SOFTWARE **DESIGN DOCUMENT**

PROJECT**: AIRLINE RESERVATION SYSTEM**

BY: UBAIDA WAHEED
SANA AKBAR
TAYYBA SALAMAT

PURPOSE OF THE DOCUMENT

This document mainly discusses the system design aspect of our AIRLINE RESERVATION SYSTEM. Design goals will be provided in the introduction of the document to identify the qualities that our system will focus on.

An overview of the current system architecture will be included for comparison with the proposed system architecture.

Besides that, the proposed system architecture, its subsystem decomposition, hardware and software mapping, persistent data management, access control and security, global software control, and subsystem services will also be included in this document.

Ultimately, the goal of this system design document is to provide design specification of SIMS to facilitate our project implementation process.

About The System Design Document

Version Control

Version No.	Name (Title)	Author	Date	Authorization
1.0	SDD Report	Sana Akbar	04/21/2022	*Sana Akbar*
2.0	SDD Report	Tayyba Salamat	05/15/2022	*Tayyba Salamat*
3.0	SDD Report	Ubaida Waheed	06/01/2022	*Ubaida Waheed*

Document Properties

Items	Details
Document Title	Airline Reservation System Design Document
Author	Ubaida Waheed Sana Akbar Tayyba Salamat
Creation Date	04/21/2022
Last Updated	06/01/2022

Table of Contents

1. INTRODUCTION:

1.1 PURPOSE OF DOCUMENT:

This document contains Requirement Specifications for AIRLINE TICKET MANAGEMENT SYSTEM. It shows the different aspects of the requirement specifications as the document proceeds. ART management system eliminates people problems that they face while reserving ticket, and helps them to save themselves a seat on plane.

1.2 SCOPE OF DOCUMENT PROJECT:

The AIRLINE TICKET MANAGEMENT SYSTEM offers a lot of opportunities for the customers, who have a great deal of trouble to find their place in the advanced the required plane. This type of system and application software, provides passengers with the opportunity to view the flights and time and destination allotted to them. It will also provide an opportunity to save a ticket, or to change or cancel it, these are the specific terms and conditions that this system offers.

1.3 Definitions, acronyms, and abbreviations:

Airline ticket Management systems, Architecture Description, Class diagram, Component diagram, Use Case, Sequence Diagram, Design Decisions, Trade Offs, Pseudocodes.

1.4 References:

1. Naveed Ali, Richard Lai, A method of software requirements specification and validation for global software development, June 2017, Volume 22, Issue 2, pp 191–214 https://link.springer.com/article/10.1007/s00766-015-0240-4
2. Luke Paireepinart, David Keyes, Jingtao Liu, Frank Medjo and Seth Orell, Software Requirements Specification for Airline Flight Booking System, February 2009 http://www.academia.edu/23567842/Software_Requirements_Specification_for_Airline_Flight_Booking_System_Software_Requirements_Specification_for_Airline_flight_booking_system
3. Lecture Slides given by Instructor.

1.5 Overview of document:

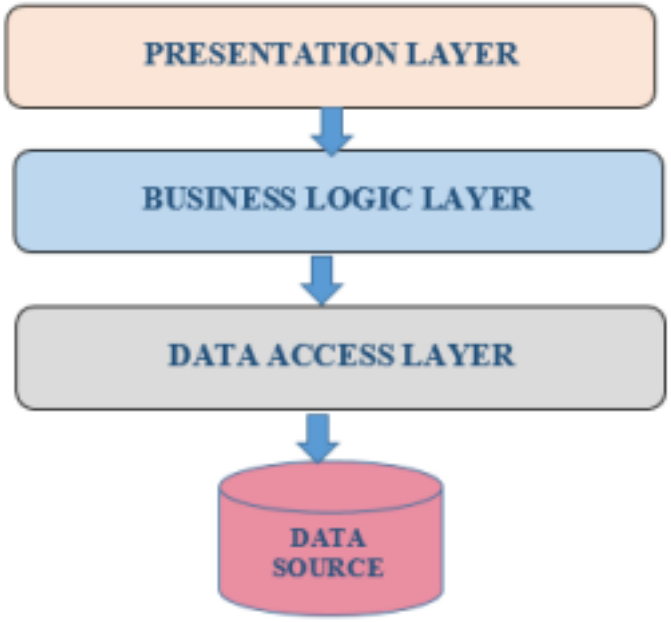
This document is divided into five sections:

- SECTION 1 contains all the diagrams which are the pre-requirements of any software documentation. It contains architecture of the system and its's components. For our system i.e., Airline management system we used layered architecture as we need security of all the confidential data of the users of our system
- SECTION 2 is extension of Section 2. In this section detailed description of all the components of the architecture are included.
- SECTION 3 talks about the reusability of our system. Our software components are reusable in many management systems like Bus ticketing management System, Aircraft management system at national level.

- SECTION 4 is all about design decisions and its trade off. In the design of airline management system, the decisions are made regarding the design attributes. Some of the design attributes in our software are described in this part
- SECTION 5 explains the pseudocode that are used in the components of our software system.

2. System architecture description:

For our system i.e., Airline management system we used layered architecture as we need security of all the confidential data of the users of our system. Our system is basically connected with bank server so it is our first priority to safe and secure passengers account data and all personal information also it is easy to test each layer. For this purpose, we divided our system into three basic layers i.e.



- **Presentation Layer:**

This layer contains the web browser, our system's main home page that every user can view when he/she open browser.

- **Business Logic Layer:**

This layer contains all of our system's services i.e., user can book ticket, see status, cancel reservation or view flight details.

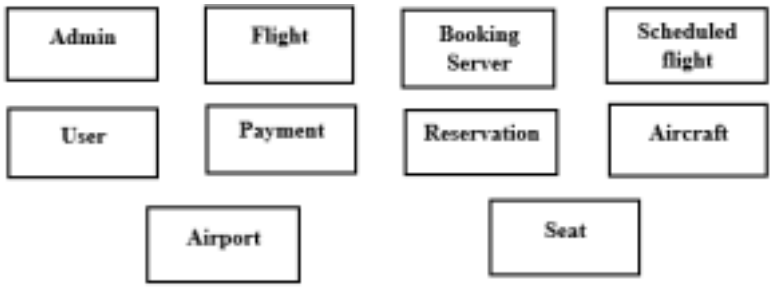
- **Data Access Layer:**

This layer is the last one and contains all the critical data that only passenger itself or admin can access. No one can access any other passenger's confidential information kept in database.

