Independent University, Bangladesh

Web Development of Airline Reservation System at AIROS

An undergraduate internship report submitted by

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In consideration of the partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE

In

Computer Science and Engineering

Department of Computer Science
and Engineering Spring 2021

Acknowledgement

First and foremost, praises and thanks to Allah, the Almighty, for his showers of blessings throughout my Internship work and allowing me to complete the Internship work successfully within the timeframe. I would like to thank Independent University, Bangladesh (IUB) for offering an Internship program for me.

From the core of my heart, I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special gratitude I give to Mohammad Noor Nabi, senior lecturer of Independent University, Bangladesh, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report. His dynamism, vision, sincerity and motivation have deeply inspired me. The timely completion of this project is mainly due to the interest and dedication of the company.

I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing me for my future.

I am also grateful to **AIROS** for recruiting me as an intern.

I want to offer my utmost gratitude to Mr Mosharraf Hossain Pavel (Head, AIROS) for his Monitoring and guidance to fulfill my Internship.

Bhuiyan Shadman Wasif

April 30, 2021

Dhaka, Bangladesh

Letter of Submission

30th April 2021,

Mohammad Noor Nabi,

Senior Lecturer of Independent University, Bangladesh

Aftabuddin Ahmed Road, Block-B, Bashundhara R/A Dhaka

Subject: Letter of Submission of Internship Report, spring 2021.

Dear Sir,
This letter is written to kindly inform you that I, Bhuiyan Shadman Wasif, have completed my Internship program and its report. The Internship was conducted from **2nd February to 2nd May 2021**. I completed my internship from AIROS which is a Software and Technology Company.
The following report is based on my experience and the work I did in the development sector of this company. I was assigned to work as a **Junior Front End Web Developer**. I tried my best to communicate and worked assiduously throughout the 3 month period.
I hope that you will be kind enough to consider any mistakes in preparing this report and accept it.

Thanking you
Sincerely yours,

Bhuiyan Shadman Wasif

Abstract

This report is divided into eight different chapters. The objective of the project is to design an Airline Reservation System application which enables the customers to search and book flights. The project consists of a MYSQL server which acts as the database for the project. My motivation for the project came from my enthusiasm and strong urge to learn Web Development which is in quite high demand in today's world. The Airline Reservation System project mainly consists of two types of users. The customers who access the information provided by the website and the administrator who modifies and updates the information available in the website. All the data needed for the application is stored in the form of tables in the MYSQL server. The report contains the details of all the tasks carried out during the full course of my Internship.

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Summary

This report is prepared on the basis of my three-month practical experience at Decimal IT. This internship program helped me to learn about the practical scenario of a software Industry. Decimal IT is already providing software solutions and services in our country and other countries. During my internship period, I mainly worked as a frontend developer. I made a travel agency website for online flight booking at a cheaper price, one pharmacy (Frontend) site mainly and few customizations.

The amount of online businesses is increasing with every single day. This means that more web pages need to be created since nowadays a website is like a modern business card. In my opinion everyone should have a website because they are so inexpensive and yet so effective. 93% Of Business purchase decisions start with a search engine search of websites. It is your professionalism. It gives you opportunities abroad. It is a very easily accessible data center. It provides self-service customer support. [1]

The airline booking system website is an attempt to stimulate the basic concepts of airline reservation system. The system enables the customer to do the things such as search for flights for travelling between cities or countries on a specified date, choose a flight based on the details, reservation of flight and cancellation of reservation.

The system allows the passenger to search for flights that are available between the two travel cities, namely the "Departure city" and "Arrival city" for a particular departure and arrival dates. The system displays all the flight's details such as flight no, name, price, airlines, seats available, departure and arrival airports. After searching the system displays list of available flights with available seat numbers and allows customer to choose a particular flight. If the seats are available then the system allows the passenger to book a flight. To book a flight the system asks the customer to enter his details such as name, address, city, state, credit card number, passport number and contact number. Then it checks the validity of card and passport and book the flight and update the airline database and user database. The system also allows the customer to cancel his/her reservation, if any problem occurs. It is a user friendly, responsive website that resizes itself, and depending on the type of device like desktop computer monitor, laptop or small screens devices like smartphone, tablets.

I have thoroughly enjoyed my experiences at Decimal IT and the internship program has been extremely useful for both my academic studies and future career.

Purpose of the Internship

Internship programs provide a new perspective to the students. It provides learning opportunities outside the boundaries of the course curriculum and classroom activities. These opportunities enhance student's capability to apply theoretical understanding into real-world scenarios, thereby enhancing the students' academic and career goals.

From the student perspective, internship assists with career development in different diverse fields such as coding, programming, networking, marketing etc. by providing vital work experience that allows students to explore their area of interests and develop relevant skills and competencies.

From the organization perspective, internship provides a unique opportunity to train fresh talents, enhance their professional development as well as aid the professional growth of the intern mentor/supervisor. Organizations can also find potential employees within the interns.

Objective of the Internship

The purpose of this internship is to expose students to real work of environment experience and at the same time. The report is prepared for the purpose of explaining the achievement of the author during the internship period. The objectives of internship program are as follows:

- To build the strength, teamwork spirit and self-confidence in students' lives.
- Provides the opportunity to learn real-life work skills and etiquette hands-on at a real job.
- To Gain valuable skills, knowledge and experience in a field to allow you to make a career transition.
- Explore a career interest, develop skills, and gain experience.
- Internships focus on the skills you will learn and the experiences you will have, not simply on the company name.
- To help you apply the theory and skills you have learned in the classroom setting, and for your personal development.
- The student will be able instilled with good moral values such as responsibility, commitment and trustworthy during their training.

Chapter 1
Introduction

1.1 Overview/Background of the work

This chapter gives an outlook about the project and its features. Web application has become a necessity of any organization which has a number of members associated with it, along with new members interested in joining it. The Internet is the best way to introduce the organization and provide current and future information to its members. A web presence is also necessary to define the legitimacy of an organization.
IUB engineering school, an institute under Independent University, Bangladesh offers undergraduate program in “Graduate in Engineering School Administration". As a student of the undergraduate program, the program requires that we complete an internship period with a reputable company where I will be trained practically with working environment practices and get familiar with the industry. I worked at a software company AIROS where I have completed 3 months of internship. In this report, I have discussed my internship period at AIROS, an overview of the work I have done, what it is about, my experiences working for a reputed organization, what I have learned and how it has helped me to develop and grow.
I designed a travel agency website for airline ticket booking. My supervisor described me the kind of design that the website should have. I also had the freedom to do some innovations too. We would have regular meetings on Skype and I would show my design, if anything was required to be changed he would tell me during that time and what more things should be added.
Our website will allow to book airplane ticket online. Earlier Airline Reservation System was manual. People had to wait in the queue. Everything was very time consuming. And at present it is hard to imagine booking ticket manually.

There’s also the global pandemic going on, so it is advisable to stay home and book airplane ticket online. We want to take all the necessary precautions to ensure passenger’s safety while they travel.
Now we also have Google Flights which is a major improvement. The world is moving really fast. So, why would people come to our site anymore when there is Goggle Flights? We will come back to this question shortly.

1.2 Objective/Goal

- Design a website for the Airline Reservation Information System. This will help with online reservation and allow to search and check flight schedules.
- Implement the web-based airline information system.
- The website should give the passengers the cheapest deals.
- The System should store Customer information in case of an emergency such as flight cancellation in case of adverse weather conditions and it should let the customers know.
- The system should make it simpler for passengers to adjust their trips.
- The System should decrease the repetitive work that is done by the system administrator and the clerks.
- Check and validate the system.

1.3 Scope of the project

Features available to user and administrator after developing this web application are:

- Admin and stuff members can view the flights booked, can view the flights available and how many seats are available.
- Admin and stuff members can add new flights, new airlines, and new airports.
- Admin and stuff members can view all the admin/s and all the stuff members and clerks.
- Admin can update or change the site settings, such as the about section and change or update the email and/or contact information.
- Passengers can view the flight list, they can search for a flight for a particular date and from a particular location to another particular location. If the flight is available with sufficient number of seats it will be displayed with all the information about that flight. Passengers can then book it by providing their information and can specify for how many people they want to book the flight.

Chapter 2

Literature Review

2.1 Relationship with undergraduate studies

The work I have been doing for the last 3 months is very familiar to what I have been studying in my Undergrad in Independent University, Bangladesh. There is the database course which helped me a lot to understand how database actually works. It helped to understand how planning is very important before doing a project. I learned about rich picture, BPMN, ERD, how to analyze the project. During my database course I also learned SQL (structured query language). Even though I mostly did the frontend part but SQL helped me to understand the project better and helped me to communicate better with the backend teammates of this project.

The system analysis and design course helped a lot to understand the requirements of a project and what are the things that needs to be carried out before starting a project, things that should be done while you're doing the project and how to end and keep improving and updating the system, providing good customer care even after finishing the project. Releasing new updated versions, etc.

The key to success in business is the ability to gather, organize, and interpret information. Systems analysis and design is a proven methodology that helps both large and small businesses reap the rewards of utilizing information to its full capacity. As a systems analyst, the person in the organization most involved with systems analysis and design, you will enjoy a rich career path that will enhance both your computer and interpersonal skills. Systems Analysis and Design (SAD) is an exciting, active field in which analysts continually learn new techniques and approaches to develop systems more effectively and efficiently. However, there is a core set of skills that all analysts need to know no matter what approach or methodology is used. All information systems projects move through the four phases of planning, analysis, design, and implementation; all projects require analysts to gather requirements, model the business needs, and create blueprints for how the system should be built; and all projects require an understanding of organizational behavior concepts like change management and team building. The major goal of systems analysis and design is to improve organizational systems. Often this process involves developing or acquiring application software and training employees to use it. Application software, also called a system, is designed to support a specific organizational function or process, such as inventory management, payroll, or market analysis. The goal of application software is to turn data into information. For example, let's consider our case, website developed for the airline ticket booking system will keep track of the number of flights booked and it will be stored in the database. [3]

The course helped me understand how important functional and non-functional requirements are. I learned about a lot of new diagrams: Logical Data Flow Diagram, Physical Data Flow Diagram, Activity Diagram, Sequence Diagram, Communication Diagram, Class Diagram, and State Chart Diagram. I have actually drawn all of the above mentioned diagrams for this project, even though it wasn't a requirement from my supervisor. But when I showed him, he was really impressed and it actually helped a lot to understand the project better. The course also taught me that when you are making a system, or a web application or mobile app you have to always ask questions to the organizations, to the people for whom you are making it and try and gather as much information as possible.

I also learned about the use case scenarios. Like what could be a normal scenario and what alternative possible scenario can there be and we also have to be prepared for that.

Below are 2 Use Case scenarios. I took help from a System Analysis and Design book [4] and came up with these while making this website:

Normal Scenarios

Use case 1:

Table 2. 1 Use Case: Online Booking

Use case name:	Online booking
Area:	Airline Reservation system
Actor(s):	Passenger, Traveling agent
Stakeholder:	Passenger, Traveling agent, Developers
Description:	Allow passengers and traveling agents to book tickets online using a secure website.
Triggering event:	Passengers and traveling agents fill out the flight details and clicks on the book ticket button.
Trigger type:	External

Steps performed (Main path)	Information for steps
1) The passenger or traveling agent logs onto the web server	User ID, password, user type
2) Password is being verified	User ID, password, user type
3) The actors then fills out the required details to view their desired flights	Online booking form
4) All the inputs are validated on the web server	Online booking form
5) Payment page appears	Secure credit card webpage
6) All the required credit card information are filled in	Secure credit card webpage
7) Credit card is charged for the booking	Secure credit card webpage
8) Online booking confirmation	Confirmation webpage
9) Download ticket as pdf and printing option appears	Confirmation webpage
10) Confirmation email is sent	Confirmation webpage

Preconditions:	Must have an Airline Reservation system account
Post conditions:	The actors here (Traveling agent and passenger) successfully Booked online ticket.

Use case 2:

Table 2. 2 Use Case: Choosing Seat

Use case name:	Choose seat
Area:	Airline Reservation system
Actor(s):	Passenger, Traveling agent
Stakeholder:	Passenger, Traveling agent, Developers
Description:	Allow passengers and traveling agents to find their preferred Seat.
Triggering event:	Passengers and traveling agents fill out the flight details and the available seats are displayed.
Trigger type:	External

1) The passenger or traveling agent logs onto the web server	User ID, password, user type
2) Password is being verified	User ID, password, user type
3) The actors then fills out the required details to view their desired flights	Online booking form
4) All the inputs are validated on the web server	Online booking form
5) A webpage appears to select desired seat	Seat selection chart
6) Payment page appears	Secure credit card webpage
7) All the required credit card information are filled in	Secure credit card webpage
8) Credit card is charged for the booking	Confirmation webpage
9) Online booking confirmation	Confirmation webpage
10) Download ticket as pdf and printing option appears	Confirmation webpage
11) Confirmation email is sent	Confirmation webpage

Preconditions:	Must have an Airline Reservation system account and the flight gives option to select seat
Post conditions:	The actors here (Traveling agent and passenger) successfully Found their desired seat and successfully booked of ticket.

Alternative scenario for use case – online booking

Table 2. 3 Alternative Use Case: Online Booking

1) passenger or traveling agent sees a list of flights
2) Passenger or traveling agent filters the flights accordingly by filling the form
3)A particular flight is selected
4)Information is sent to the airline
5)The flight is full

Alternative scenario for use case – choose seat

Table 2. 4 Alternative Use Case: Choosing Seat

1) passenger or traveling agent sees a list of flights
2) Passenger or traveling agent filters the flights accordingly by filling in the information of their desired flight
4) A particular flight is selected
5) Seating chart is displayed
6) Passenger selects the desired seat
7) Information is sent to the airline
8) The selected seat is not available

[4]

Well of course the Web Development course is the one that inspired me to make websites. That is where I started learning about HTML, CSS, JavaScript, jQuery, Bootstrap, and PHP. I also took the android app development course which I really enjoyed. Working in android studio was really good, previously I learned Java and worked in Eclipse IDE and NetBeans IDE but android studio was really of another level. We are going to make an app too after we launch the website, so it will definitely help me in the future. We also want to do multi-threading very soon so that many users can use the site and it will improve the performance big time. I learned about multi-threading a little from my Microprocessor course and more in my OS course here at IUB.

