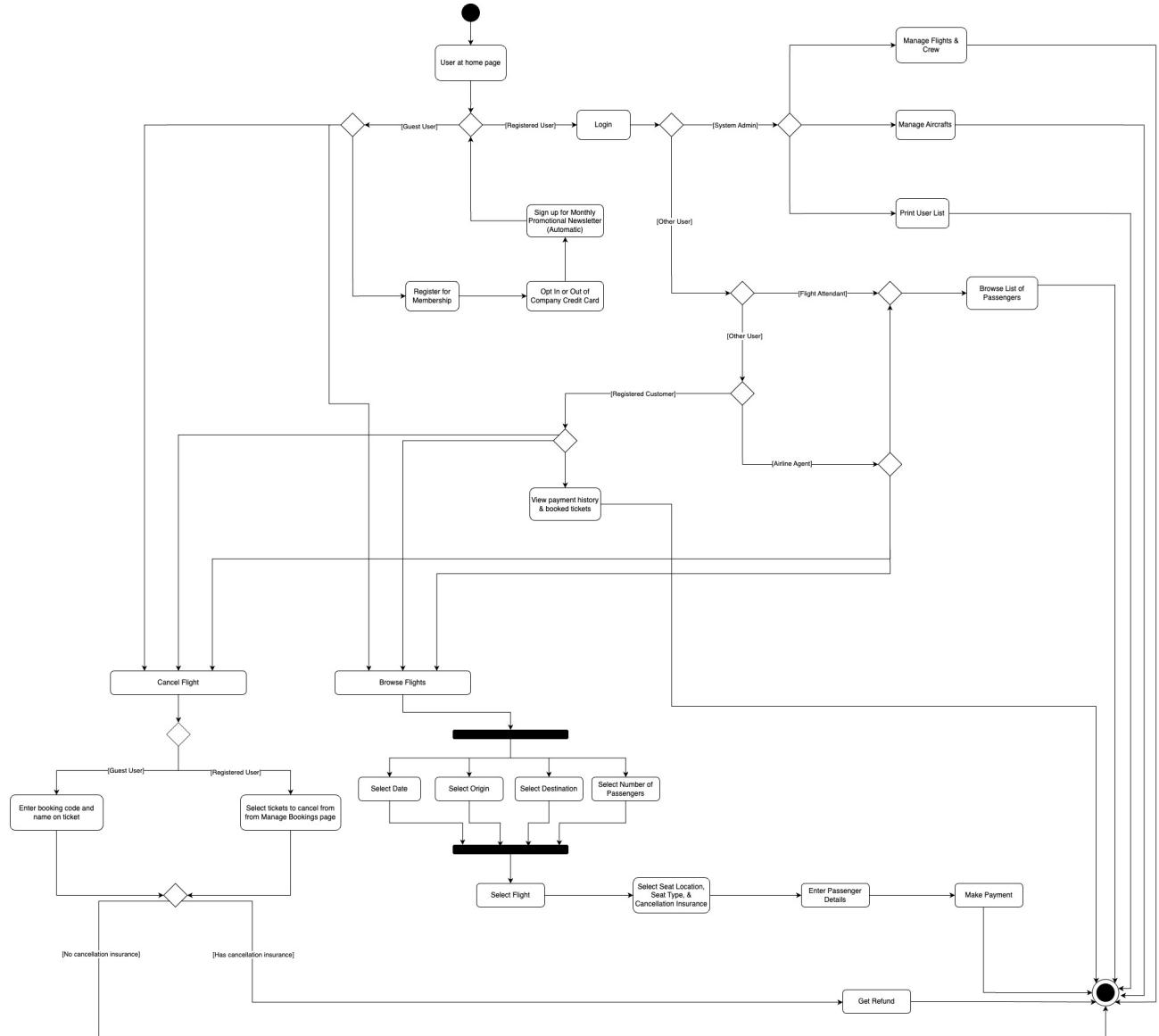
Receive Monthly Promotions

Preconditions: User must be a registered member.

On the first day of every month, the system sends out the month’s promotions to the list of airline members/registered users in the database.

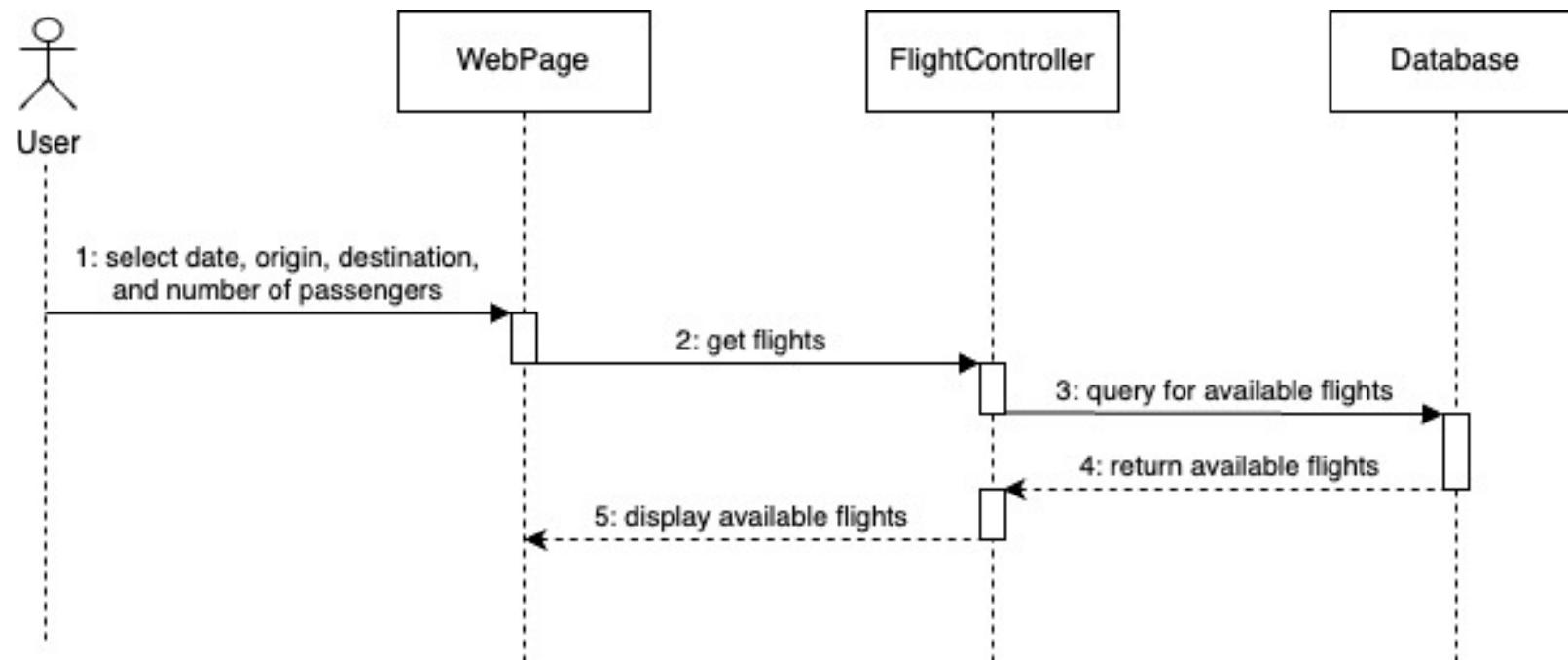
Postconditions: Registered users receives promotional emails at the beginning of every month.