2.1 Overview of modules / components:

Our system is divided into following modules or subsystems:

- Admin
- Flight
- Booking Server
- Scheduled flight
- User
- Payment
- Reservation
- Aircraft
- Airport
- Seat



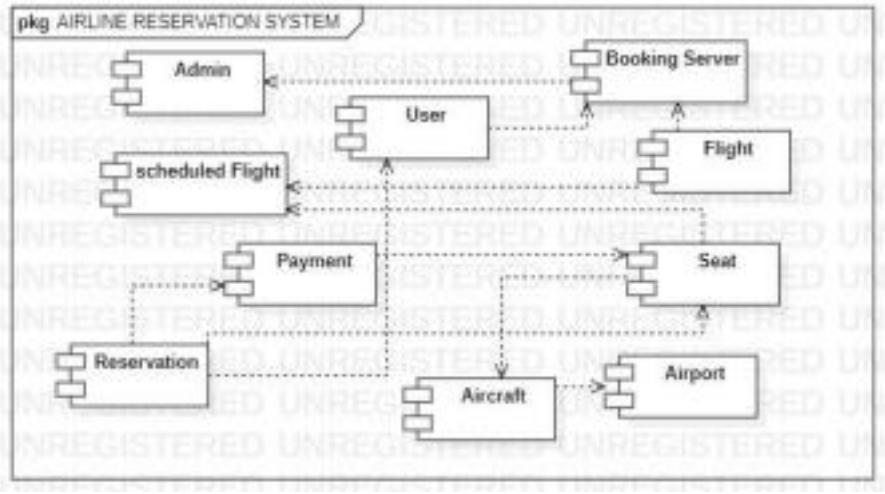
2.2 Structure and relationships:

2.2.1 Component Diagram Components:

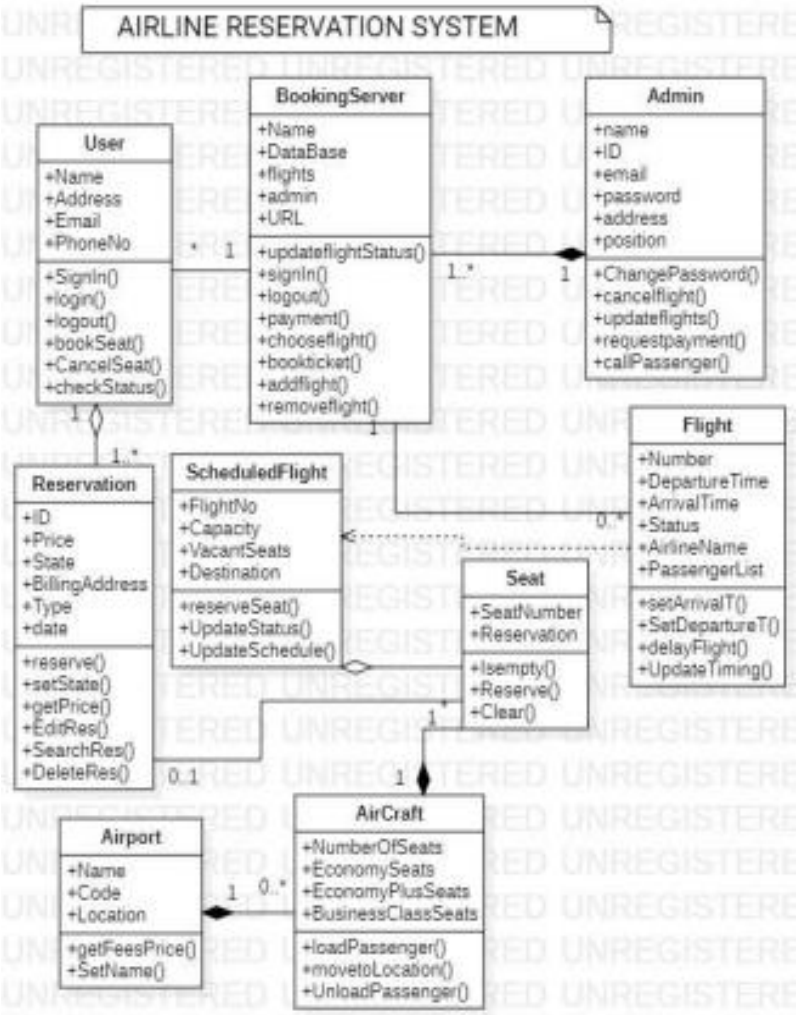
After identifying components came to know that following modules depends on each other:

- Booking server depends on Admin
- Flight Depends on Booking Server
- Flight depends on scheduled Flight
- Seat depends on scheduled flight
- User depends on booking Server
- Payment depends on Seat
- Reservation depends on Payment
- Reservation also depends on available seats
- Aircraft depends on Airport
- Seat depends on Aircraft