2.2 History leading to this project

Earlier Airline Reservation System was manual. Everything was very time consuming, it was difficult and not very convenient for passengers to wait in the queue and go and book their tickets. For the Airline it was very difficult to calculate how many people booked their flights and how many seats were empty for a particular flight. It was also very time consuming to do all these calculations, it was a waste of money too as more people were hired for this work. In the year 1946 the American Airlines was the first one to start an automated Airline reservation system. The system was very efficient and airlines all over the world was very impressed by this system. Soon, more and more airlines started their own automated booking system.

United Airlines developed the Apollo Reservation System, and soon allowed access to travel agents. The Apollo system was the foundation of further developments, and it spread from US airlines to European airlines as well.

Other airlines followed soon and began to establish their own systems. In 1968 Delta Air Lines launched the Delta Automated Travel Account System (DATA). United Airlines and Trans World Airlines soon participated in the race in 1971 with the Apollo Reservation System and Programmed Airline Reservation System (PARS). [2]

The development and research of the Airline Reservation System started to became pretty significant in the airlines industry.

At present, airline reservation systems have developed into computerized reservation systems and it is a great progress made by this industry.

We are in the 21st Century and it is the era of Science and Technology. New technologies and enhancement just keeps on coming! More and more developments being made, even at this very time. The Web has become a great platform over the last four years for Airlines to make their own online Reservation System. The Web has become a very handy resource. Nowadays people don't have to meet with traveling agents, they can do their reservations online. It saves the travelers a lot of hassle, saves so much time for both the passenger and the Airlines.

So, more and more Airline companies are making their own online Airline Reservation System.

Chapter 3

Project management and Financing

3.1 Work Breakdown Structure

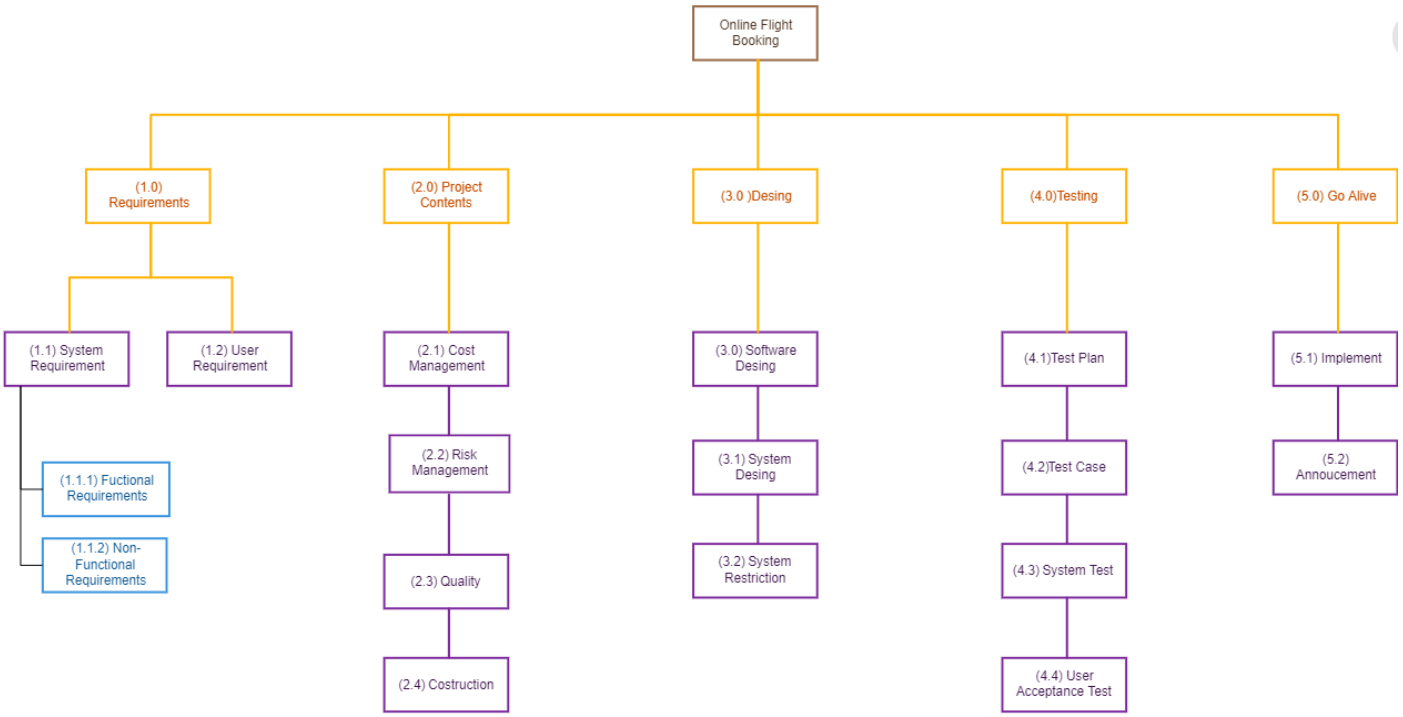


Figure 3. 1 Work breakdown Structure of Airline Reservation System project

3.2 Gantt chart

Reasons for which Gantt chart is important for our project:

- It shows what the various activities are
- When each activity begins and ends
- How long each activity is scheduled to last
- Where activities overlap with each other, and by how much
- The start and end date of our project
- How many stuff members are needed for a particular day

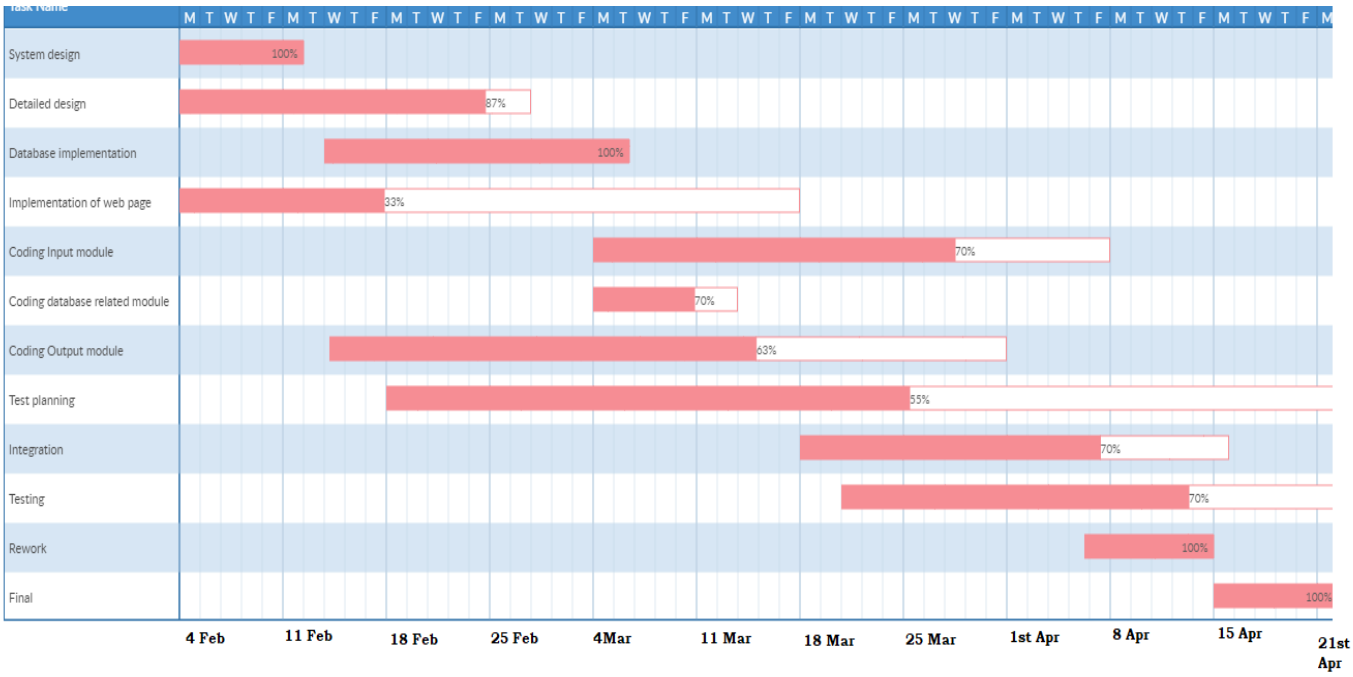


Figure 3. 2 Gantt chart of Airline Reservation System project

3.3 Process/Activity wise distribution

Every designer and design agency will have their own project phases depending on client's needs and requirements. To create more accurate estimates on a long-term basis, it is important to break down project phases in a consistent manner. Generally, web projects may be broken into the following phases:

- Research and planning
- Solution design
- Web design
- Front-end development
- Back-end development
- Content writing
- Testing
- Launching a website

Each of these phases are broken down into smaller phases, for example, research and planning require gathering information and project planning; solution design means creating wireframes, sitemaps and user workflow. The design stage will include designing a homepage (which can take up to 2 to 3 times more time than other pages) and additional pages. It also means adding content provided by the client. After the design is finished a complex technical task of building the design is put in the hands of the developers. The front-end development stage consists of cross-browsing fixes and building templates. A mobile design must also be built out by the developers in accordance with the existing design. The back-end development stage includes CMS setup and configuration, creating contact forms and various other functionalities. Then the content has to be uploaded and the functionality needs to be tested. After all these steps are complete, a website can then be ready for launch. [5]

3.4 Estimated Costing

We are planning to get hosting from SiteGround as it is one of the best hosting provider. Domain name will cost us around $16/year. The hosting will cost us $5.95/month, so it will be $71.4 per year. We will get free SSL certificate from this host provider, so that’s a bonus. For SEO and marketing we are planning to spend around $70.

Chapter 4

Company Profile

4.1 AIROS:

AIROS is a Software and Technology Company of Bangladesh established in 1 Jan 2018. Meaning of AIROS is Artificial Intelligence, Robotics and Software. Our aim is to develop and offer customized software and technology of any kind to the market which will define AIROS in Bangladesh and Internationally. It is not a typical company which works intensively to make unique product. We focus on the functionality and aesthetic of any product for complete customer satisfaction.

4.1.1 Work principle:

AIROS is based on “First Principle” not analogy. “First Principle” means AIROS will solve the problem by identifying the variables of the problems then solve it one by one in chronological pattern.

4.1.2 Vision:

We want our customer to be more productive, so their work efficiency increases and continue to increase for near future. In near future we want to lead the technology and software industry of Bangladesh. So, we want our product to be errorless. It is a personal commitment to the customer and market. Our target is to make a revolution to the industry.

4.1.3 Mission:

Our work is challenging in a way because we are not making conventional or a typical software, we will create technology itself, so we will create and innovate all the time.

Our passion is Science, technology, innovation, creation and make very complex system simplified so that it can be user friendly and easy to navigate. Imagination and productivity go hand to hand in AIROS.

Chapter 5
Body of the Project
5.1 Work Description

I have mainly worked on the frontend part and a little bit of the backend too which was additional. Used HTML, CSS, JavaScript, Bootstrap, PHP and MYSQL.

The airline reservation system is a website-based booking system that facilitates in combining data from all airlines through the use of global distribution systems. The system provides records and rates in real time to customers as well as travel agents. It saves a lot of time for both the passengers and the Airline Company. It simply makes life much easier. In this current pandemic situation it is hard to go outside and book your tickets, it is possible to do it from the comfort of home with just a few clicks and the payment is done online too and the system takes care of it all. The airline booking system website is an attempt to stimulate the basic concepts of airline reservation system. The system enables the customer to do the things such as search for flights for travelling between cities or countries on a specified date, choose a flight based on the details, reservation of flight and cancellation of reservation.

The system allows the passenger to search for flights that are available between the two travel cities, namely the "Departure city" and "Arrival city" for a particular departure and arrival dates. The system displays all the flight's details such as flight no, name, price, airlines, seats available, departure and arrival airports. After searching the system displays list of available flights with available seat numbers and allows customer to choose a particular flight. If the seats are available then the system allows the passenger to book a flight. To book a flight the system asks the customer to enter his details such as name, address, city, state, credit card number, passport number and contact number. Then it checks the validity of card and passport and book the flight and update the airline database and user database. The system also allows the customer to cancel his/her reservation, if any problem occurs. It is a user friendly, responsive website that resizes itself, and depending on the type of device like desktop computer monitor, laptop or small screens devices like smartphone, tablets.

Our goal:

- Design a website for the Airline Reservation Information System.
- Implement the web-based airline information system.
- The website should give the passengers the cheapest deals.
- The System should store Customer information in case of an emergency such as flight cancellation in case of adverse weather conditions and it should let the customers know.
- The system should make it simpler for passengers to adjust their trips.
- The System should decrease the repetitive work that is done by the system administrator and the clerks.
- Check and validate the system. Run Tests and check the system.

At present we have talked with some of the local airlines (Biman Bangladesh Airlines, US- Bangla Airlines and Regent Airways) and an agreement is going on with them.

How the system can be used in tandem with Google Flights

We planned to make a travel agency website for online ticket booking. People would wonder now that Google Flights is available why shall people use these websites anymore. But the thing is our website can

be used in tandem with Google Flights. Often Google flight can't give the cheapest deals because the cheapest fares only show up on smaller online travel agency sites, so Google won't find them. There's another issue with Google Flights which is ghost fares. Often Google Flights will show a fare for a certain rate, but when you click on it to book, it's not available or you are told to call the airline. Theirs is really no need to call the airline that's because you've been ghosted by Google. So what can be done is this:

If the user has a flexible time, the user can look up for the flight options in Google flights. If your dates and locations are relatively open, start with the map feature. You can then move the map to view the prices for a specific region. The map will populate with the cheapest fares for your selected date range. If you know where you want to go but your dates are slightly flexible, check out the calendar view, which shows two months of availability at a time. The lowest prices are highlighted in green and you can easily change the trip duration or select different dates to see how it affects the price. Once you know the cheapest dates for your trip and have a price on Google Flights, head over to our site and do the same search. In some cases, the price might be the same, but in others, the price found could be significantly less when you book with a smaller OTA (online travel agency) such as ours. There are some positivity and some cons but the optimum deal will be to use both in tandem. At the end of the day depending on the savings, it could be worth it. [7]

5.2 Feasibility Analysis

In case the system proposal is acceptable to the management, the next phase is to examine the feasibility of the system. The feasibility study is basically the test of the proposed system in the light of its workability, meeting user's requirements, effective use of resources and of course, the cost effectiveness. These are categorized as technical, operational, economic, schedule and social feasibility. The main goal of feasibility study is not to solve the problem but to achieve the scope. In the process of feasibility study, the cost and benefits are estimated with greater accuracy to find the Return on Investment (ROI). This also defines the resources needed to complete the detailed investigation. The result is a feasibility report submitted to the management. This may be accepted or accepted with modifications or rejected.
In short, following decision are taken in different feasibility study:

Economic Feasibility: When people will use our website and book tickets from it then we will get a commission from our partner Airlines. So, it is economically feasible.