3. Systems Activity Diagram

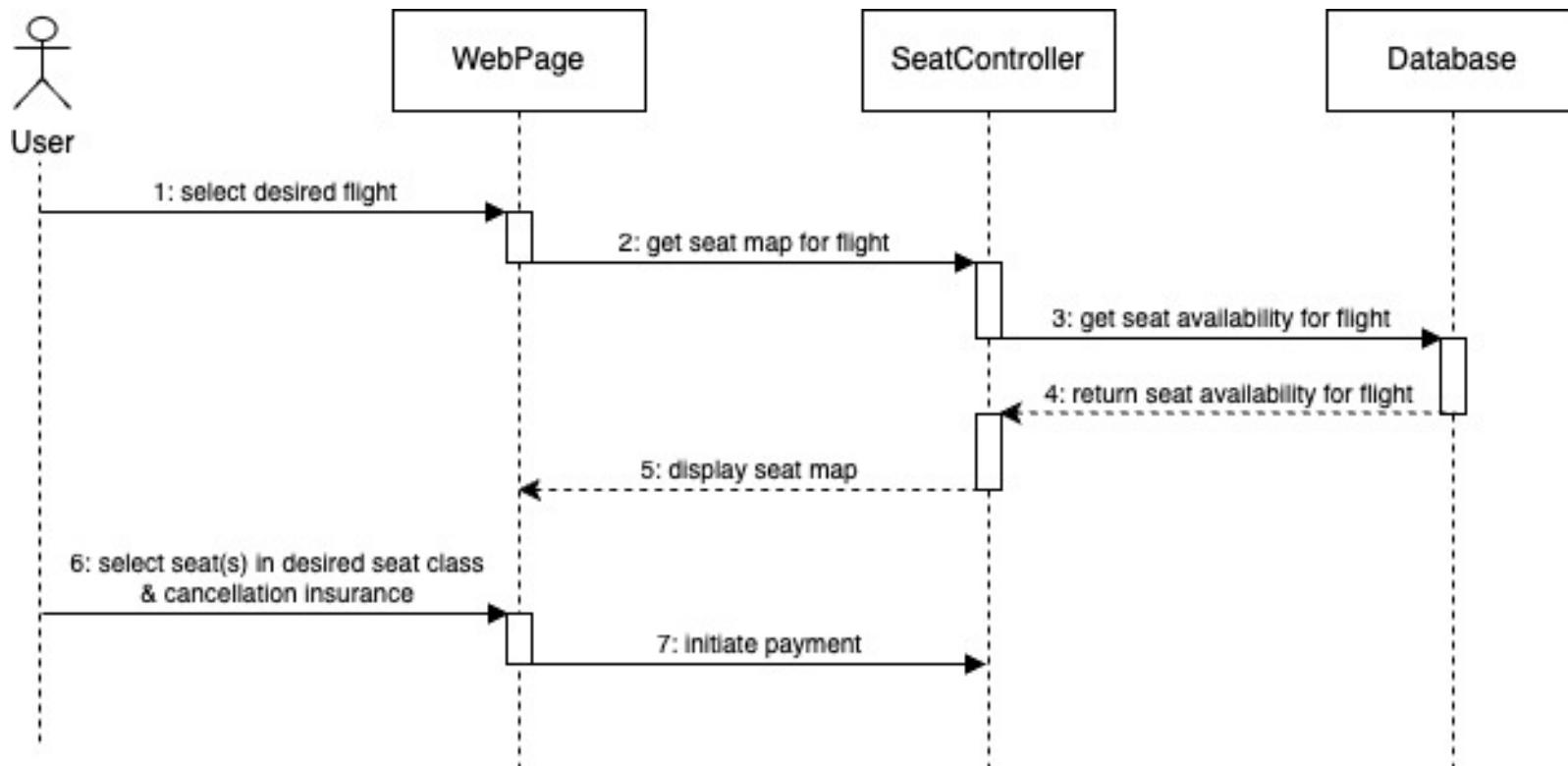


4. Sequence Diagrams

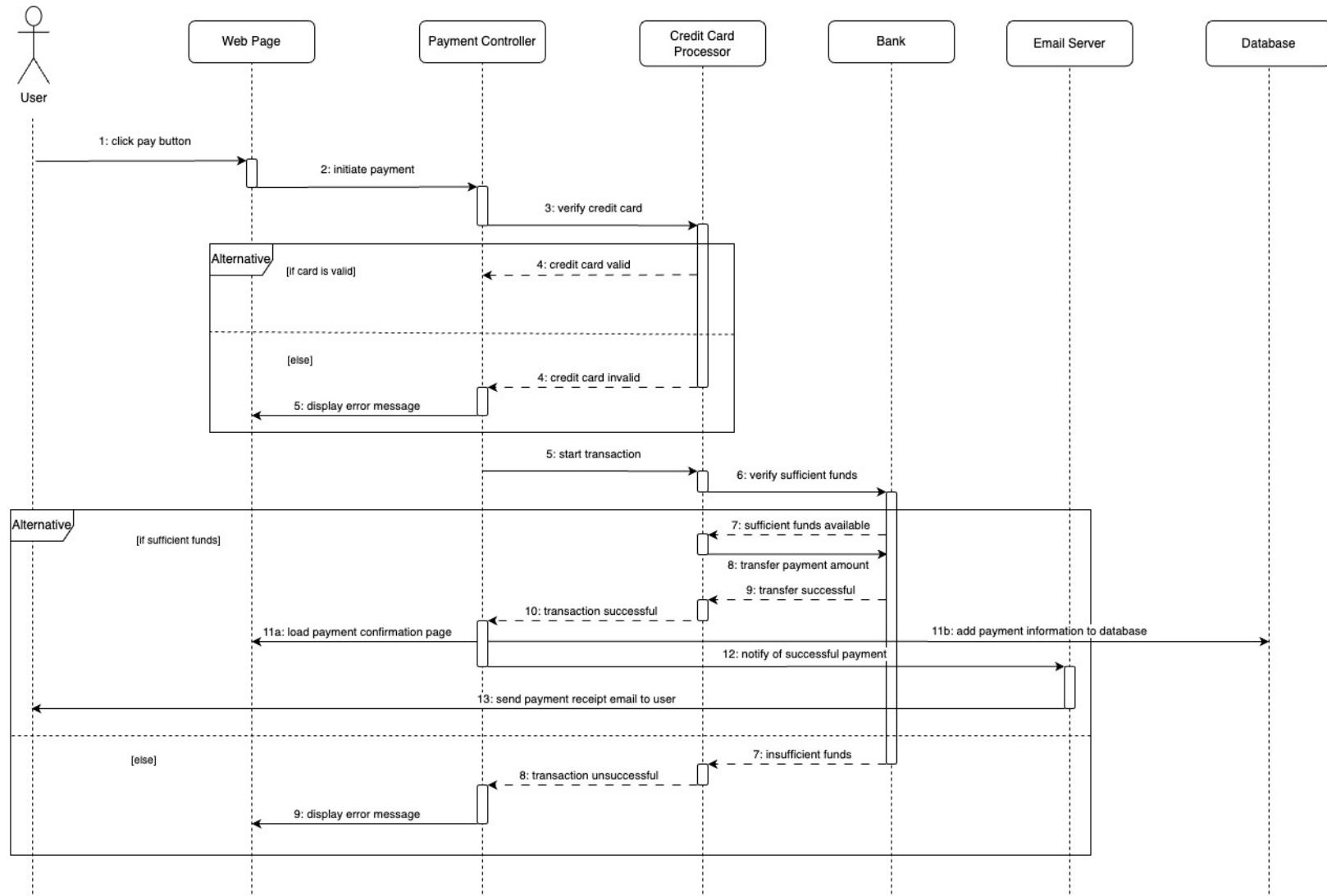