2.2.2 Component Diagram:

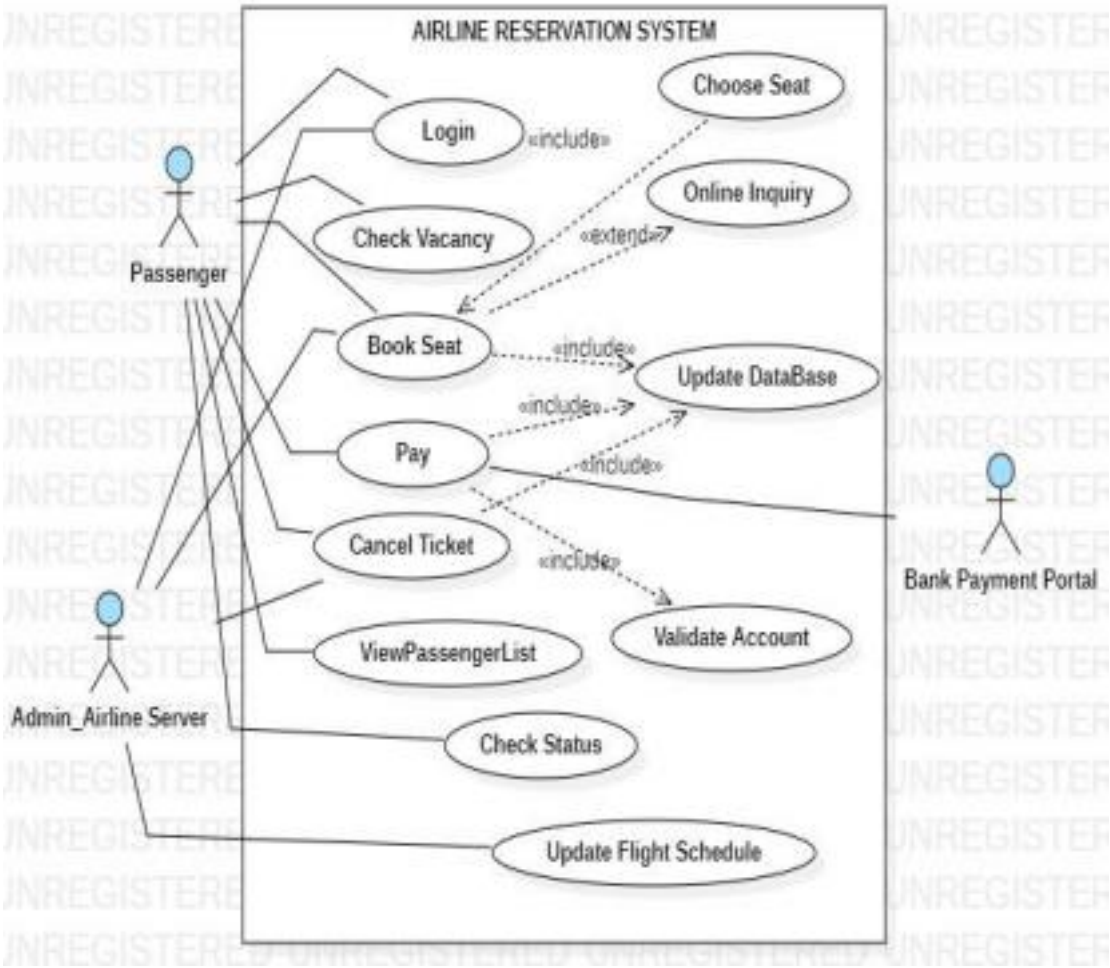


2.2.3 Class Diagram:



2.3 User interface:

2.3.1 USE CASE DIAGRAM:



a) Usecase#1: Login

Level: Primary

Primary Actor: User or Passenger

Stake Holder's Interest: To login for the online airline reservation system

Pre-Condition: The user or the customer creates a username and password at the time of registering with the system. He then uses them to logon to the system and make reservations

Success Scenario: Verifies the validity of the username and password that the User has entered and permits the customer to view the material offered on the system, if the username and password are valid.

b) Usecase#2: Check vacancy

Level: Secondary

Primary Actor: Customer or Passenger

Stake Holder's Interest: User wants to check vacancy and available flights between two cities for the desired schedule

Pre-Condition: The consumer searches for available seats and data concerning different touring packages available at his target destination airline ticket reservation.

Success Scenario: System displays data of desired seats and various touring deals offered at customer's choice of place.

c) Usecase#3: Book Seat

Level: Secondary

Primary Actor: User or passenger

Stake Holder's Interest: Passenger wants to book ticket for his/her desired journey and desired seat type i.e., economy seat, economy plus seat or business class seat.

Pre-Condition: The user see the information associated to airlines and checks the vacancy of seats on flights. If user finds that there are any available desired tickets, he/she then purchases it.

Success Scenario: After authentication and availability, user book his/her desired seat in airplane.

Include use case: In order to book seat user must select or choose his/her seat type and also after booking database must be updated.

Extend use case: For online ticket reservation there is an option for the online inquiry service.

d) Usecase#4: Pay

Level: Secondary

Primary Actor: User or passenger

Stake Holder's Interest: Wishes to pay for the ticket which he/she reserved from his/her bank account online

Pre-Condition: User must have valid account in bank, valid account info and also must have sufficient balance for the payment of the seat which he/she reserved.

Success Scenario: After authentication from the bank server, user paid successfully and user invoice displays on the screen along with its flight schedule.

Include use case: After payment of the ticket database must be updated and user invoice displays.

e) Usecase#5: Cancel Ticket

Level: Secondary
Primary Actor: Administration
Stake Holder's Interest: Admin wants to cancel the ticket if the user for which user requested to cancel

Pre-Condition: The admin logs onto the system with the username and password provided to him and it must be correct as it would be validated.

Success Scenario: The admin validated by confirming the username and password. Then displays the window where the admin search for the customer's invoice who has demanded for cancellation of booking. After this, the admin sends a confirmatory e-mail to the passenger.

Include use case: After the cancelation of ticket for flight the database must be updated too and confirms cancellation.

f) Usecase#6: View Passenger List

Level: Secondary
Primary Actor: User or passenger
Stake Holder's Interest: User wants to see the list of all the passengers travelling in the specific flight.

Pre-Condition: User must be login to the system which can be done by entering correct username and password also user must request to view the passenger list of scheduled flight and must enter valid flight info.

Success Scenario: User enters correct flight info which matches with the scheduled flight then the list of all the passengers of the airplane displays on the screen.

g) Usecase#7: Check Status

Level: Secondary
Primary Actor: User or passenger
Stake Holder's Interest: Passenger wants to check the current status of his/her ticket

Pre-Condition: User must have login with his/her username and password, validated, must enter correct reservation info and must book a seat first.

Success Scenario: Passenger verifies by the admin and his/her record matches in database after which the status i.e., either booked or unbooked displays successfully.