Operational Feasibility: Whenever a passenger books a flight, the flight, booked flights, tables in the database changes. Manually it is very difficult to keep this records but it is easy using the web based application. So, it is operationally feasible.

Technical feasibility: Our Company is a reputed software company in Bangladesh. It has technical expert and system developer team. They are highly qualified to make any software and reach any requirement goal. As well as company has a lots of resources to create this kind of software. Making this software is technically feasible.

5.3 System Design

Analysis collects a great deal of unstructured data through interviews, questionnaires, on-site observations, and procedural manuals and like. It is required to organize and convert the data through system flowcharts, data

flow diagrams, structured English, decision tables and the like which support future development of the system. The Data flow diagrams and various processing logic techniques show how, where, and when data are used or changed in an information system, but these techniques do not show the definition, structure and relationships within the data.

It is a way to focus on functions rather than the physical implementation. This is analogous to the architect's blueprint as a starting point for system design. The design is a solution, a "how to" approach, compared to analysis, a "what is" orientation.

System design is a highly creative process. This system design process is also referred as data modeling. The most common formatted used the E-R notation explains the characteristics and structure of data independent of how the data may be stored in computer memories.

The process of system design can be divided into three stages. They are:

- Structure design
- Database Design
- Interface design

As we know that system design is a solution to "How to approach to the creation of new system". It provides the understudying and procedural details necessary for implementing the system. The steps involved during system design were as follow: -

LOGICAL AND PHYSICAL DESIGN

The current physical system was thoroughly reviewed, how the data flow will work, what are file contents, its volumes and frequency etc.

After this input, output specifications security & control specification were prepared. It was also decided that how physical information will flow through the system and a physical design walk through.

5.4 Six Element Analysis

Table 5.1 Six Element Analysis

Process	Human (Role)	Non-Computing Hardware	Software	Hardware	Database	Connectivity
Selecting Flight	Select flight from Website	Customer books flight over phone call	AIROS Flight Booking System	PC or any other smart device	MySQL	Internet
Add a New Flight	Admin adds a new flight, provides all the information and it gets stored in the database	None	AIROS Flight Booking System	PC or any other smart device	MySQL	Internet
Add a New stuff	Admin adds a new stuff, enter his/her details and it gets stored in the database	None	AIROS Flight Booking System	PC or any other smart device	MySQL	Internet
Add a New Airlines	Admin adds a new airlines, enters airlines details and it gets stored in the database	None	AIROS Flight Booking System	PC or any other smart device	MySQL	Internet
Add a New Airport	Admin adds a new airport, enters airport details and it gets stored in the database	None	AIROS Flight Booking System	PC or any other smart device	MySQL	Internet