Browse Flights



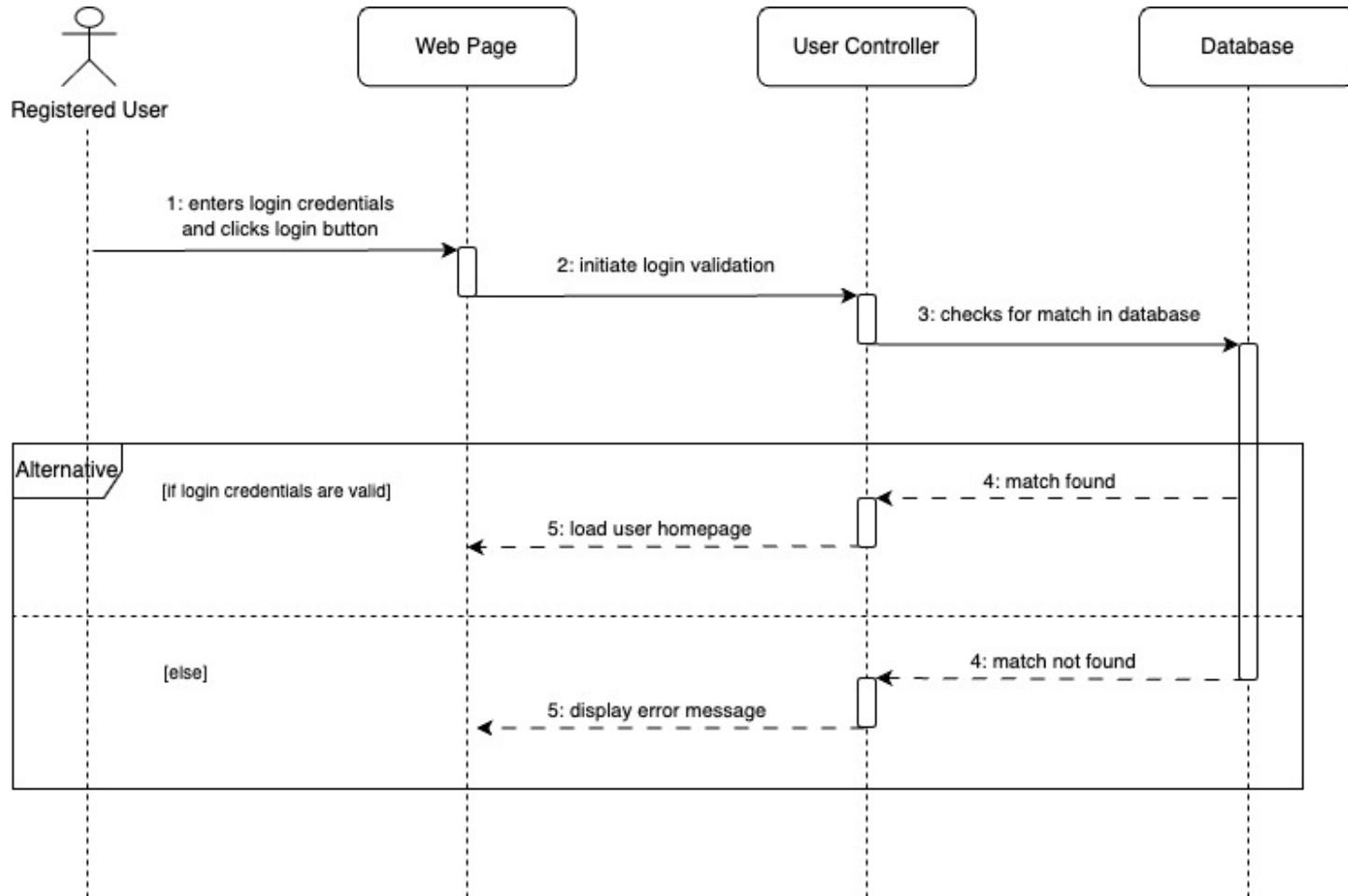
Select Seat



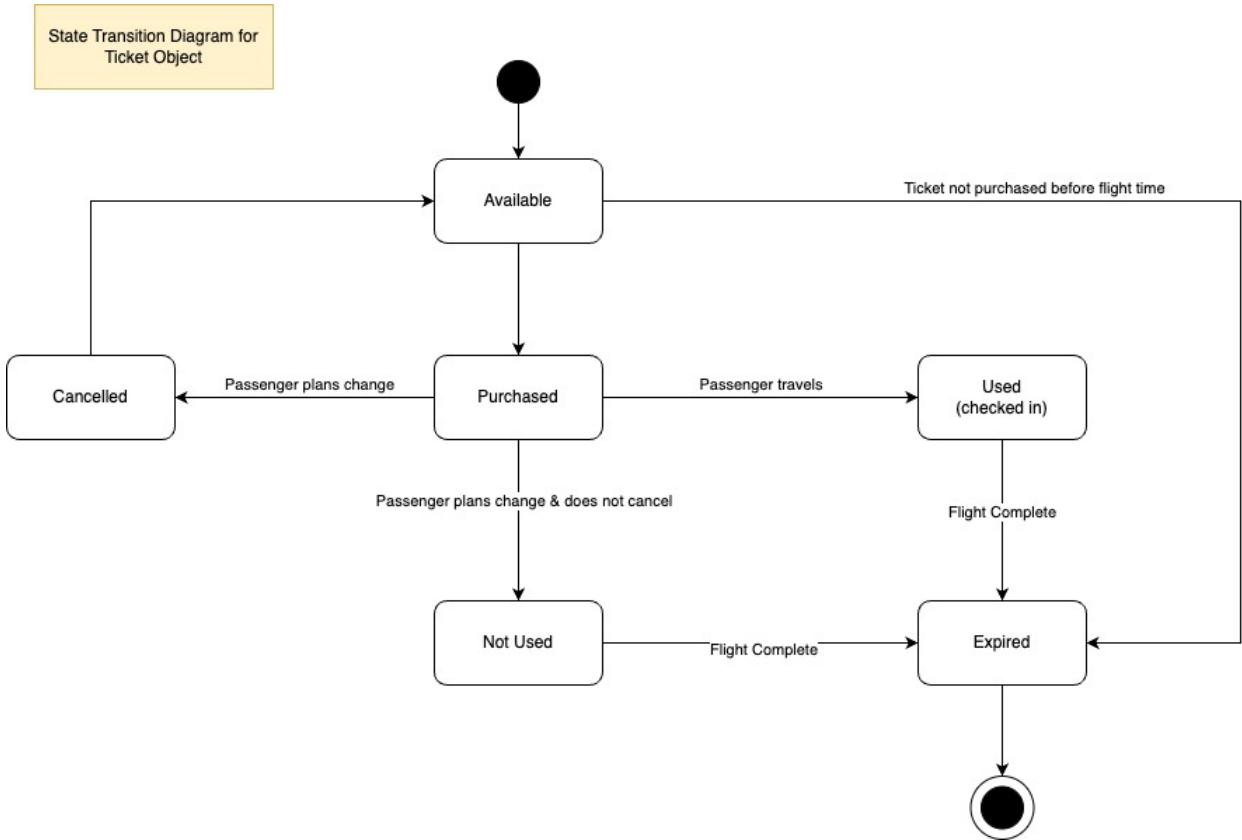