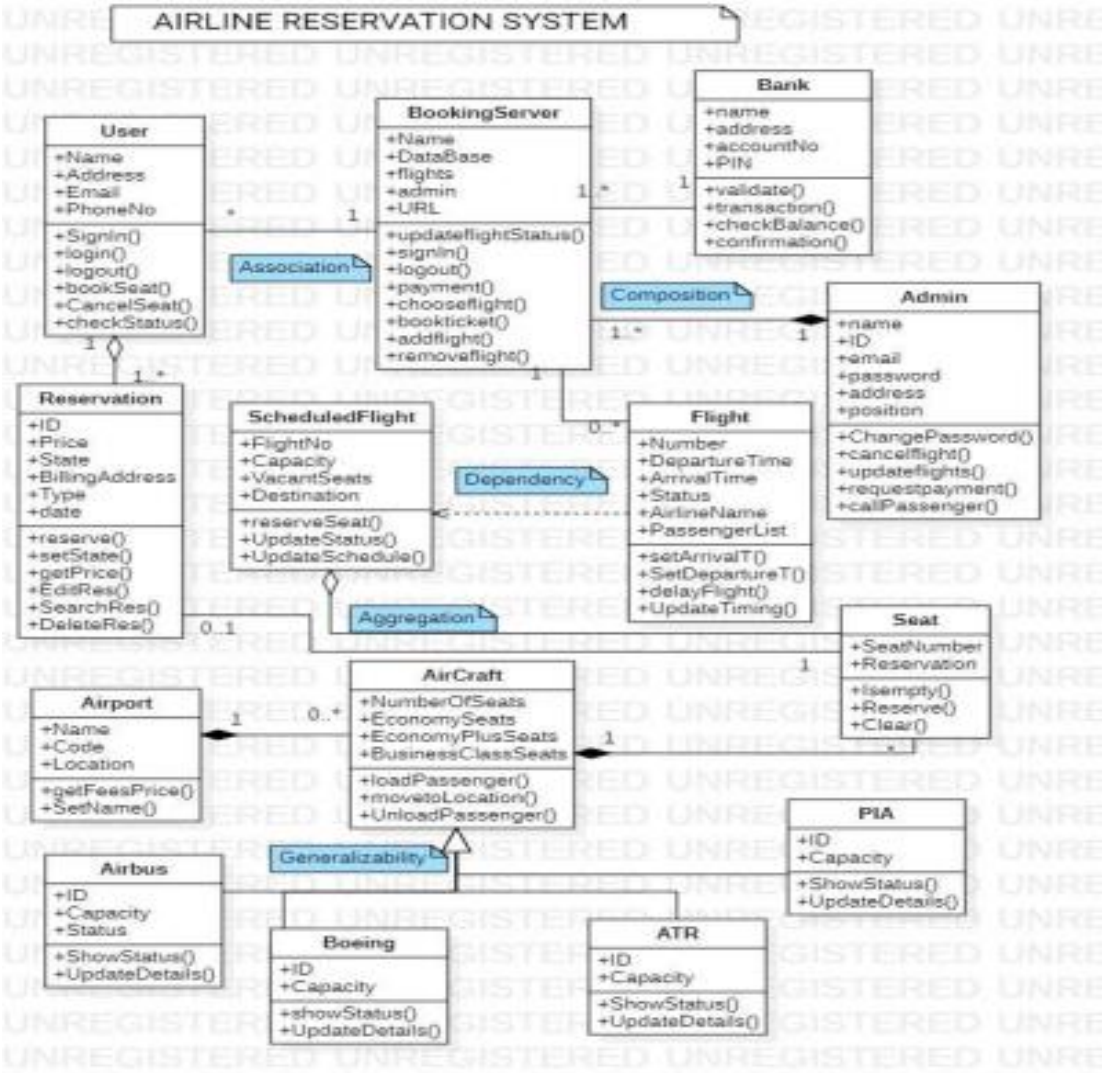
h) Usecase#8: Update Flight Schedule

Level: Secondary
Primary Actor: Admin or Airline Server
Stake Holder's Interest: Admin or server insert, removes or changes flight material in the presentation database
Pre-Condition: The admin logs onto the system with the username and password provided to him and it must be correct as it would be validated.
Success Scenario: The admin validated by approving the username and password. Then displays

window where the admin can insert flight schedules to the database, erase the flight info or change info.

3. Detailed description of components:

3.1 CLASS DIAGRAM



DESCRIPTION:

3.1.1 USER CLASS:

Attributes: Name, Address, email, phone number
Functions: sign up, login, logout, bookseat, cancel seat check status.

3.1.2 BOOKING SERVER CLASS:

Attributes: Name, Database, flights, admin, URL.

Functions: Update flight status, logout, payment, choose flight, book ticket, add flight, remove flight.

3.1.3 RESERVATION CLASS:

Attributes: ID, price, state, Billing Address, type and date
Functions: reserve, set state, get price edit reservation, search reservation and delete reservation

3.1.4 BANK CLASS:

Attributes: Name, Address, account number and PIN
Functions: validate, make transaction, check balance and confirmation

3.1.5 ADMIN CLASS:

Attributes: name, id, e-mail, password, address and position
Functions: change password, cancel flight, update flights, request payment and call passenger.

3.1.6 FLIGHT CLASS:

Attributes: number, departure and arrival time, status, passenger list and airline name
Functions: set arrival and departure time, delay flight and update timing

3.1.7 SCHEEDULED FLIGHT CLASS:

Attributes: flight number, capacity, available seats, destination
Functions: reserve seat, update status, update schedule

3.1.8 AIRPORT CLASS:

Attributes: name, code, location
Functions: get fees price, set name

3.1.9 SEAT CLASS:

Attributes: seat number and reservation
Functions: is empty, reserve and clear

3.1.10 AIRCRAFT CLASS:

Attributes: number of seats, number of economy seats, economy plus seats and business class seats.
Functions: load passenger, unload passengers and move to location

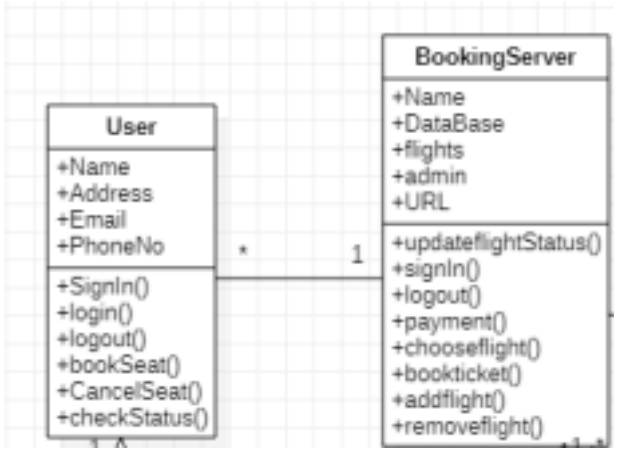
3.1.11 AIRBUS, BOEING, ATR AND PIA CLASS:

Attributes: ID, capacity, status
Functions: show status, Update details

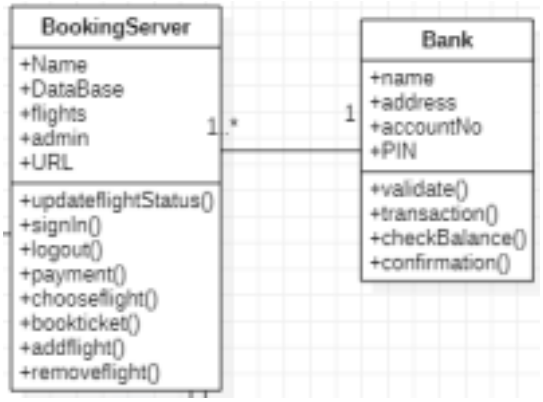
3.2 RELATIONSHIPS

3.2.1 ASSOCIATION:

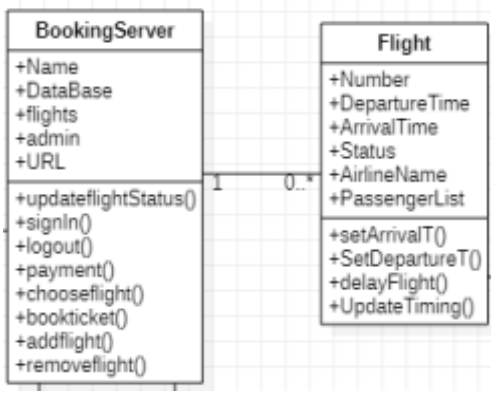
- **User and booking server:** one booking server can serve for many user



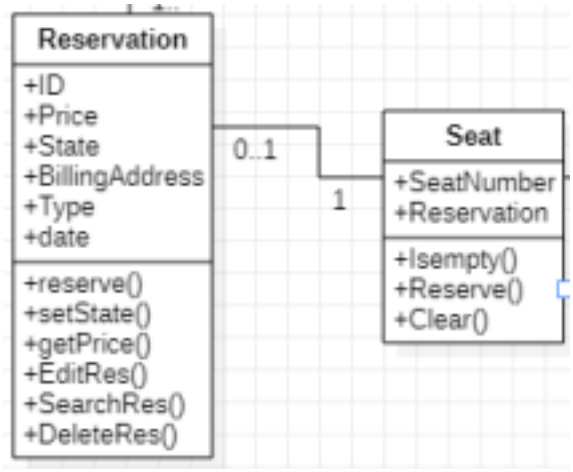
- **Bank and booking server:** one bank can have many booking servers