5.5 Rich Picture

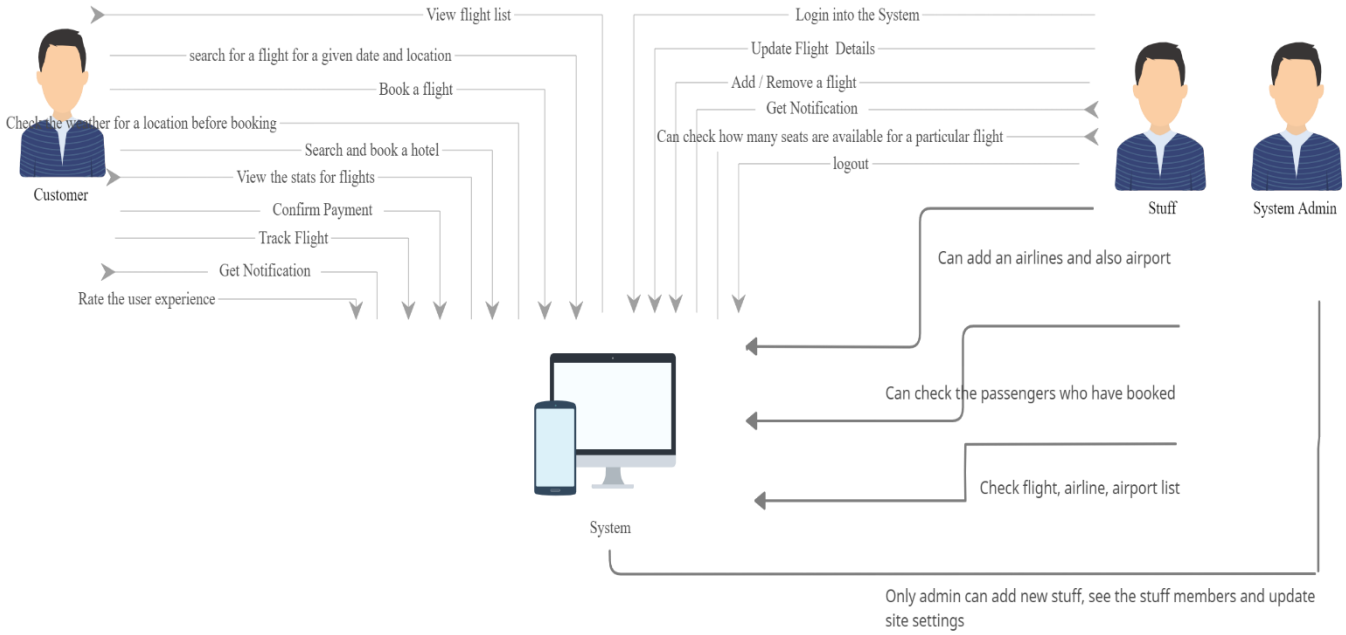


Figure 5.1 Rich picture

5.6 UML Diagrams

5.6.1 ERD

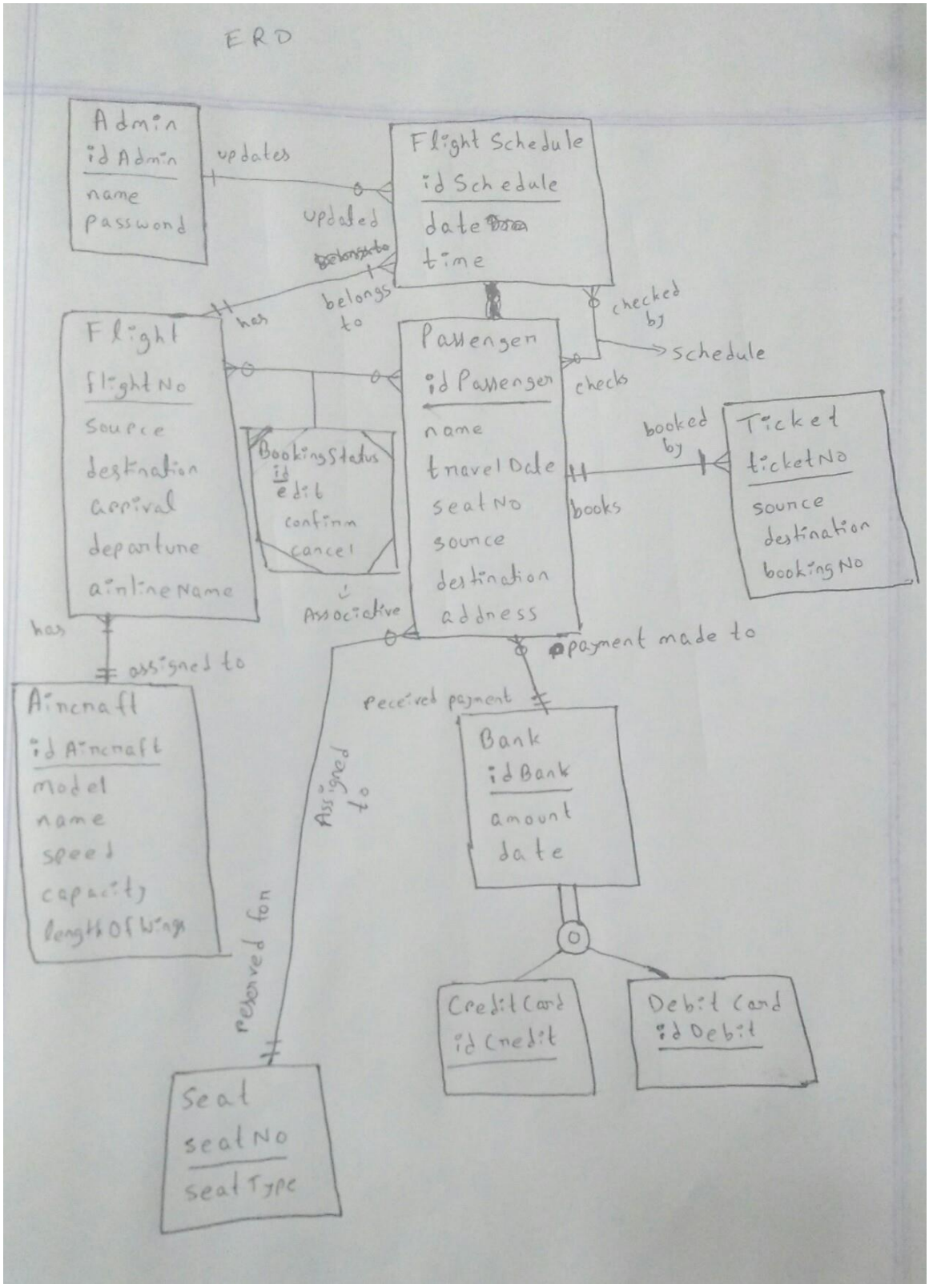


Figure 5.2 Entity Relationship (ER) Diagram

5.6.2 Logical Data Flow Diagram

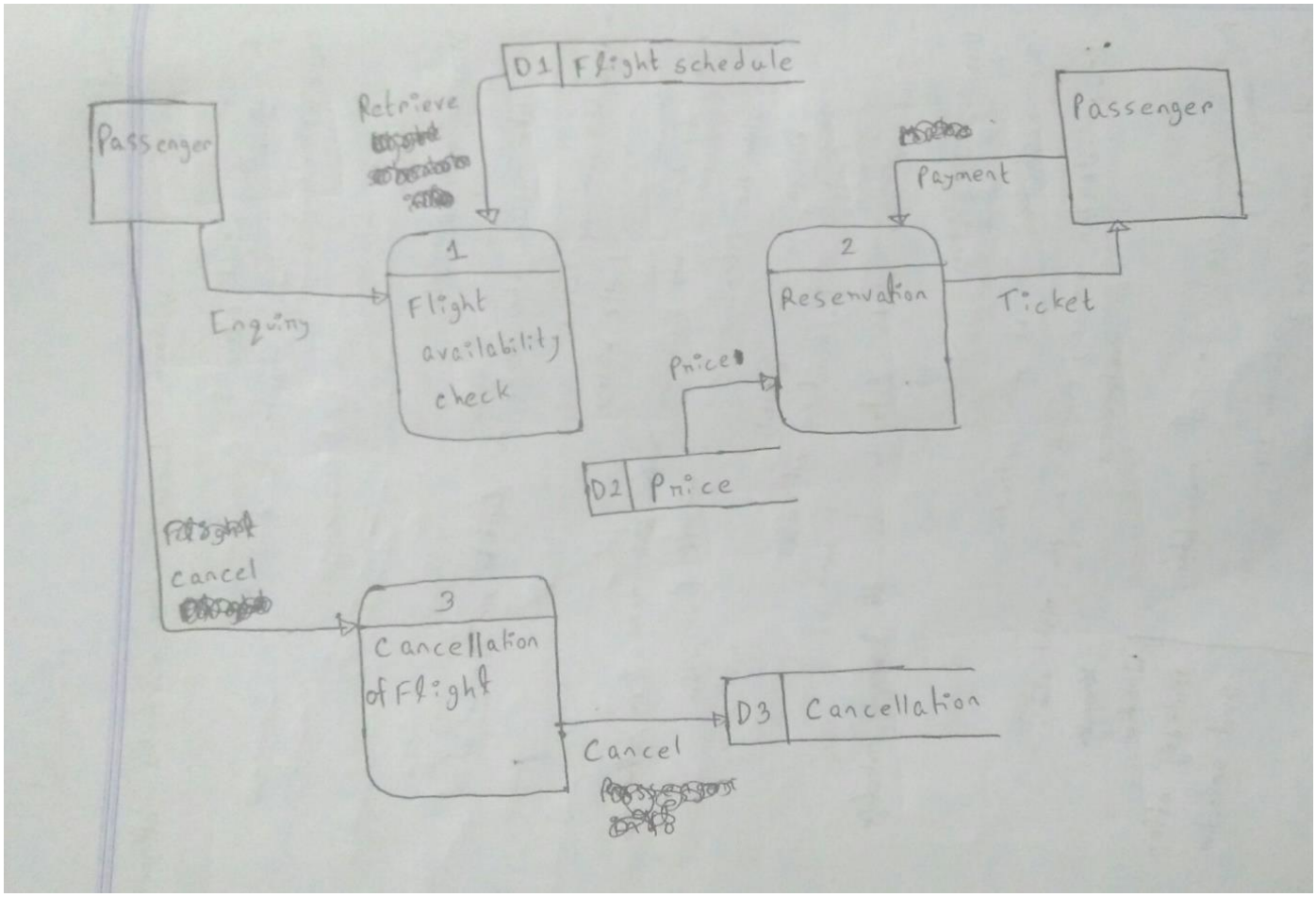


Figure 5.3 Logical Data Flow Diagram

5.6.3 Physical Data Flow Diagrams

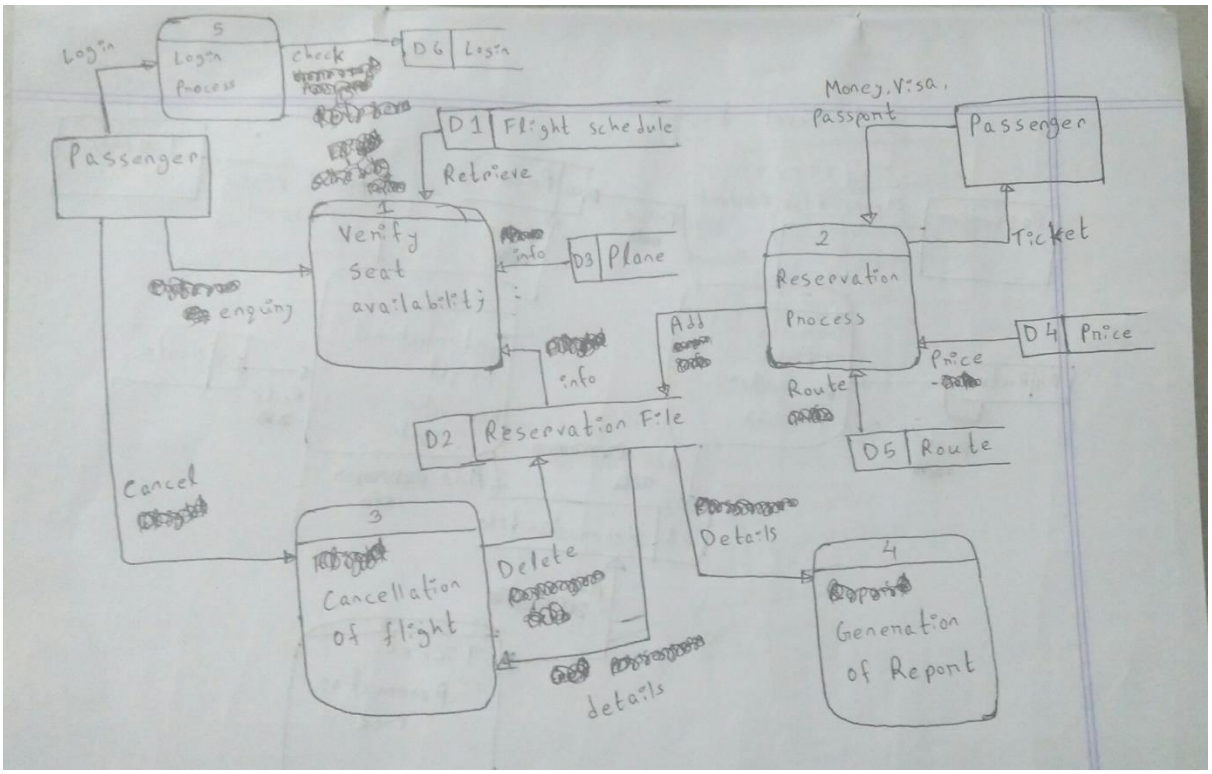
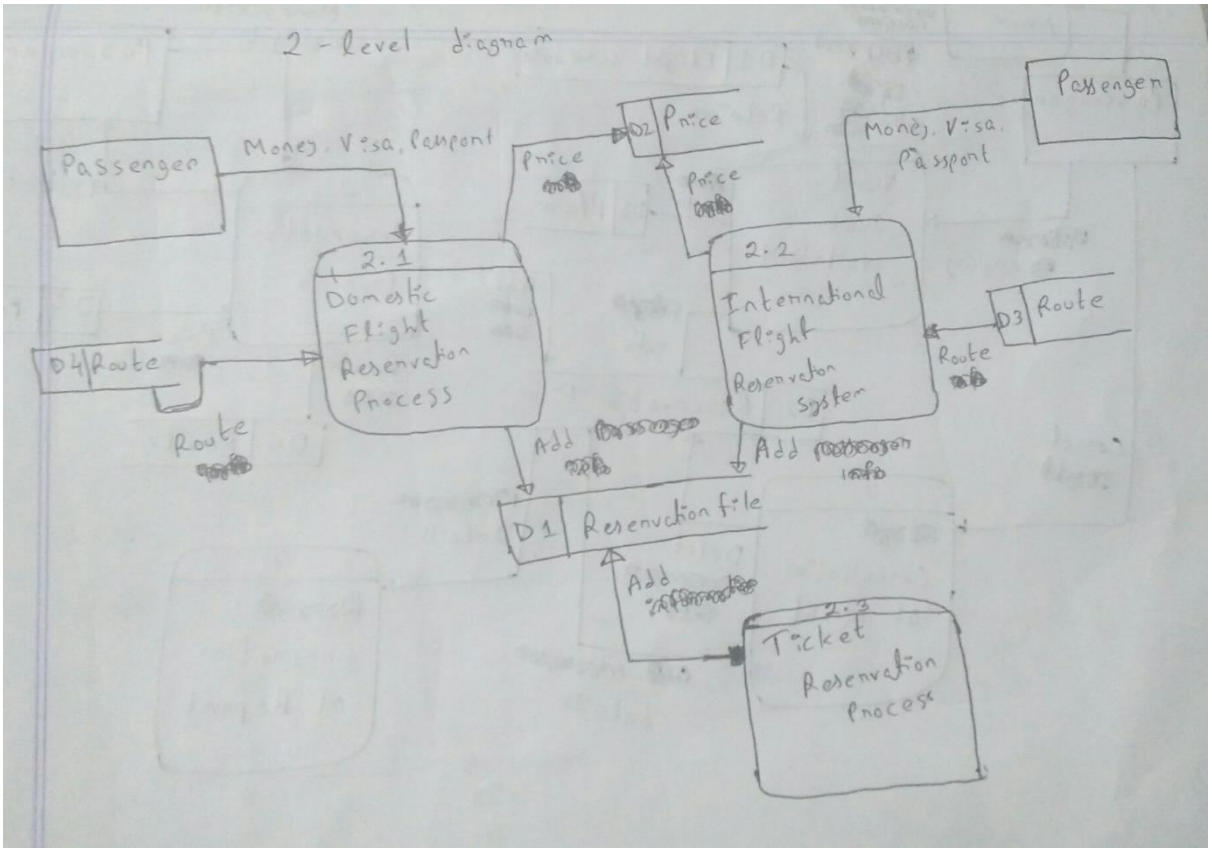


Figure 5.4.1 Physical data Flow Diagram - 1



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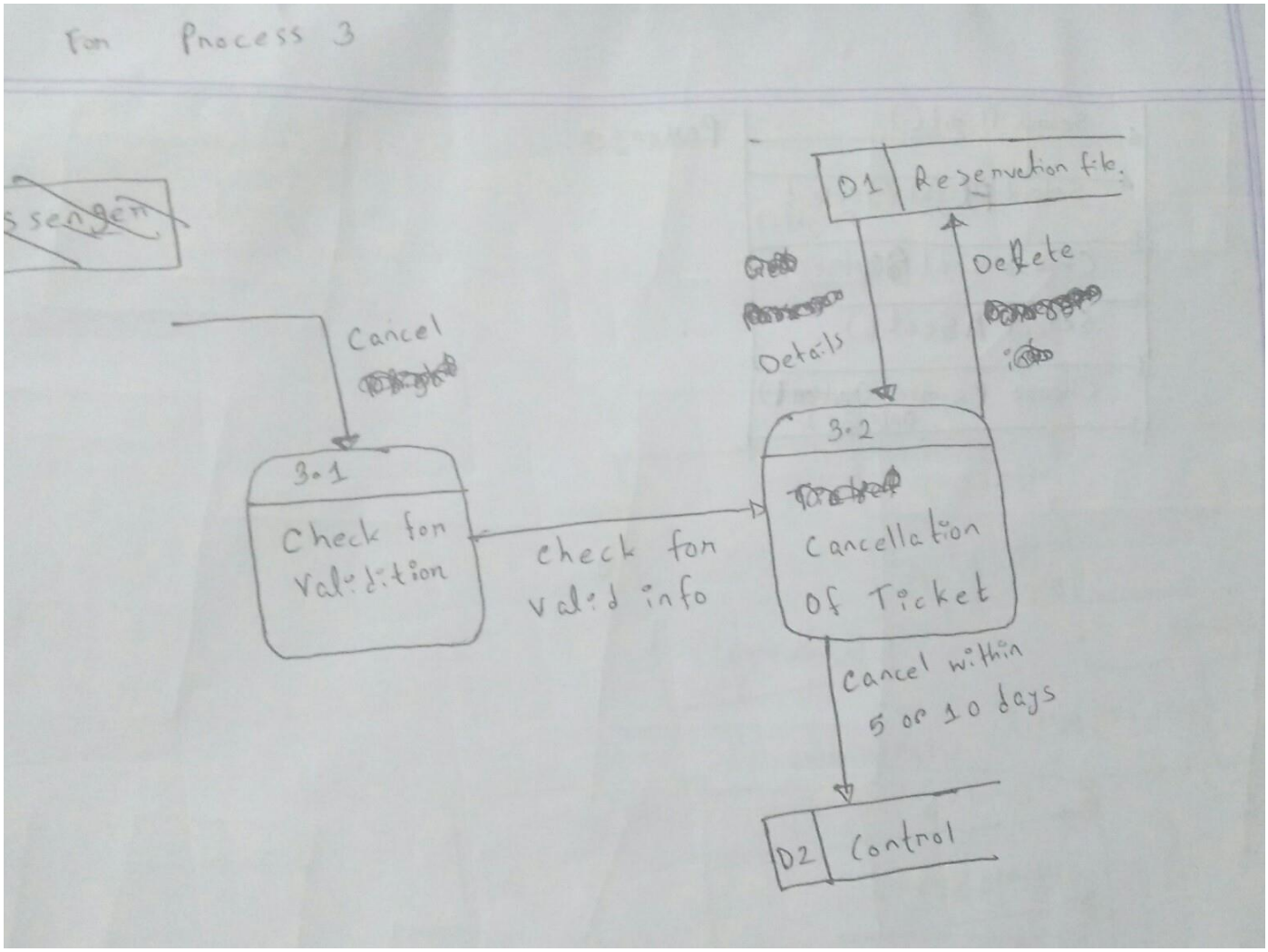