Make Payment



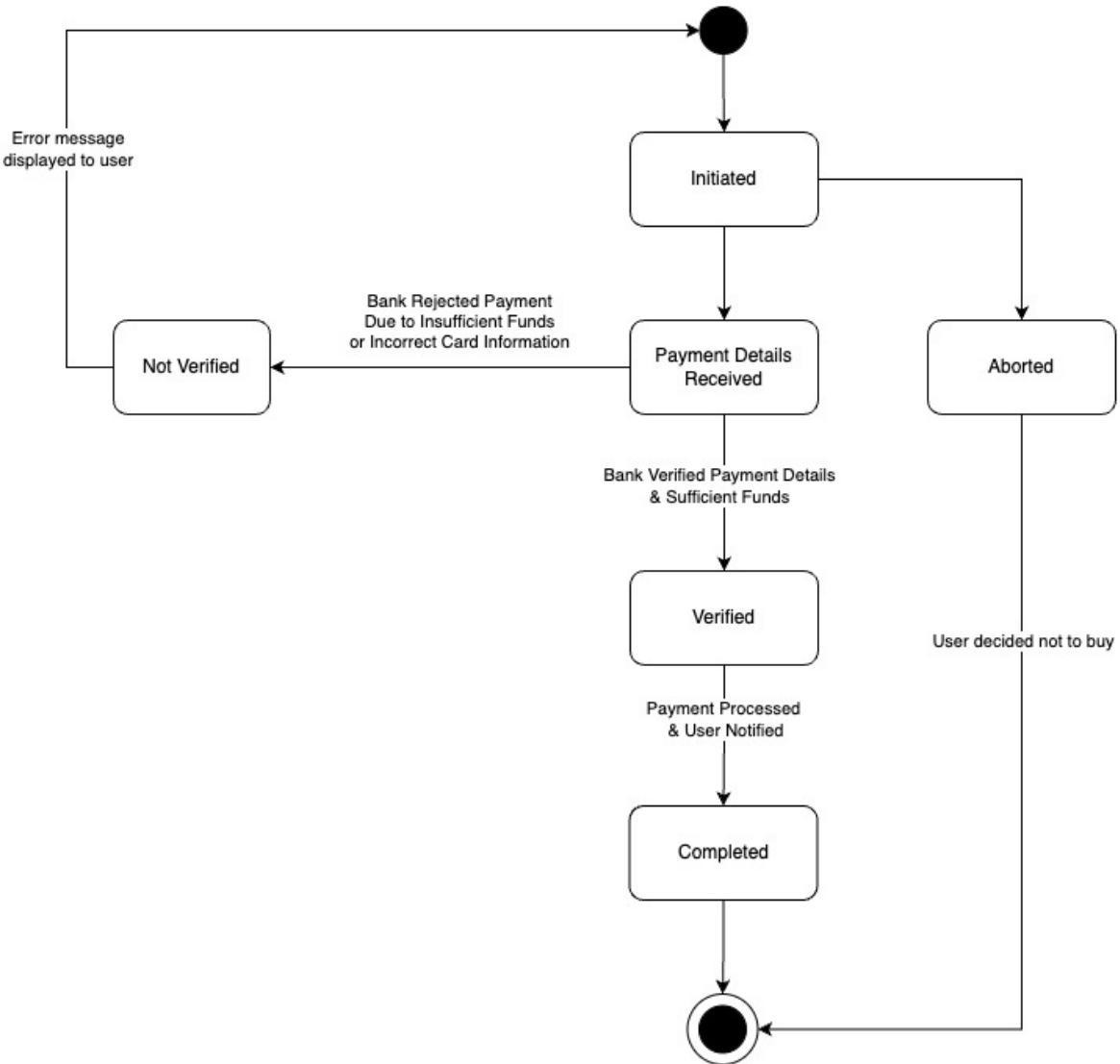
Login



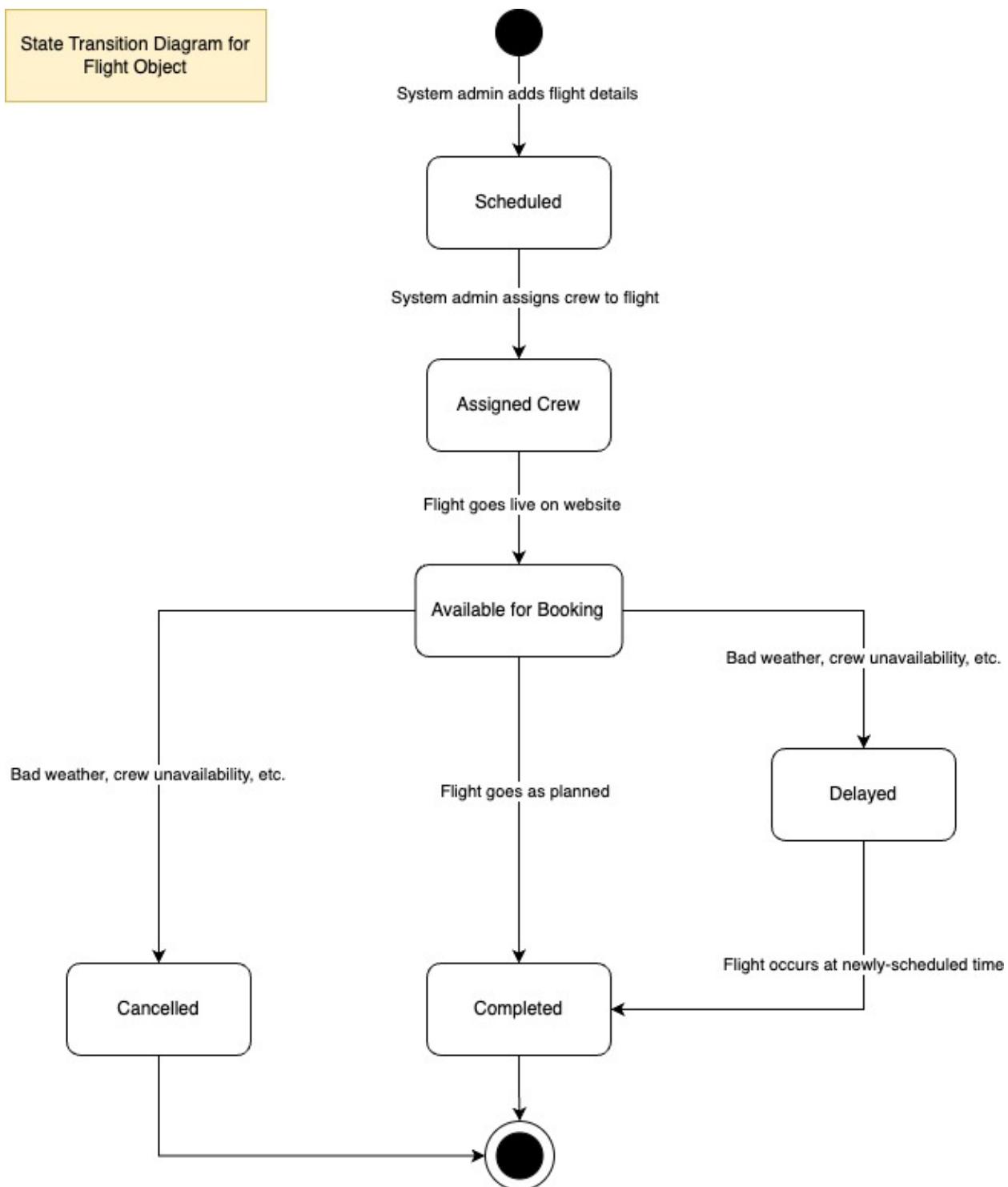