- **Flight and booking server:** one booking server can have no or many flights

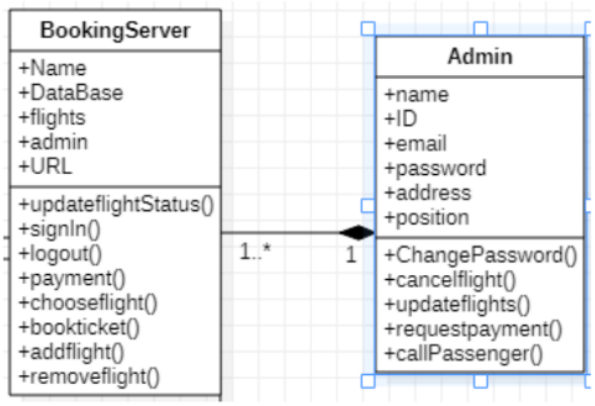


- **Reservation and seat:** one seat can have no or one reservation

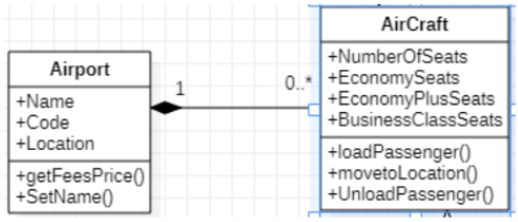


3.2.2 COMPOSITION:

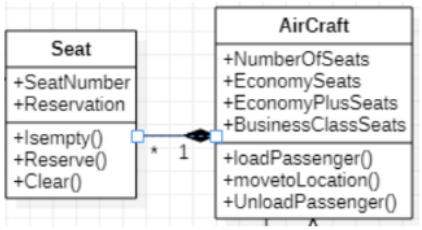
- **Booking server and admin:** if booking server not exists then admin can never exist



- **Airport and aircraft:** Aircraft and airport also have strong ‘has a’ relationship

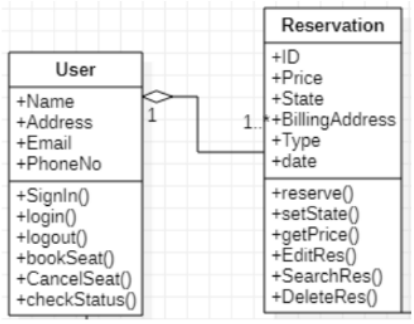


- **Aircraft and seat:** seat cannot exist independently without aircraft

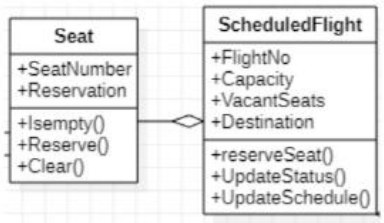


3.2.3 AGGREGATION:

- **User and reservation:** user has reservation

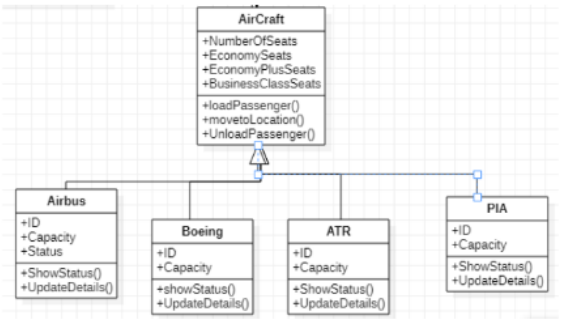


- **Seat and scheduled flight:** scheduled flight has seats



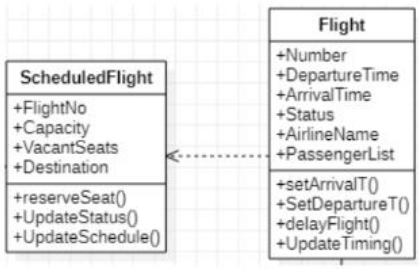
3.2.4 GENERALIZATION:

- **Aircraft and ATR, Boeing, PIA and Airbus:** ATR, Boeing, PIA and Airbus are specified form of aircraft.



3.2.5 DEPENDENCY:

- **Flight and scheduled flight:** Flight is dependent on the scheduled flight

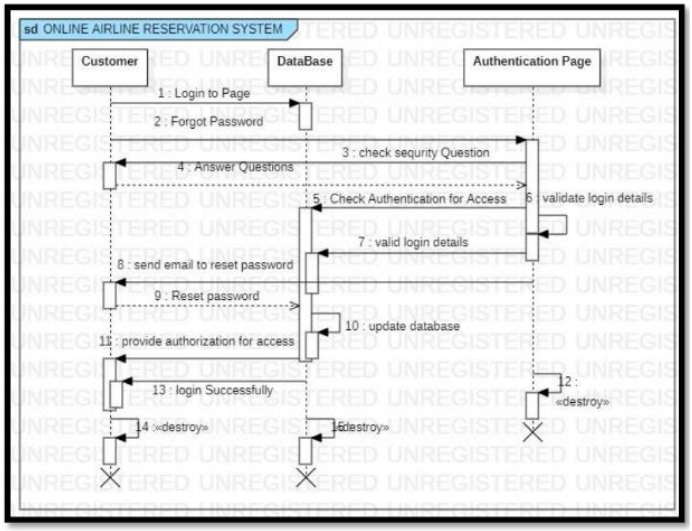


3.3 Sequence Diagram:

3.3.1 Sequence Diagram for login to airline reservation system:

Description:

Customer first enters his/her respective username and password in order to login to the airline reservation system. It will be validated in the authentication page. If Passenger forgot his/her password he/she can chose the option of forgot password. In result passenger is asked to answer some security questions which will be validated. If passenger answer them correctly then he/she can reset password. After entering new password, it will be updated in database and user will receive confirmatory message of resetting password.

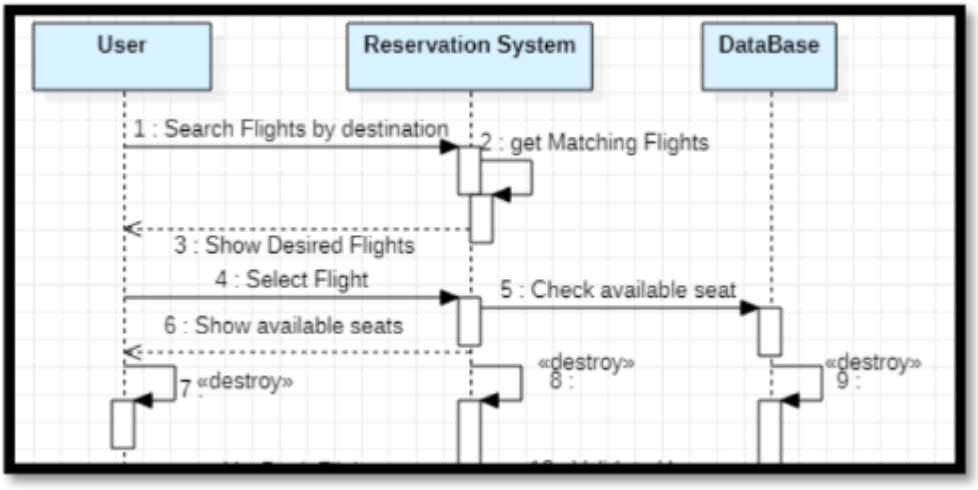


3.3.2 Sequence Diagram for checking Availability:

Description:

As user have already re glistered, then he easily searches flight according to desired location. After that our system will check for the desired flights list and will show to the user. User selects

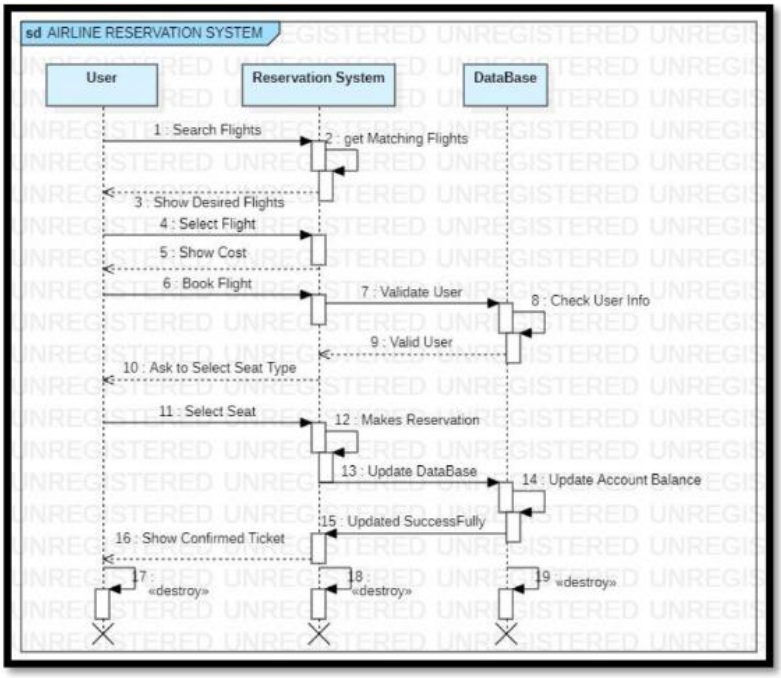
any flight of which he wants to check availability which will be checked by database and the details of respective flight along with their type i.e., available business class, economy, economy plus seats will be displayed.



3.3.3 Sequence Diagram for Searching and Booking:

Description:

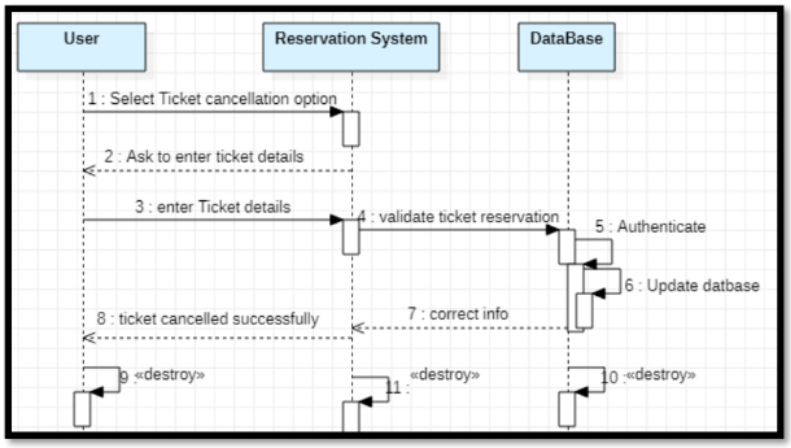
User first searches for his/her desired vacant seat in specific aircraft which will be searched in reservation system. Then the result/status of respective seat will be displayed if seat is vacant then cost will be shown if he/she wants to book that seat. After booking user will pay for his/her desired seat from his/her online bank account. Before payment, user's account details will be validated. Then database updated, customer invoice will be displayed and confirms ticket. At the end, logout from the system.



3.3.4 Sequence Diagram for cancellation Booking:

Description:

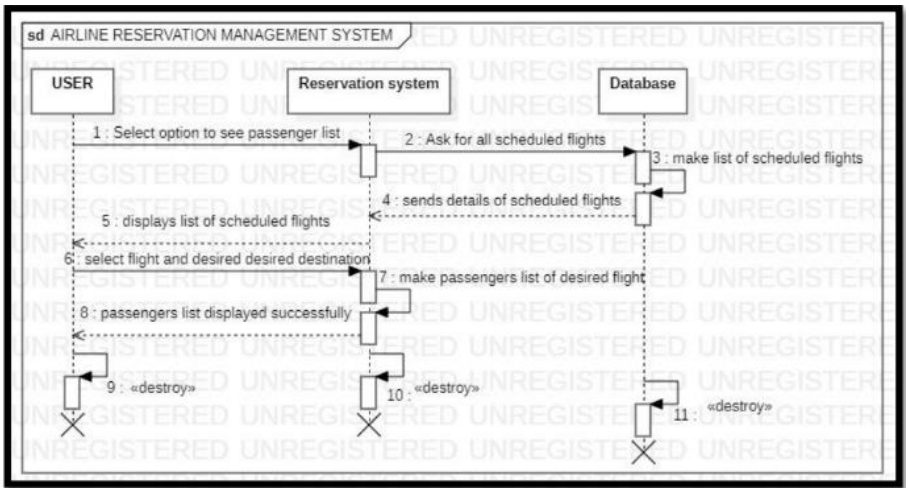
In order to cancel the ticket, user first have to book the seat. For this he selects the option to cancel the ticket after which he will be asked to enter his ticket details. When user enters his ticket info, it will be validated in database that whether this ticket is booked or not. If seat is reserved then it will be updated as available and confirms the cancelation of ticket to the user by transferring message or mail.



3.3.5 Sequence Diagram for viewing passenger list:

Description:

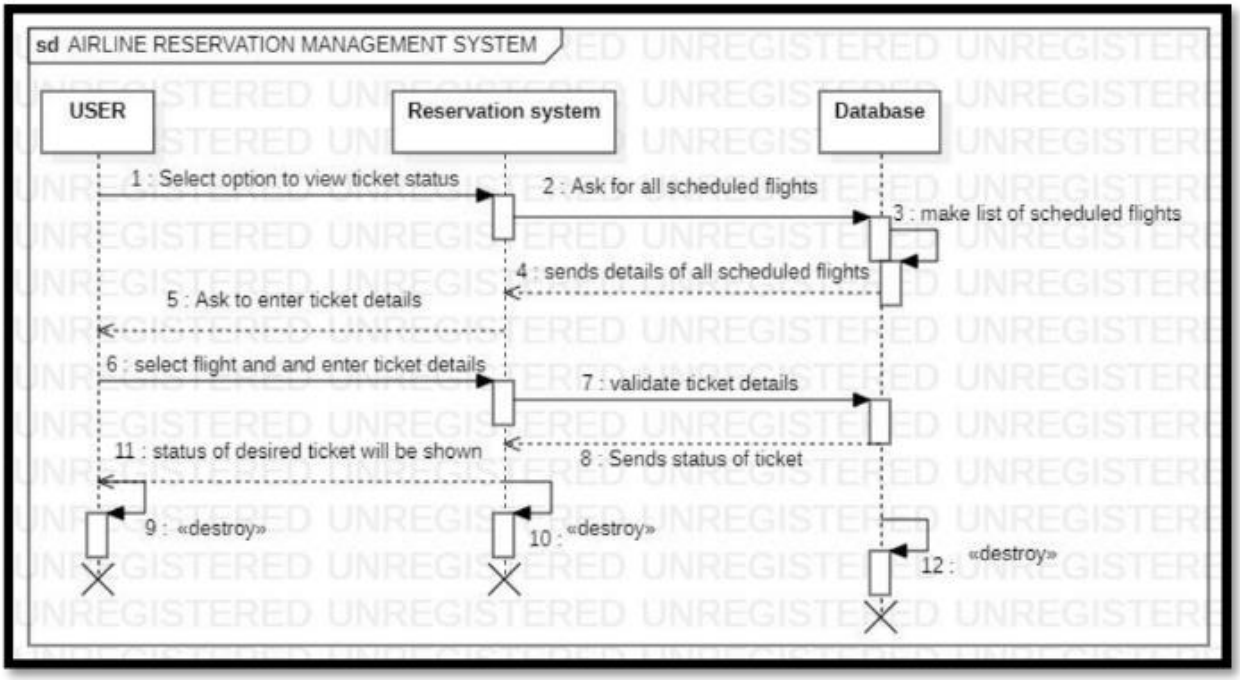
From main menu user will choose the option to view passenger's list. System will fetch details of all scheduled flights and then it will be displayed to the user. he will select the desired flight of which he wants to view the list. Then system will display the list of all passengers traveling in respecting flight.



3.3.6 Sequence Diagram for checking status:

Description:

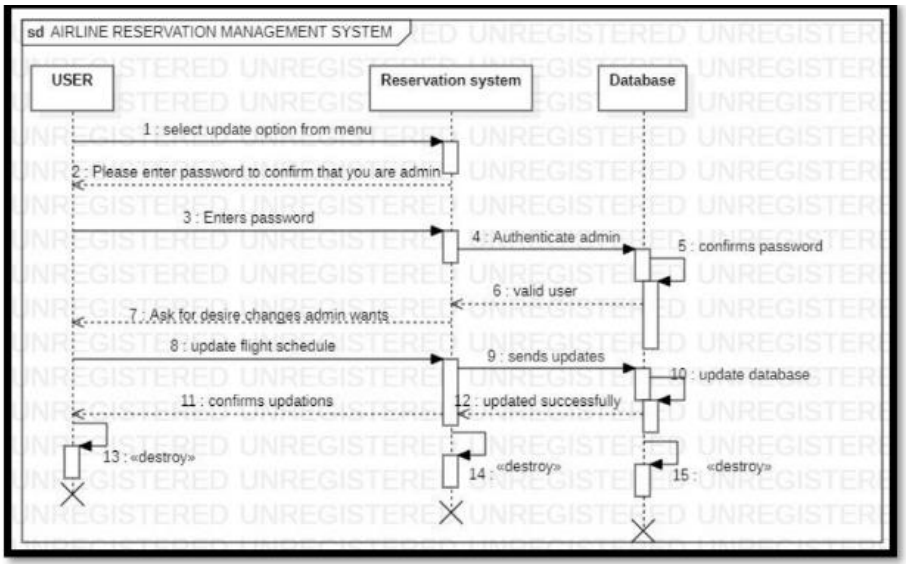
User will select the option from menu then will enter the ticket details of which he wants to see the status. In database ticket details will be validated that the seat of respective information exists or not if exists then the status of ticket will be shown.



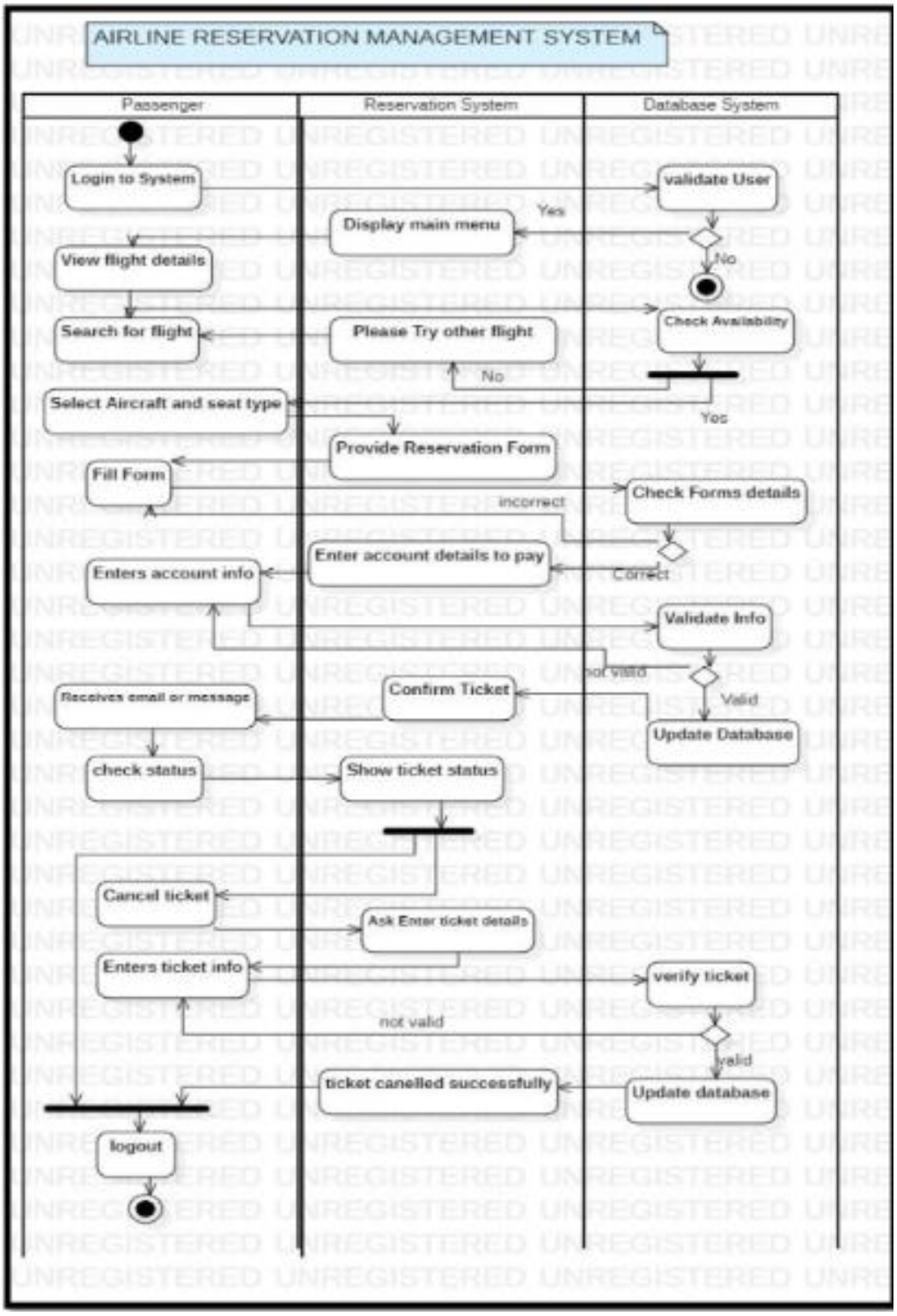
3.3.7 Sequence Diagram to update flight schedule:

Description:

Flight details can only be altered by admin so when a user wants to update the flight info, he will be asked to enter the password to confirm that he is admin. Flight details can only be updated when the password will be entered correctly otherwise message of access denied will be displayed.


sd AIRLINE RESERVATION MANAGEMENT SYSTEM
USER
Reservation system
Database
1 : select update option from menu
2 : Please enter password to confirm that you are admin
3 : Enters password
4 : Authenticate admin
5 : confirms password
6 : valid user
7 : Ask for desire changes admin wants
8 : update flight schedule
9 : sends updates
10 : update database
11 : confirms updations
12 : updated successfully
13 : «destroy»
14 : «destroy»
15 : «destroy»

3.4 ACTIVITY DIAGRAM:



3.4.1 ACCESS CONTROL OF ACTORS:

Actor	Access
Admin	● Register Customer ● Delete Users Info ● Manage flight Details ● Manage seat details ● Update database or aircraft information ● Schedule flight ● Search flight ●Search for particular passenger ● Edit status ●Update flight time or destination
Customer	●Register ●Signin ●View flight details ●Book ticket ●cancel ticket ●view ticket status ●view passenger list and flight details ●access bank account
Bank server	●can access user's bank account ●Update account details after payment ●access to airline management system

4. Reuse and relationships to other products:

Our software components are reusable in many management systems like Bus ticketing management System, Aircraft management system at national level.

These services, methods and processes in the software product can easily be reusable in any ticketing management with minor changes.

5. Design decisions and tradeoffs:

5.1 Design Decision:

In the design of airline management system, the decisions are made regarding the design attributes. Some of the design attributes in our software are described as below:

5.1.1 Reliability:

By this attribute means that software performs all the tasks with great precision and accurate.
In our software of Airline management system, the all the components are highly reliable and secure and there is no need to maintain the software on the regular basis which is the time taking process.

5.1.2 Availability:

By availability it means that the all the functionalities performed by the user must be readily available to the user and the interface must be user friendly so that user will not face any kind of difficulty while Login**, booking the ticket, cancellation, returning the home screen and checking the flight schedule.**

If error occurs the system readily displays the error message to the maintenance team so that error can be remove.

5.1.3 Security:

This is the most important attribute in our software design. This is because it is an Airline Management System software so the suer will visit or use this to **"see the flight schedule, prices for the flights and if the customer wants, he/she login in the software and book their tickets by providing the personal details and card details".**

So, to avoid leakage of the personal information or the payment details of the customer we had made our software highly secure.

- We had use some of the cryptographic techniques such as providing OTP message on the phone and email which is only known to the original customer.
- We had use some of the personal questions related to CNIC of the customer which will ensure that the customer is reliable, and the security is ensured.
- We had restricted the communication between different modules.

5.1.4 Portability:

Our software is the application-based system and the web-based system so it will not restrict to certain kind of operating system.

So, it will be available to use in **iOS, Android, Linux, Mac and on any webserver.**

5.1.5 Maintainability:

Our software is highly maintainable. The software can easily incorporate the new functionalities and new modules without affecting the whole system.

If any error occurs it will easily be removed without any difficulty faced by the user.

5.1.6 Reusability:

This attribute applies to our software system because our software can be reusable for bus management system, airline management system (at national level) and much more.

5.2 Tradeoffs:

Design tradeoffs means that by increasing the capability of one module or attribute in the software will affect the other attribute in the software.

In our design following tradeoffs occur:

5.2.1 Cost Vs Reusability:

In our software design there is an attribute Reusability because some of the components of our product can be reusable.

But if our software is so much reused then the cost will be affected i.e., by increasing the reusability the cost on the software will also increase which will not prove friendly.

5.2.2 Efficiency vs Portability:

As our system is not restrict to any kind of operating system so it will affect the efficiency of the software product because every operating system and web servers have different interface and mode of communication so it will affect product efficiency.

5.2.3 Rapid Development vs Functionality:

In our software product there is rapid development because the flights schedules are keep updating regularly and on the time basis, so it will affect the functionality of the software in some ways.

6. Pseudocode for components:

Here is the pseudocode for the components used in our software.

6.1 Pseudocode for Login:

When the user wants to login in the software, they will first click on the login button or if the user had booked the ticket, he/she will click on proceeds to checkout.

- Then if the user had the registered email id and password, he/she will simply be entered those and then clicks on sign in.
- If the user is new customer, he will click on the sign up where he will enter his first name,

last name, email id, password, confirm password and some security questions and then validation email is sent to user, and he will simply login from the sign in page.

- If the user forgets his password, he is required to click on the forget password which will move him to the page in which he will enter his email id and then he will be asked some of the security questions set by him and then an email will be sent to reset password and after that he can simply login.

6.2 Pseudocode for Check Vacancy:

- User opens the software either on the Operating system or the Web server
- Then he will click on book the flight
- After that he will be asked either to book one way or round trip
- Then user enter the location from where he will travel
- Then user will enter the destination location
- After that user sets the date
- Then different flights from different airlines will be displayed and their prices. ·
- If the flight is not available at the required dates, then error message will be displayed “NO flights Available on the Set Dates. Please change your dates”

6.3 Pseudocode for Book Seat

- User will confirm the ticket.
- Then he will be asked to choose the seat
- An arena will appear in which booked seats are displayed with red color and unbooked with blue color along with the windows so show these are window seat and these are centered.
- Then user will simply click on the seat and confirmation message appears.
- User can also communicate to the staff of the airline through online inquiry · And then he will move to payment details.

6.4 Pseudocode for Payment:

- User will move to the confirm to book
- A page having the payment details including card details appear
- User enters the card number
- It will be validating that card number is correct or not

- After validation, the user enters card expiry date and SSV of the card
- Then OTP message will be sent on the customer's phone number which will be entered and then payment for the ticket is done.
- Confirmation email and SMS will be sent from the airline management and the bank management.

6.5 Pseudocode for Cancel Ticket:

- User login his account
- There he sees his confirmed seat.
- Then if the user wants to cancel the ticket, he will click on Cancel ticket
- After that a pop-up message displays that if he cancels ticket, he will be returned only 50% of the amount. Does he really want to cancel?
- If user agreed, then the 50% of payment will be returned and his ticket will cancel · Then confirmation email will be sent.

6.6 Pseudocode for Check status:

- User will simply login
- Then clicks on the ticket booked.
- After clicking the date time all the details regarding flights will appear. User can also download the ticket in the .pdf form

6.7 Update flight Details:

- If the flights details updated, then email will be sent to user
- If user wants to check the status, he will follow the same procedure as Check Status