Figure 5.4.3 Physical data Flow Diagram - 3

5.6.4 Activity Diagrams

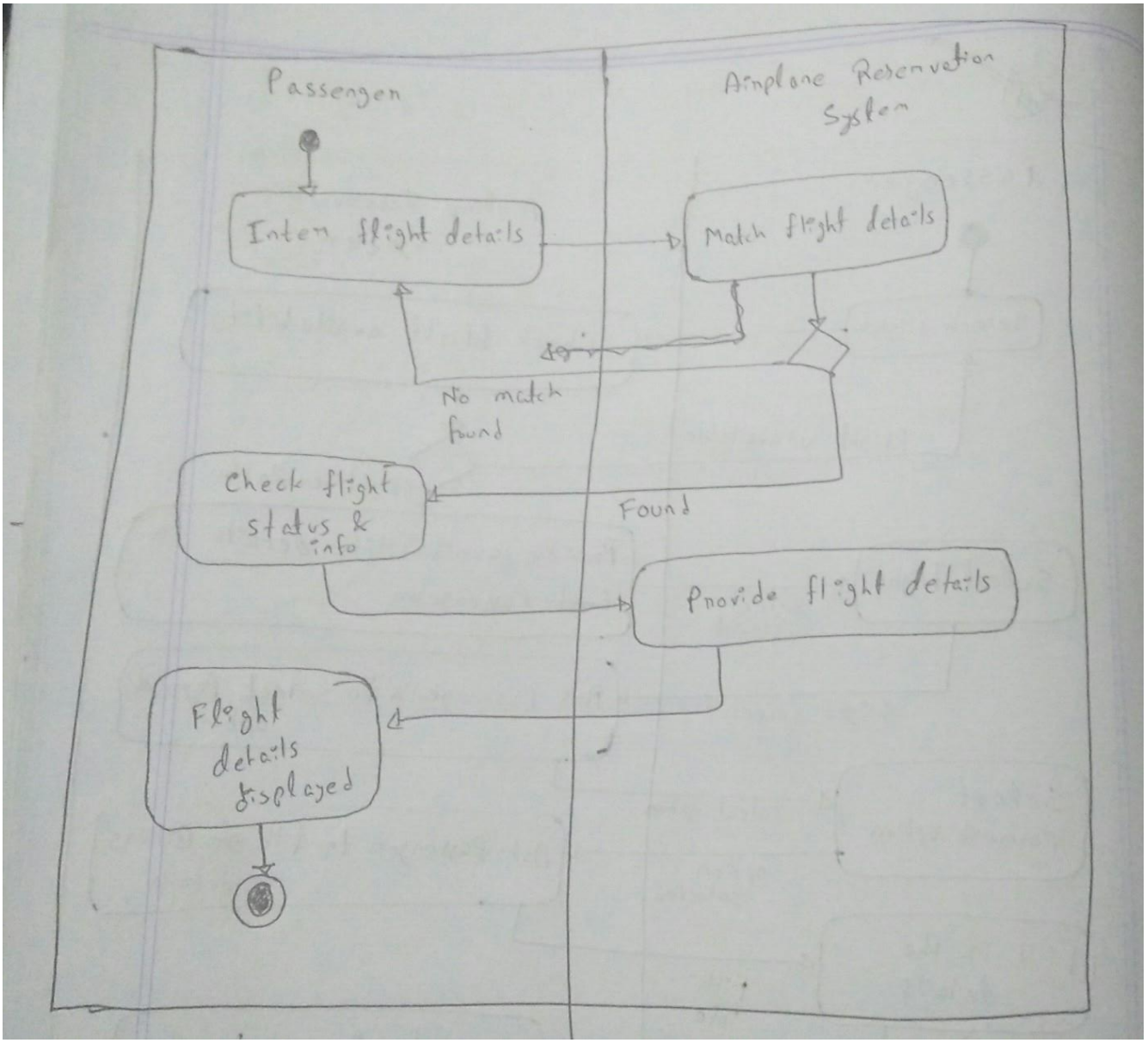

Figure 5.5.1 Activity Diagram - 1

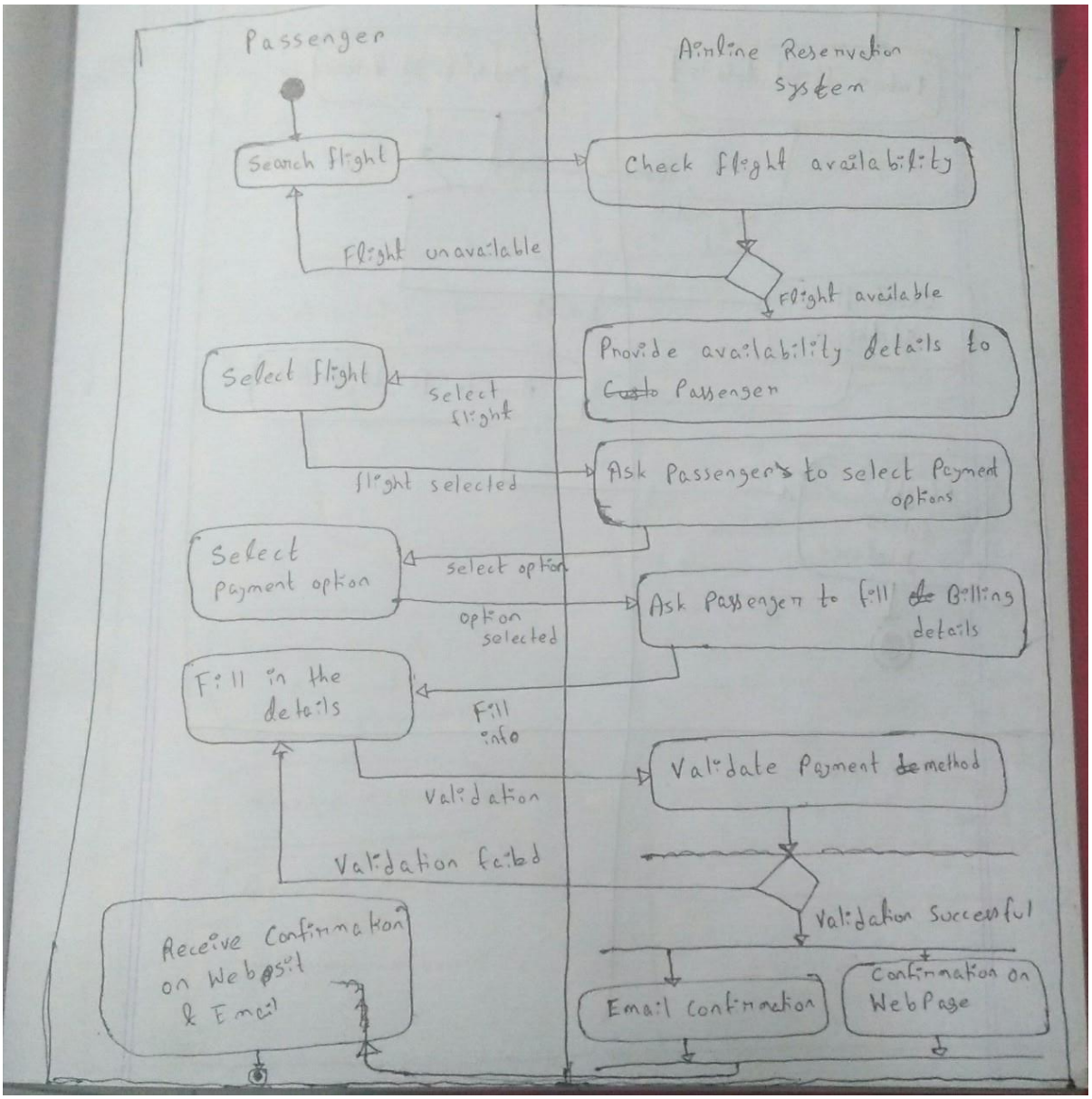

Figure 5.5.2 Activity Diagram - 2

5.6.5 Sequence Diagram

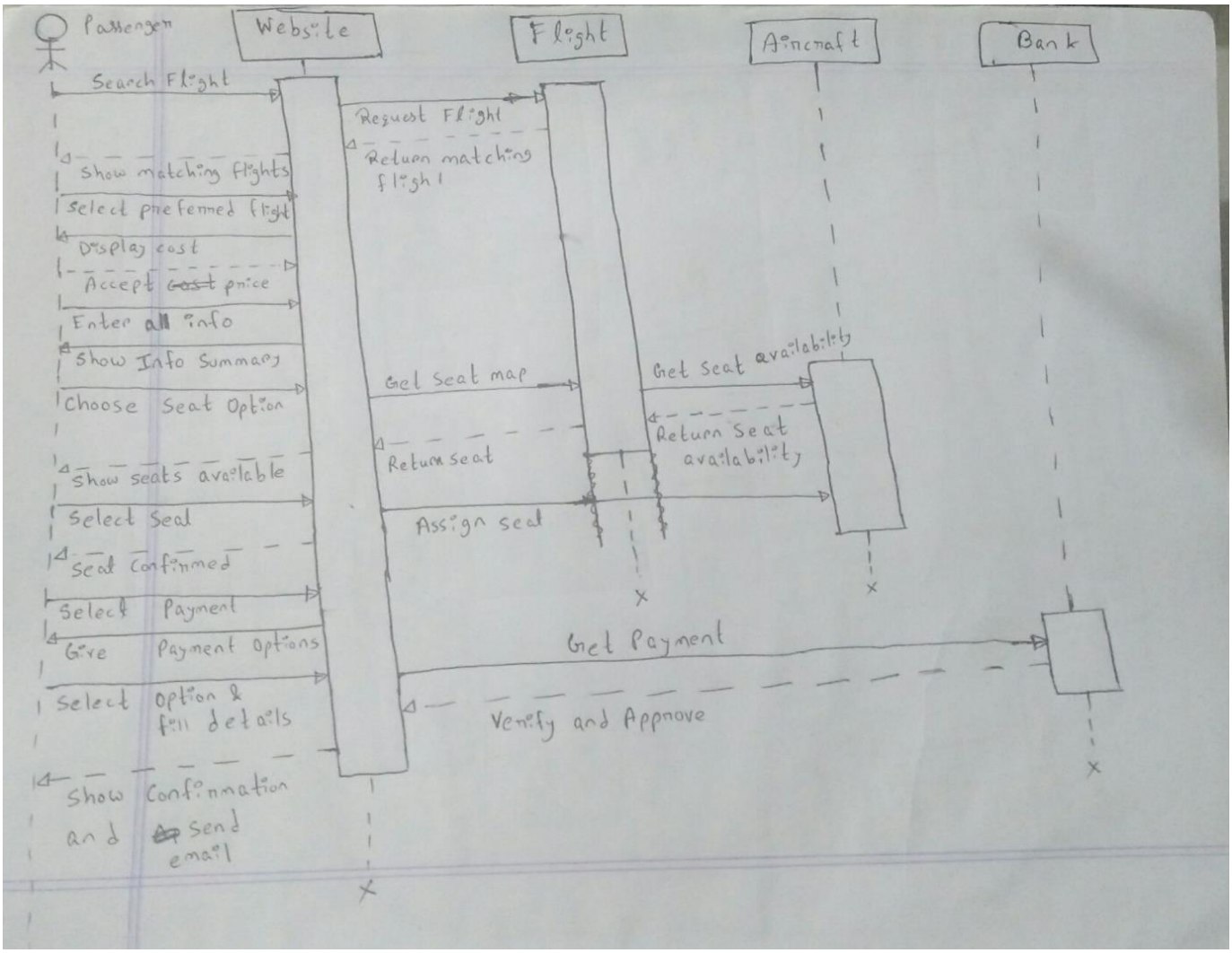

Figure 5.6 Sequence Diagram

5.6.6 Communication Diagram

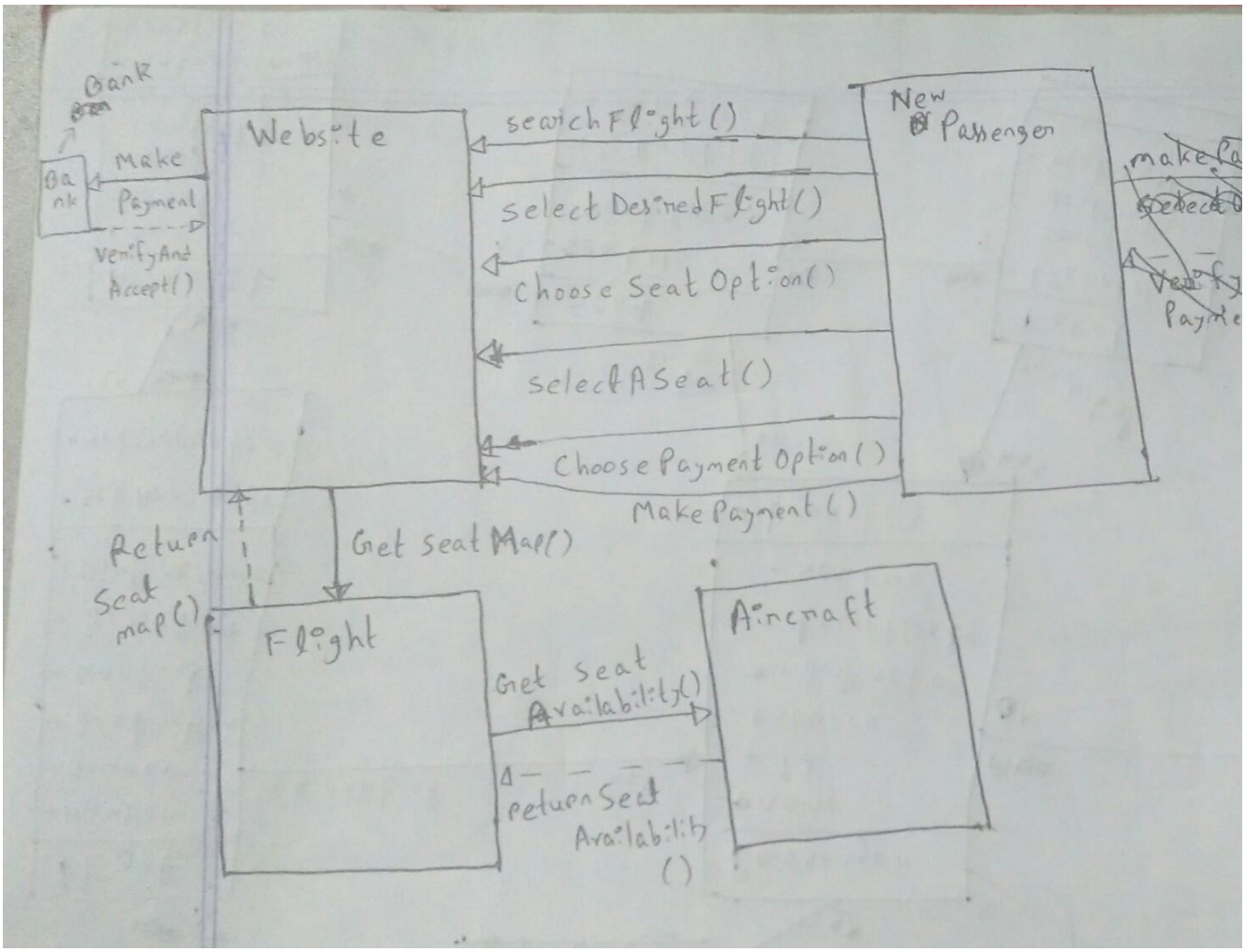

Figure 5.7 Communication Diagram

5.6.7 Class Diagram

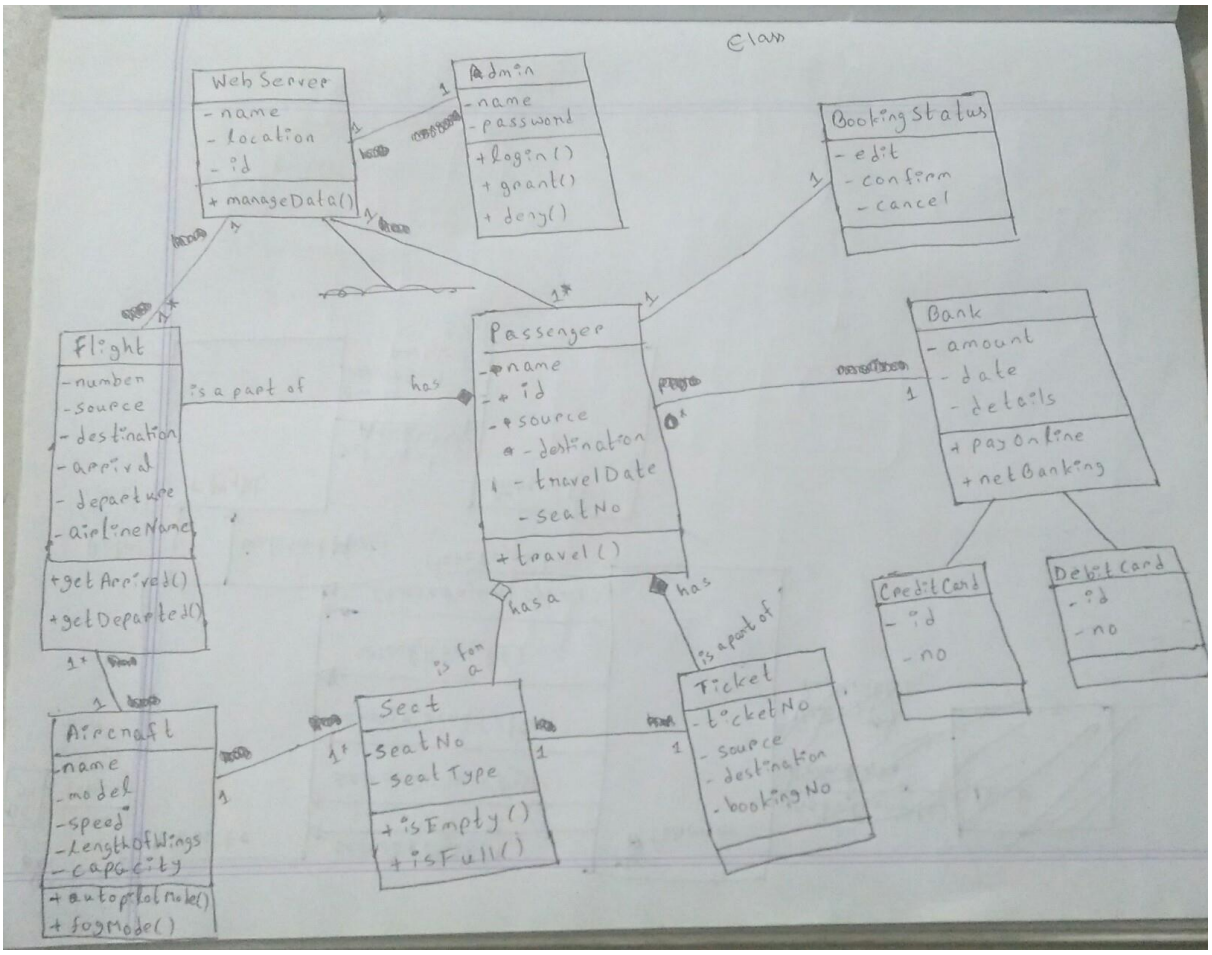

Figure 5.8 Class Diagram

5.6.8 State Chart Diagram

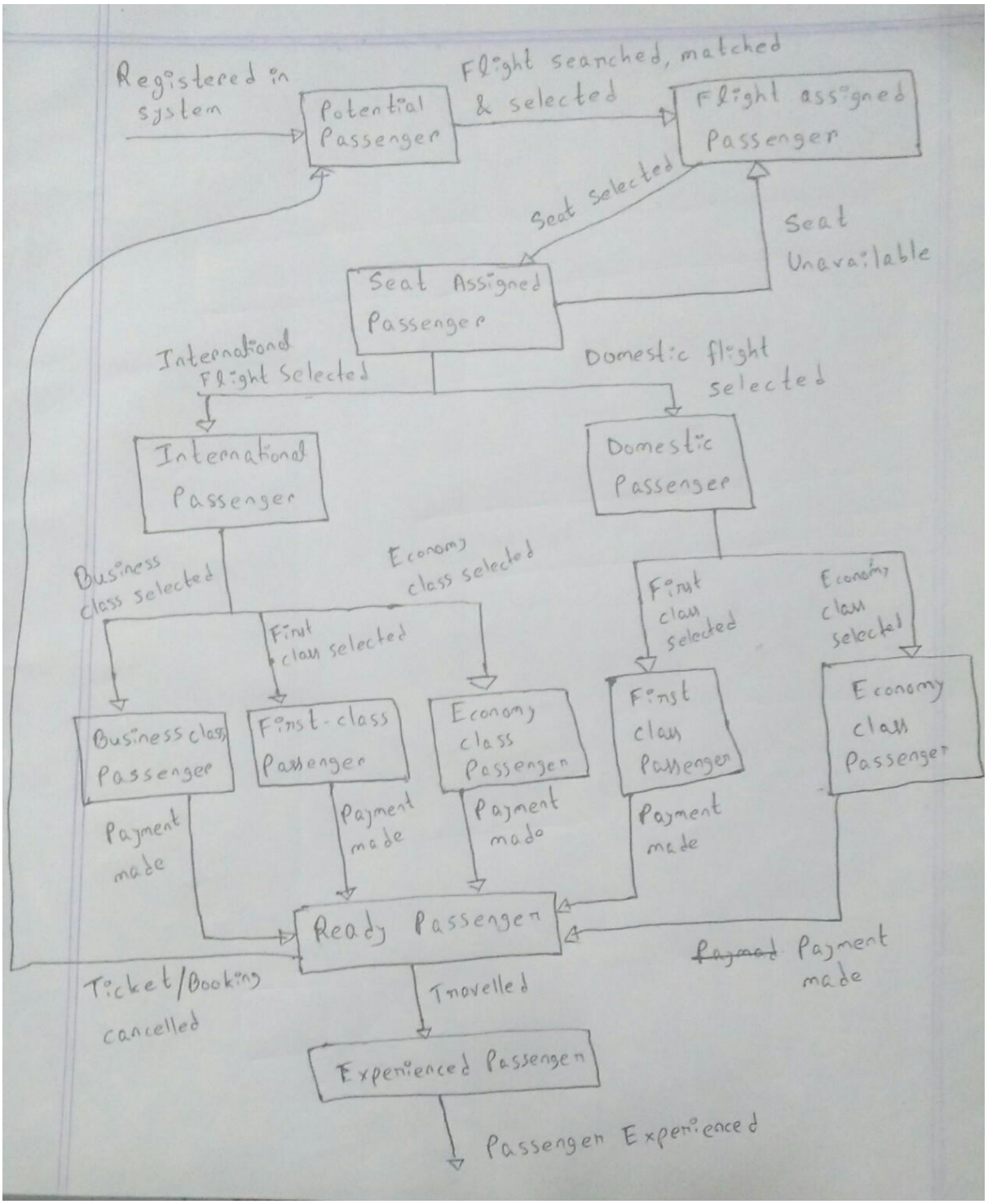

Figure 5.9 State chart Diagram

5.6.9 Use Case Diagram

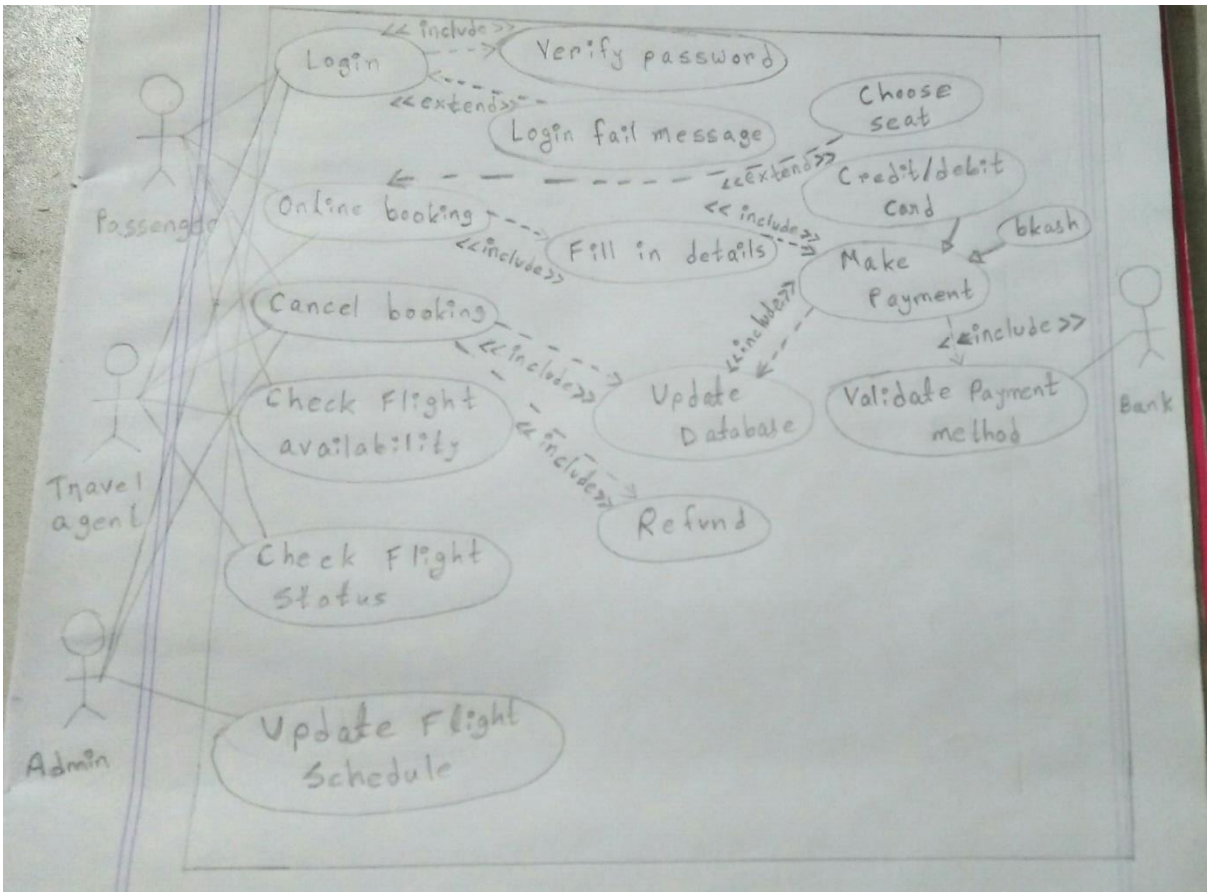

Figure 5.10 Use case Diagram

5.6.10 Context Diagram

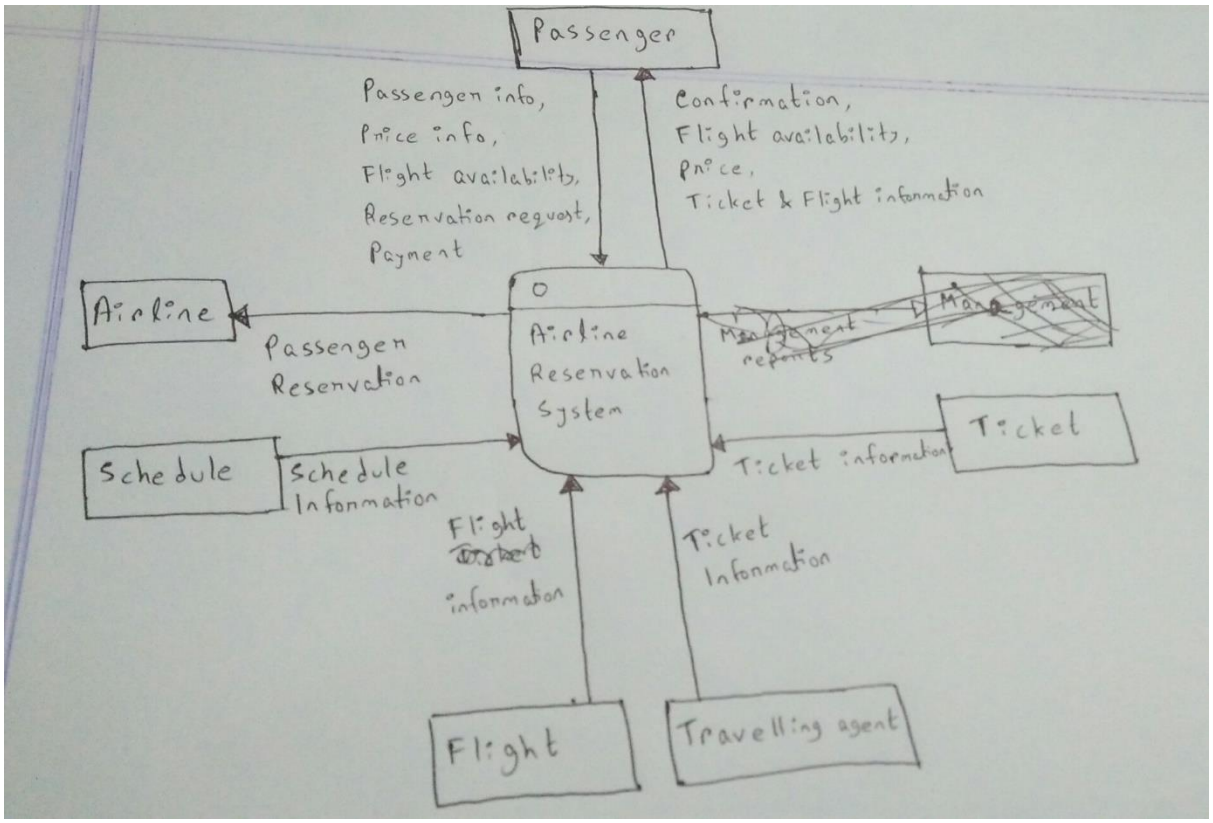

Figure 5.11 Context Diagram

5.7 CRUD Matrix

Table 5.2 CRUD Matrix

Activity	Passenger	Ticket	Booking	Booking detail	Flight	Seat
Passenger Login	R					
Search Flight					R	
Select Flight		C	C	C	R	
Search Seat						R
Select Seat		U	U	U		R
Make Payment and Book Flight	U	U	U	R	U	U
Add account	C					
Close Account	D					
Cancel Booking		D	D			
Change Passenger demographics	RU					
Change Flight Schedule	RU	RU	RU	CRUD	RU	RU

5.8 Functional Requirements

- The system will reschedule the tickets and the flights.
- The system will reserve tickets
- The system will allow passengers to book flights
- The system will give option to select seat if the flight offers.
- The system will allow passengers to check flight status
- The system will give passengers the option to print ticket
- The system will give passengers option to cancel flights if required
- The system will send email confirmation upon successful flight booking
- The system will give passengers a number of different payment options and handle the payment by contacting with the bank
- The system will allow admin/stuff to update the flight schedule
- The system will allow passengers to view any previous flight history of theirs.
- The system will allow to admin/stuff add new stuff members
- The system will allow to admin/stuff/passengers to view the flight list
- The system will allow passengers to search a flight for a specific date and location
- The system will allow only admin to update site settings

- The system will allow admin/stuff to add airline(s), airport(s)