5. State Transition Diagrams

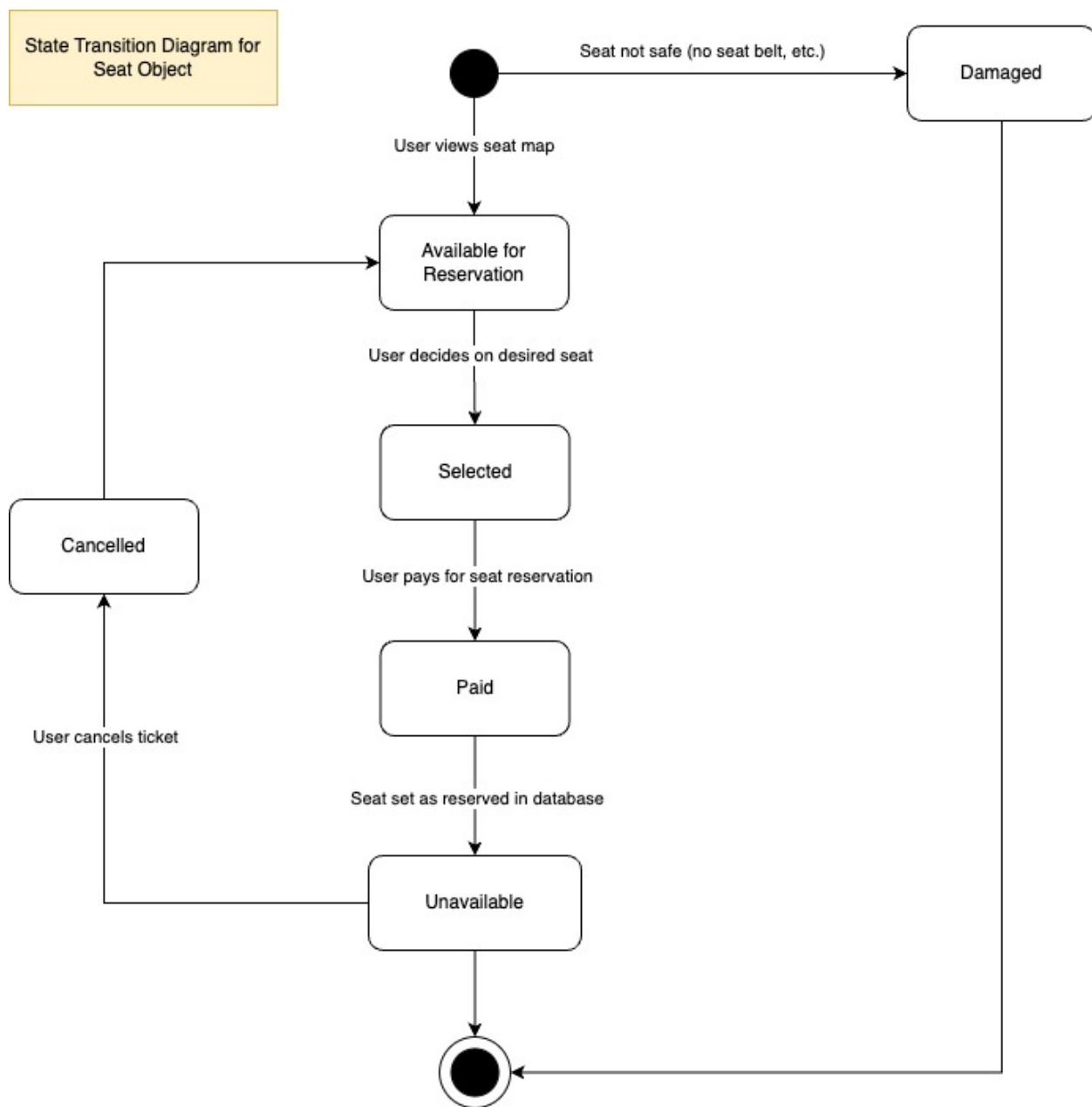


State Transition Diagram for
Payment Object