- The system will allow admin/stuff/passengers to view the number of available seats for a particular flight
- The system should allow passengers to track a flight
- The system should allow passengers to check the weather conditions of a location before booking a flight
- The system should also allow passengers to also book a hotel

5.9 Non Functional Requirements

- Once the user fills out the details of the flight the response shouldn't take longer than 5 seconds to load onto the screen.
- Passengers can view only their own previous history of flights and no other passenger's.
- The system will display confirmation message within 3 seconds as the users completes the payment.
- The system will be able to transfer data to other devices. For instance, the downloaded pdf of the ticket can be sent from a PC to smartphone.
- The system must be user friendly.
- The system must be able to accommodate users who are at different locations.
- All the webpages that are part of the system must load within 10 seconds.

5.10 Software key technical features

- It must have real time update of the availability of seats and prices.
- Passengers should be able to change their flight dates and times or cancel the flight.
- Travelers should be able to share their booking information with their friends in social media. So, there should be social media share button.
- It should have multiple payment options such as bkash, credit card, debit card, online banking, PayPal, Payoneer.
- It should have multiple language options as there could be many non-English speakers, and they won't use this software unless the software also supports their native language.

5.11 Product Features

The application would be running on a Windows XP/2000 Operating system. This project is mainly intended for two types of audiences. One is the customer or the end user and the other is the administrator of the website. Some of the major functions of the product can be categorized under two different categories that are for the administrator and the user. The functions of the customers/passengers are as follows:

Home Page: Like all the other airline websites available online, the user can access the user home page of the Airline Reservation System website, after he/she logs into the system. Here, the passenger can look up information regarding flights, packages and motels.

Booking Flights: The customer can also search for the flights available and reserve his place on the flight.

Contact the Company: The Customer can also call the company if he has any concerns or questions related to the bookings he has made online.

Some of the functions of the Airline Reservation System, such as creating, maintaining and updating the database are available only to the administrator. The functions of the administrator are as follows:

Login/Logout: The administrator has to login first to make changes to the Airline Reservation System, by adding, deleting or modifying the data in the Airline Reservation System database. After making the necessary changes, he then has to logout of the system, in order to prevent misuse of the data.

Add/Update Customer Information: Daily the Airline Reservation System might have customers booking with the website. Sometimes the customers might request changes of their information. Only the administrator will have the sole rights to modify the database accordingly.

Add/Update Flight Information: The Administrator also has the sole rights to add, delete or modify the flight information. Sometimes, flights get cancelled for some reason, so such flights would be removed from the list of flights available to the customer. Similarly whenever any flight information has to be modified or if any new flights need to be added to the database, these operations are performed by the administrator.

Add/Update Airline Information: If new airlines agree to join the administrator has to add them to the database or delete if any airlines doesn't wish to continue being our partners anymore.

Add/Update Airport Information: If there are new airports from which flights are available for the planes of our partnered airlines then the administrator has to add them to the database or delete any airport if an when needed.

Cancellation of Reservations: Sometimes, after making a reservation, a customer might cancel the reservation he has made. So, the administrator also handles such special situations and sends the customer an e-mail confirmation after deleting the specific transaction.

E-mail confirmations: Whenever a customer makes or cancels a reservation, the administrator is responsible for sending confirmation e-mails to the customer, confirming the transaction.

Chapter 6
Methodology

A software development methodology or system development methodology in software engineering is a framework that is used to structure, plan, and control the process of developing an information system. [6]

There are several software development methodologies:

- Waterfall Model
- Prototype Methodology
- Rapid Application Development
- Dynamic System Development Model Methodology
- Agile Software Development Methodology
- Spiral Model

We choose agile process as methodology for this project. The Agile Methodology is based on iterative and incremental development instead of a linear approach. It does not build an entire system at once, but rather develops incrementally. Less time is invested upfront for documentation and analysis, as clients are constantly seeing and testing the product and providing feedback. The development and feedback process adds accountability (tangible milestones of completed work, not just documentation), and tends to improve client satisfaction by allowing ongoing input.

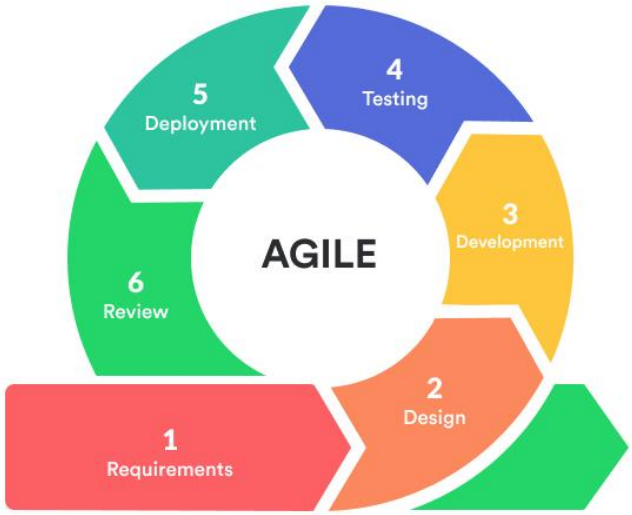

Figure 6. 1 Agile Software development methodology

There are several reasons for choosing this agile process. Let's have a look at those reasons.

Better product quality: Agile methods have excellent safeguards to make sure that quality is as high as possible by:

- Taking a proactive approach to quality to prevent product problems.
- Embracing technological excellence, good design, and sustainable development.
- Defining and elaborating on requirements just in time so that knowledge of product features is as relevant as possible.
- Incorporating continuous integration and daily testing into the development process, allowing the development team to address issues while they're fresh.
- Taking advantage of automated testing tools in order to develop during the day, test overnight, and fix bugs in the morning.
- Conducting sprint retrospectives, allowing the scrum team to continuously improve processes and work.
- Completing work using the definition of done: developed, tested, integrated, and documented.

Higher customer satisfaction: Agile project teams satisfy customers by:

- Keeping customers involved and engaged throughout projects.
- Having a product owner who is an expert on product requirements and customer needs.
- Keeping the product backlog updated and prioritized in order to respond quickly to change.
- Demonstrating working functionality to customers in every sprint review.
- Delivering products to market quicker and more often with every release.
- Possessing the potential for self-funding projects.

Customized team structures: Self-management puts decisions that would normally be made by a manager or the organization into scrum team members' hands. Because of the limited size of development teams — five to nine people — agile projects can have multiple scrum teams on one project. Self-management and size-limiting mean that agile projects can provide unique opportunities to customize team structures and work environments.

More relevant metrics: The metrics agile project teams use to estimate time and cost, measure project performance, and make project decisions are often more relevant and more accurate than metrics on traditional projects. On agile projects, you provide metrics by:

- Determining project timelines and budgets based on each development team's actual performance and capabilities.
- Having the development team that will be doing the work provide effort estimates for project requirements.
- Using relative estimates, rather than hours or days, to tailor estimated effort to an individual development team's knowledge and capabilities.
- Refining estimated effort, time, and cost on a regular basis, as the development team learns more about the project.

- Updating the sprint burn down chart every day to provide accurate metrics about how the development team is performing within each sprint.
- Comparing the cost of future development with the value of that future development, which helps project teams determine when to end a project and redeploy capital to a new project.

Improved performance visibility: On agile projects, every member of the project team has the opportunity to know how the project is going at any given time. Daily scrum meetings, daily sprint reviews, and visible progress charts offer concrete ways to see progress.

Increased project control: The many opportunities to inspect and adapt throughout agile projects allow all members of the project team — the development team, product owner, scrum master, and stakeholders — to exercise control and ultimately create better products.

Improved project predictability: Agile project management incorporates several practices, artefacts, and tools for improved predictability:

- Keeping sprint lengths and development team allocation the same throughout the project allows the project team to know the exact cost for each sprint.
- Using individual development team speed allows the project team to predict timelines and budgets for releases, the remaining product backlog, or any group of requirements.
- Using the information from daily scrum meetings, sprint burn down charts, and task boards allows the project team to predict performance for individual sprints.

Reduced risk: Agile techniques virtually eliminate the chance of absolute project failure:

- Developing in sprints, ensuring a short time between initial project investment and either failing fast or knowing that a product or an approach will work.
- Always having a working product, starting with the very first sprint, so that no agile project fails completely.
- Developing requirements to the definition of done in each sprint so that project sponsors have completed, usable features, regardless of what may happen with the project in the future.
- Providing constant feedback on products and processes through daily scrum meetings and constant development team communication, sprint reviews and retrospectives, and releases in which the end user can see and react to new features on a regular basis.

Generating revenue early with self-funding projects, allowing organizations to pay for a project with little up-front expense.

Chapter 7
Results and Analysis

Let's have a look at what we have achieved so far:

- Customers can visit the home page
- Customers can view the list of available flights
- Customers can search for flights by providing the details.
- Customers can book a flight for one or more number of people depending on the number of available seats.
- Customer can contact the administration anytime.
- Admin can add/update/delete airline(s), airport(s), flight(s) and stuff member(s) to or from the database.
- Admin/Stuff can view the customer, flight, airline and airport details.
- Admin can update the site settings.
- Stuffs can add/update/delete airline(s), airport(s) and flight(s) to or from the database.
- Admin/Stuff can login/logout of the system at any time.

Problems:

- Passengers cannot select their preferred seat
- Travelers don't have access to aircraft maintenance report which would have eased their nerves a bit more, as many people fear from travelling in the air.
- Passengers cannot print their boarding pass from the current system.

Solutions:

- Interview Passengers and airline personnel. This will allow the Airline Reservation System to assist Airways in several airline administration tasks and services from time of initial reservation till completion of the task.
- Use mobile boarding passes and tell customers to take a screenshot of that.

Opportunities:

- The computerized online system allows passengers to book a flight anytime and from the comfort of their home.
- It is much easier to cancel a flight or change the flight timings from the comfort of home.
- Online reservation allows to check traveler reviews, so passengers can get an idea and make their choices.

User Characteristics: There are two kinds of users for the Airline Reservation System. One is the customer and the other is the administrator. The customers do not need to have any prior training to use the application. However, instructions for making flight and motel reservations would be provided to them on the airline website. The administrators would however need to be trained in order to use the application.

Constraints: In case of changes made to the database, the application should be able to show the updated information on the website, without much delay. The database for the project is designed to be of moderate size.

Assumptions: There are no assumptions as of now. To be updated in later versions if there are any.

Chapter 8

Project as Engineering Problem Analysis

8.1 Sustainability of the Project/Work

Sustainability refers to its ability to be maintained and updated. In the modern world every application being released needs to be maintained and continuously updated for its users.

Sustainability can be of 3 main types:

Community Sustainability: This type of support comes in many forms such as installing and downloading the application, using the applications, referring to others, subscribing, etc. So, once the website will be live and the SEO done successfully there will be many visitors and they will refer it to their friends, family and other people. So, it will be sustainable in terms of community.

Financial Sustainability: This refers to how the application's running cost will be after it has been released and whether or not it will generate enough revenue. An application's running cost includes server cost, database storage cost, API cost and others. As customers book with our site we will get a commission from the airlines. So, it will be financially sustainable as more and more customers come to our site and book with it. There will also be advertisements on our site once it gets enough daily visitors.

Organizational Sustainability: This refers to how the organization will continue to operate after the launch of the site. Usually after the launch the organization maintains the application with the help of its present team, an extended team and sometimes with a fresh new team. The organization continues to update the application by adding new features. This is really important that the company does so. We have a lot of updates and new features to add to our existing system, all of which are planned already. So it is Organizationally Sustainable.

8.2 Social and Environmental Effects and Analysis

Social effect: Our site has plans to make partnership with more airlines to expand the number of flights customers can search for.

Environmental Effects: Unfortunately there is a lot of carbon emissions from airplanes. We must think of ways to reduce them. Our website will help passenger book their tickets and fly but it has no direct harmful environmental impacts.

8.3 Addressing Ethics and Ethical Issues

In the era of Science and Technology there is so much cybercrime, hacking, data collection, etc. There are some ethical guidelines that must be followed when working on creating and releasing an application. Some of the ones we are following are:

- Keeping user data safe, private and not sharing them with anyone else.
- Only the lead developer and the owner has access to the server and the database.
- Collect only the relevant user data.
- Proper use of third party services and API.
- No discrimination or biasing.

Chapter 9
Future Work and Conclusion

9.1 Future Works

We have lots of plans and we want to add a lot more features. Some of the ones we have thought about adding already and working on are:

- Allowing Customers to book a hotel near the location they are planning to travel to.
- Allowing Customers to check the weather conditions of their departure and arrival location and also of the interval routes if it's a long journey and the plane is stopping in an airport in between.
- Allowing Customers to print their booking and ticket confirmation.
- Allowing Customers to track flights.
- Launch a mobile app too.
- Find and show the cheapest deals.
- Offer travel packages.
- Add image and Video gallery for best places to visit both in domestic and international places.
- Add ranking of Airlines and show places that has been visited the most in the last month or so.
- Customer should be able to view their history of shopping.
- Customers should have a profile.

9.2 Limitation of Work

- Due to the pandemic it was not possible to go to the office physically and so we had to do all the discussion and team meetings via the online platforms and faced some internet issues.
- Due to time shortage for an internship program, the system couldn't build a proper plan.
- There is no technical senior person in the team so without proper guidance development of this system cost a lot of time and faced a lot of challenges.
- Due to Lack of experience developing this system costs many difficulties.

9.3 Conclusion

The Airline Reservation System makes life a lot easier for people do book tickets online as compared to the traditional method. It is a very good way to find the cheapest deals when used together with Google Flights and can be a very useful application. It has been a great opportunity for me to work as a web developer during internship at the reputed software company AIROS. This three month internship program was a big step towards my carrier in the job market. During my internship I learned many important knowledge about IT sector. The internship program helped me to gain important knowledge about how the IT sectors are shaping in our country and kinds of opportunities the new generations might have in the upcoming years. Internship at AIROS taught me how to handle recent software related technologies, frequently used technologies and best use of this technology. This program gave me a clear idea about professional life as a web developer, the challenges I may

face and how to handle those situations. During internship I tried to learn more about web development every day and tried to become a good web developer.