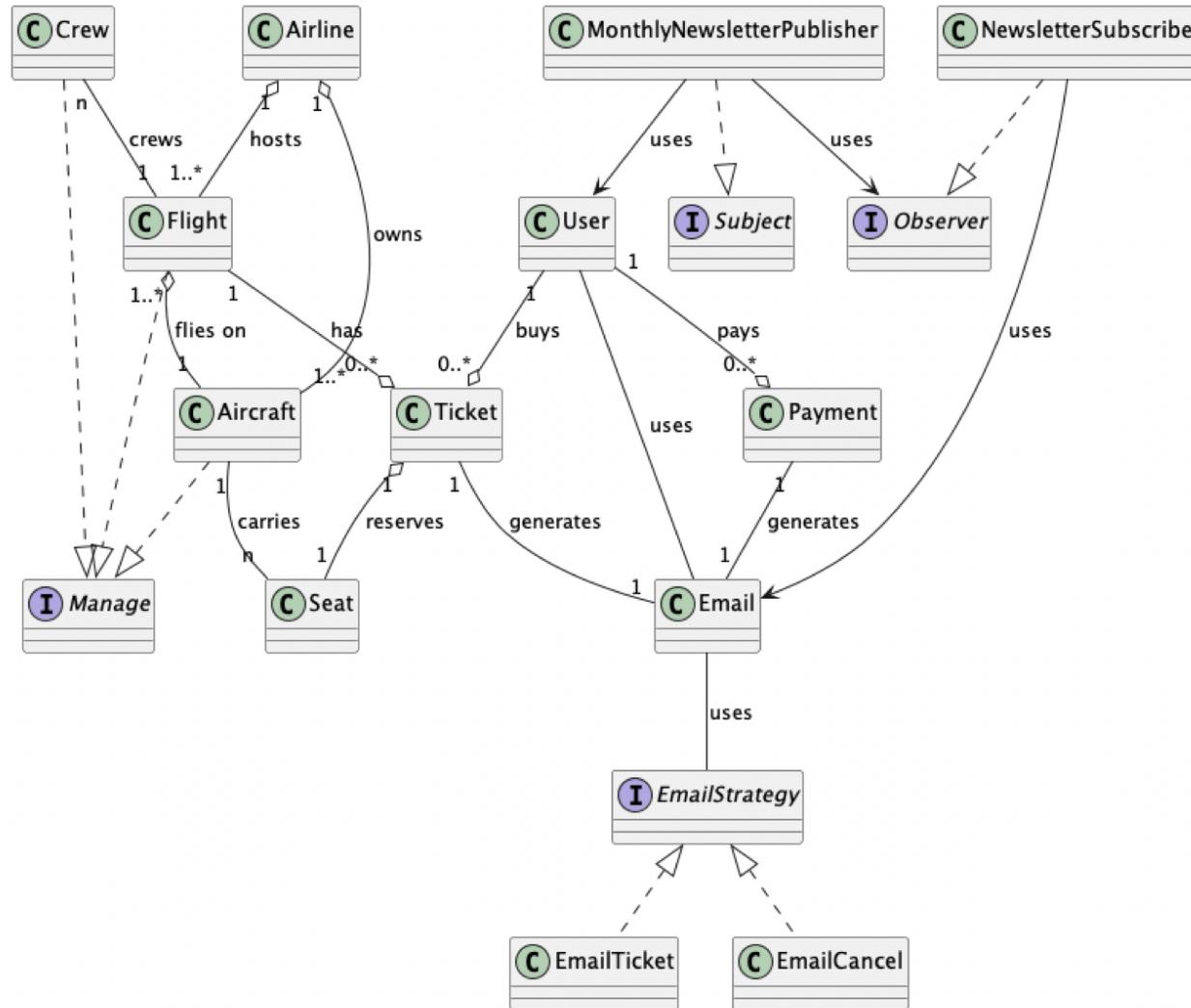


State Transition Diagram for Flight Object

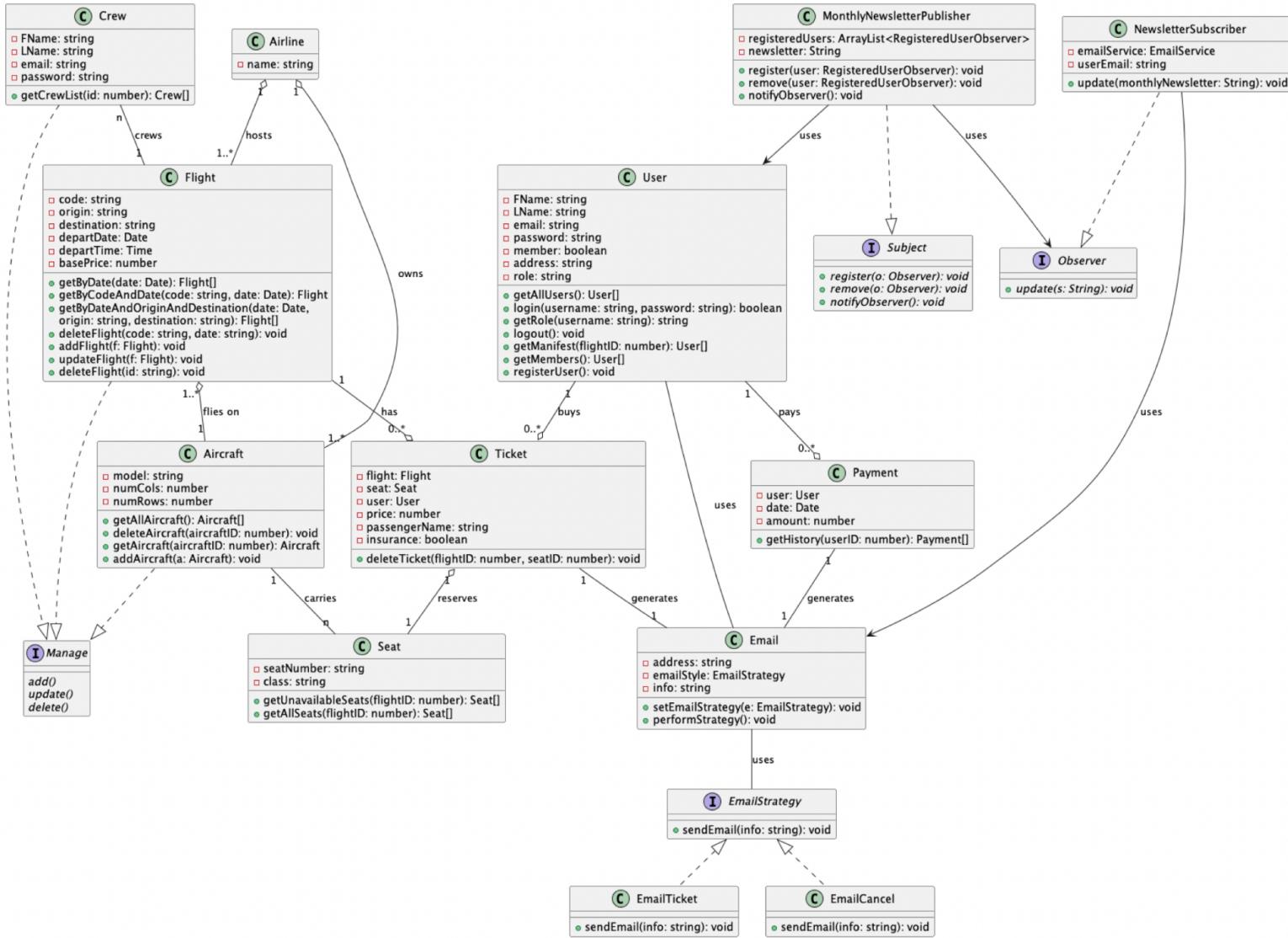




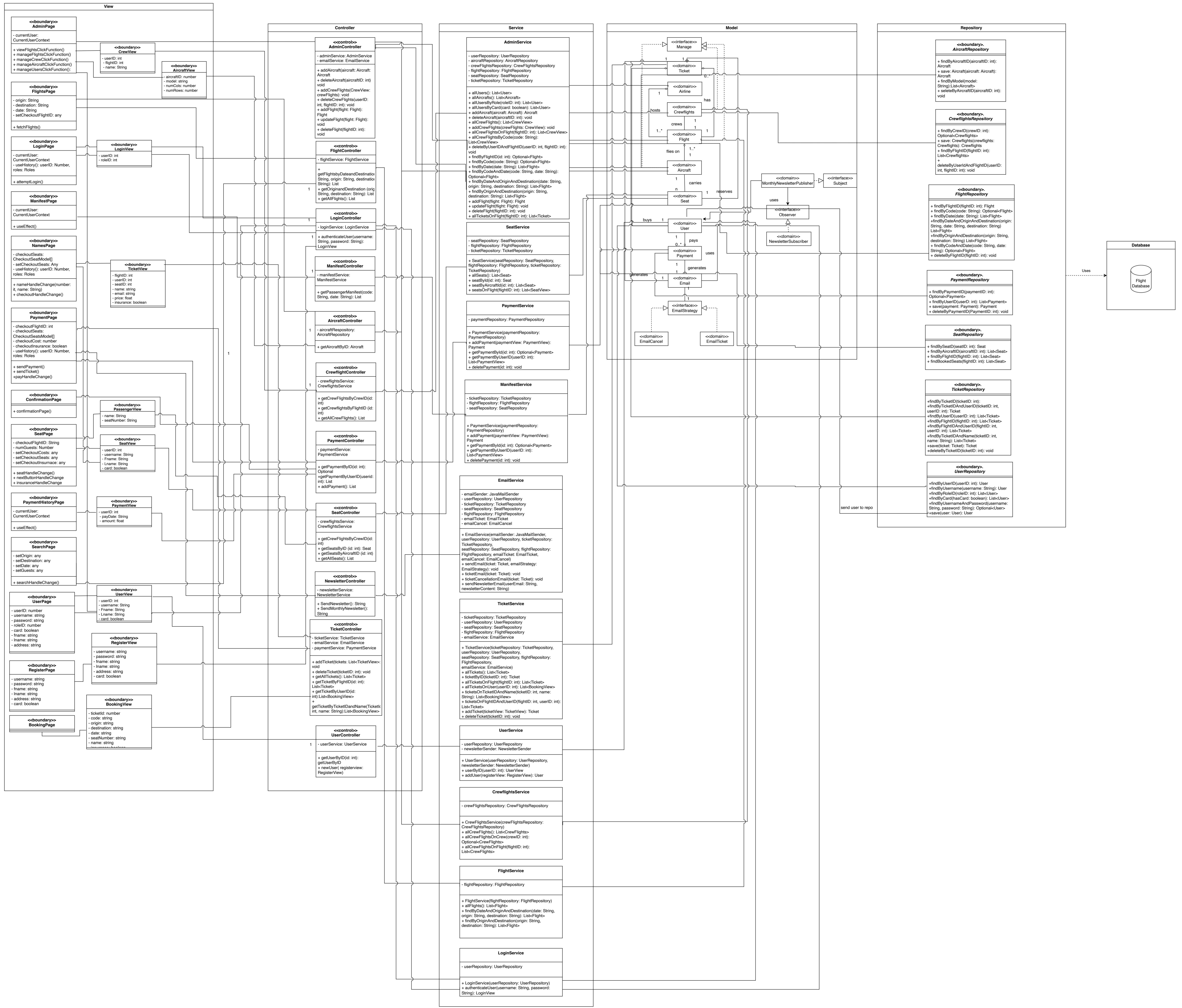
6. Domain Class Diagram



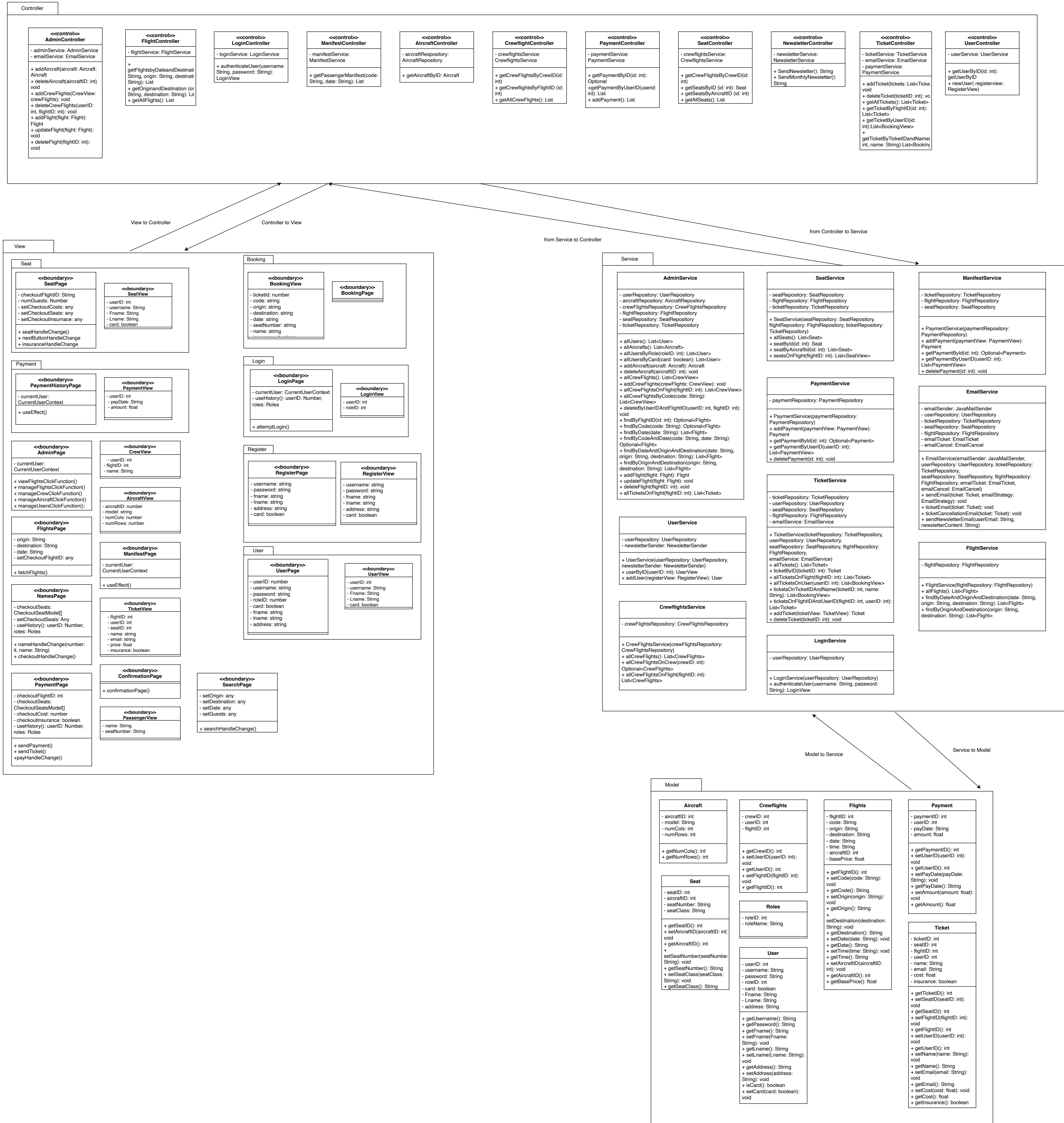
7. Detailed Domain Class Diagram



Detailed Design Class Diagram



Package Diagram



10. Deployment Diagram