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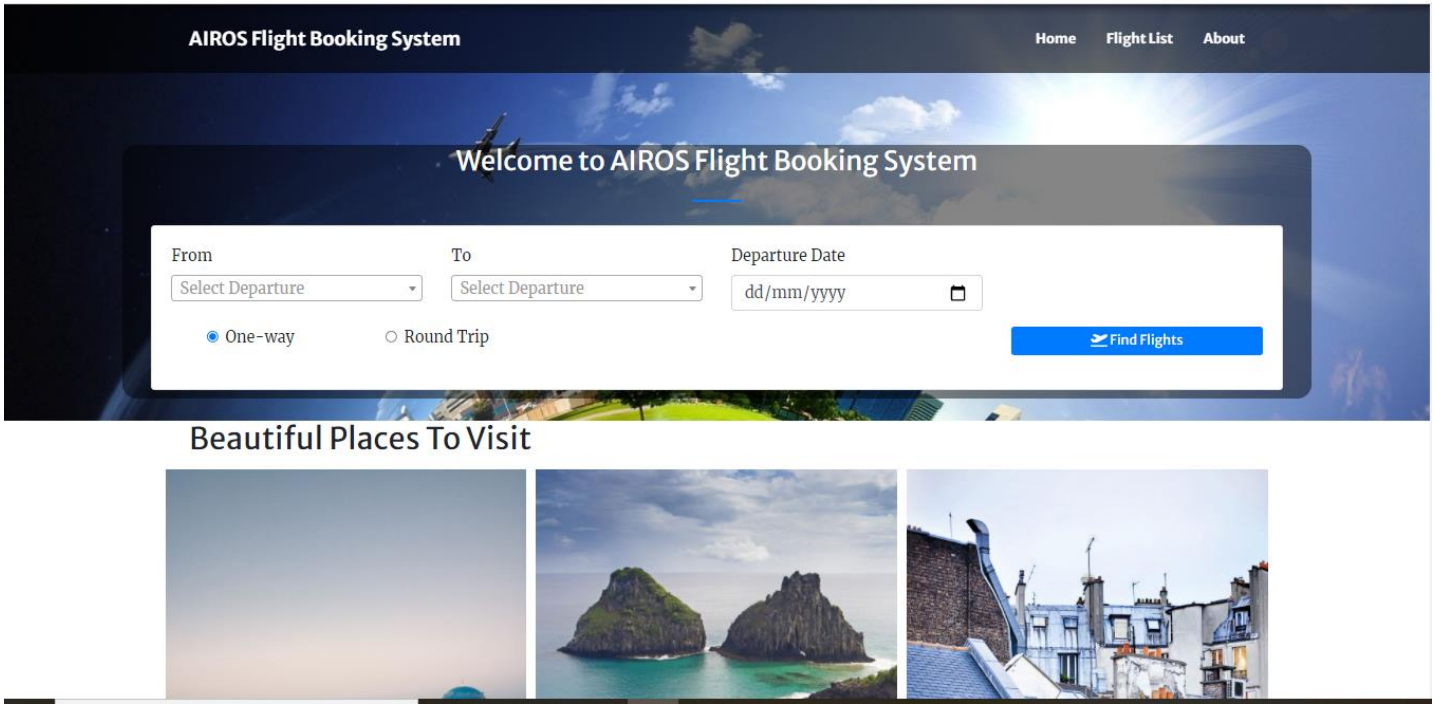
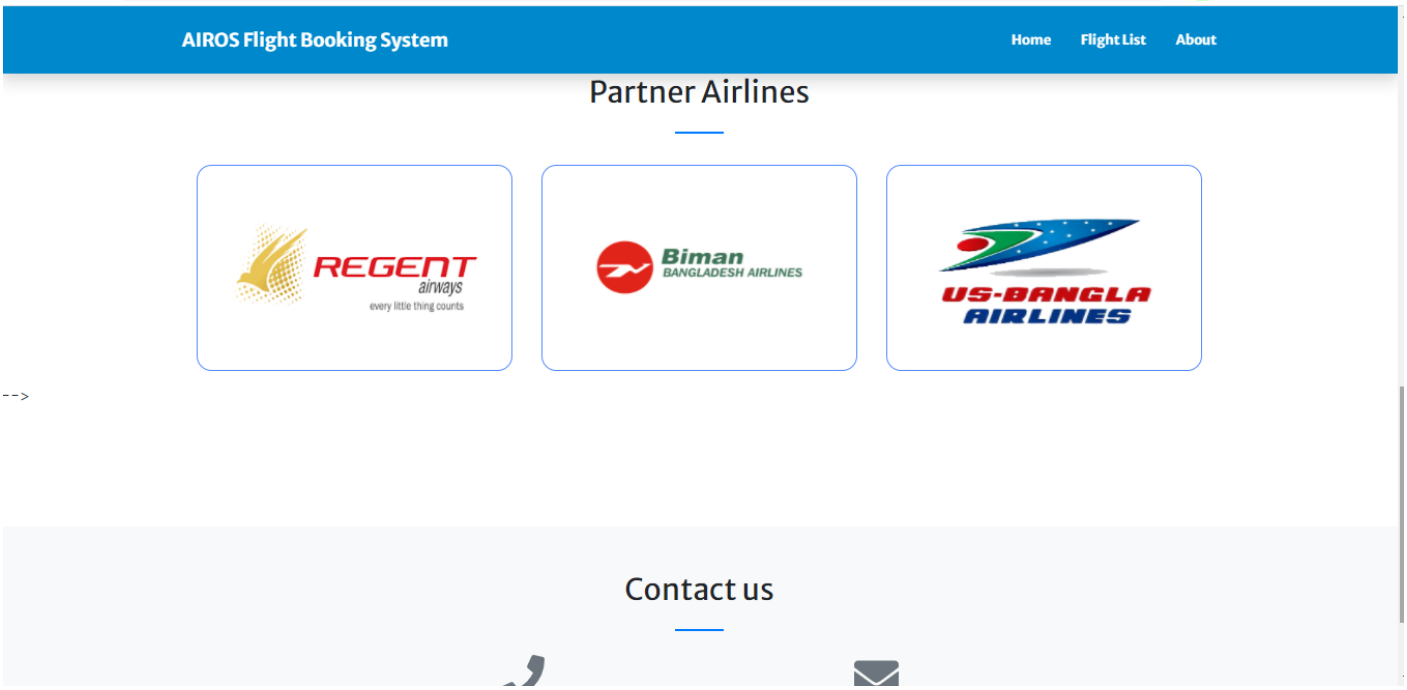
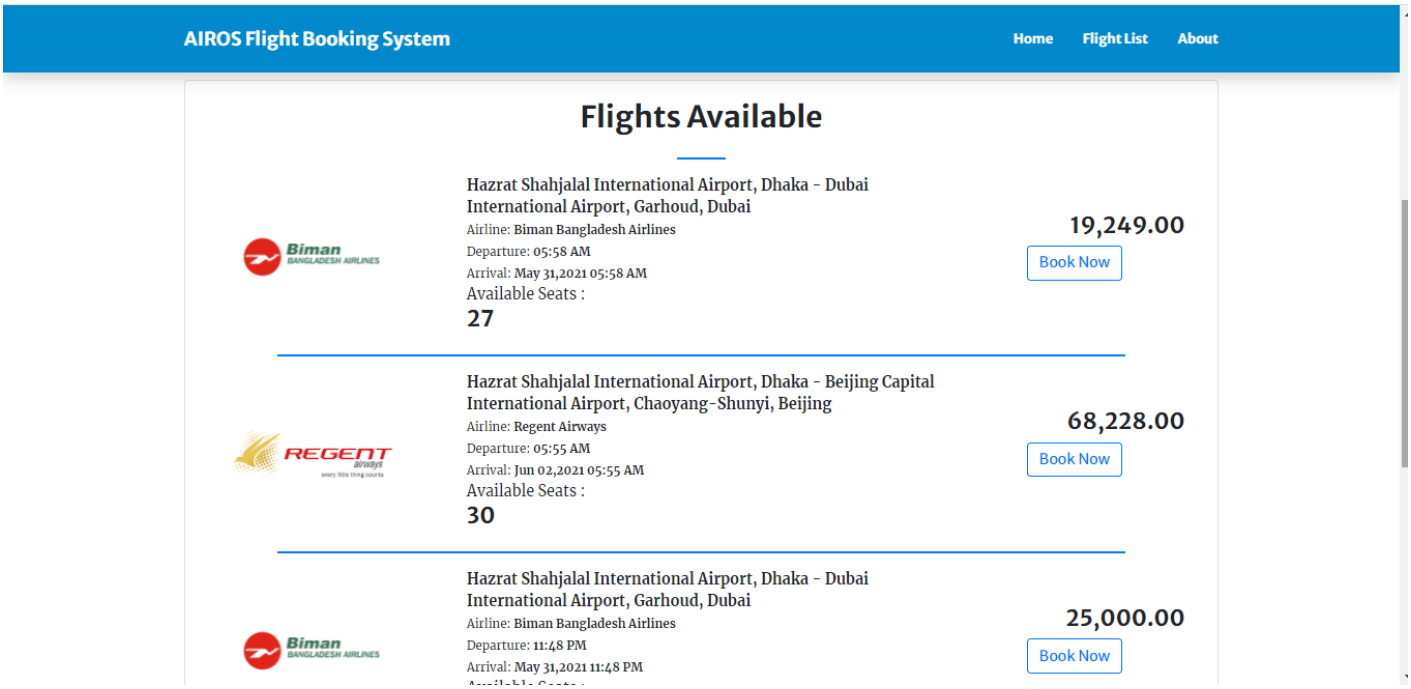
Appendix (UI Screenshot)



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Flight List
About
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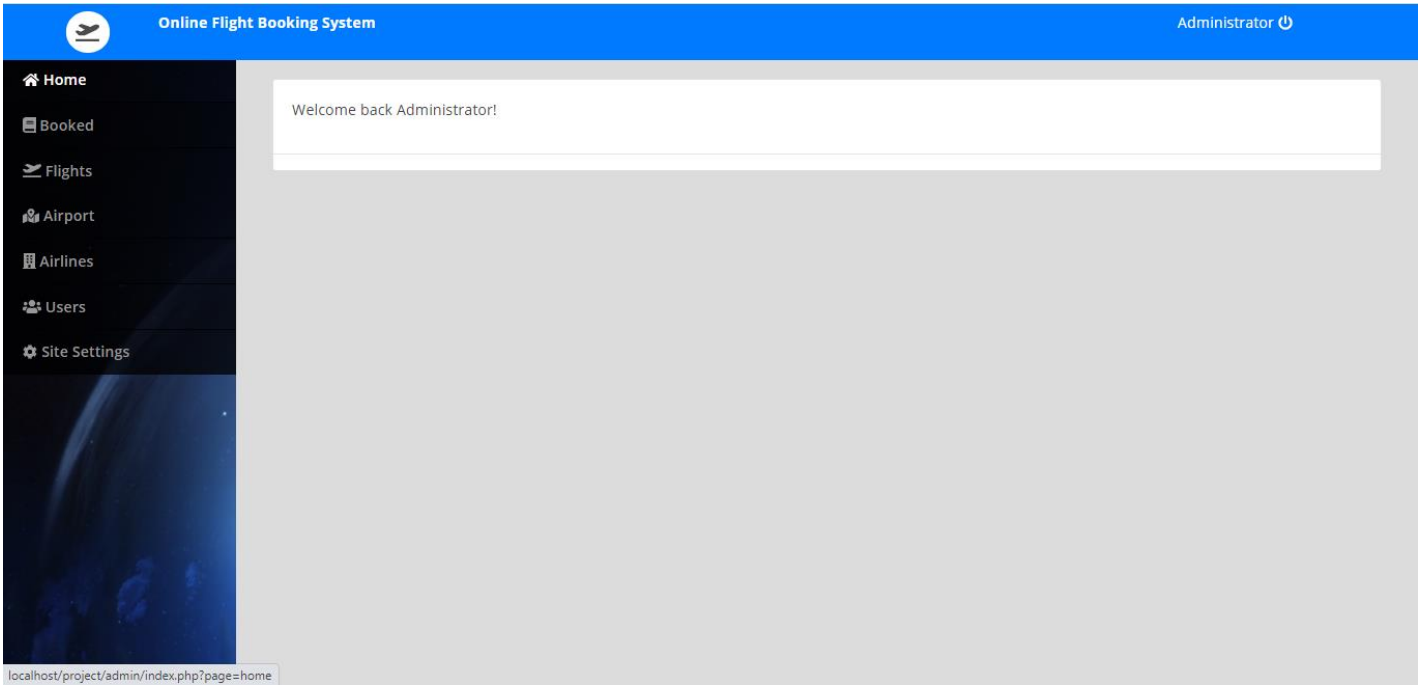
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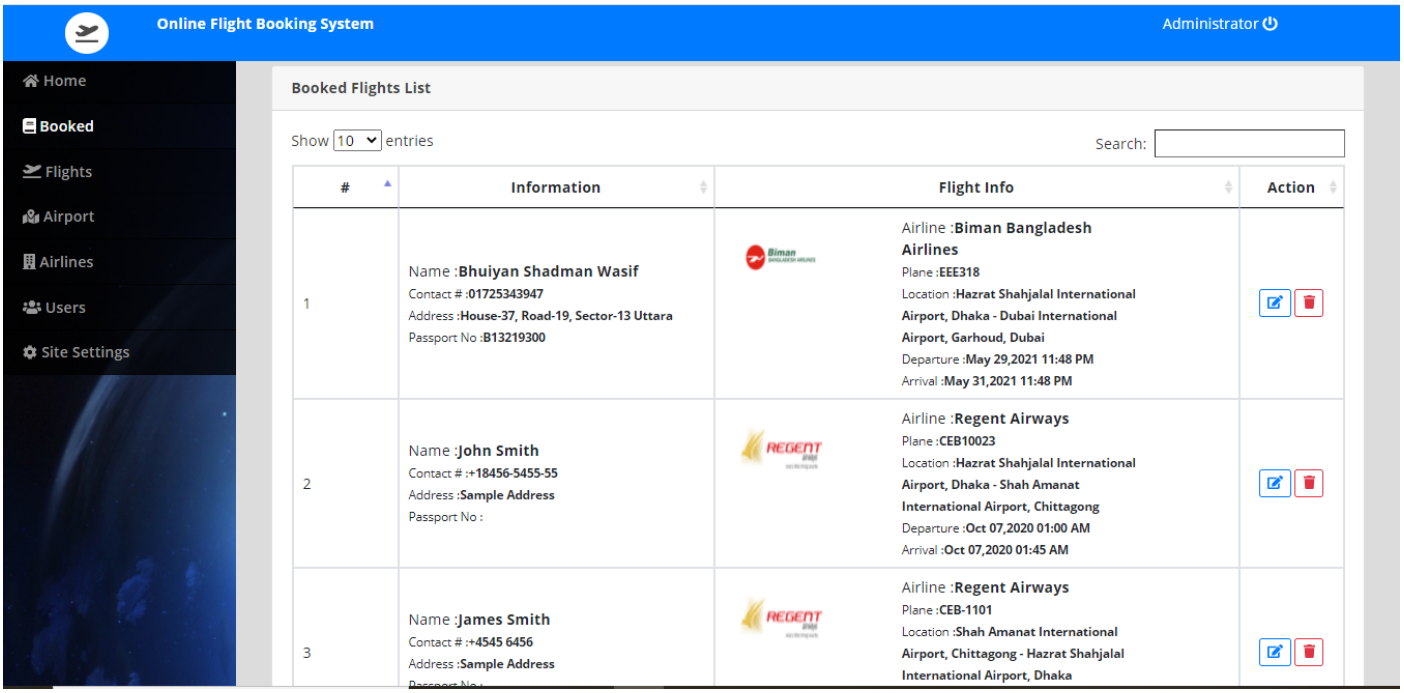
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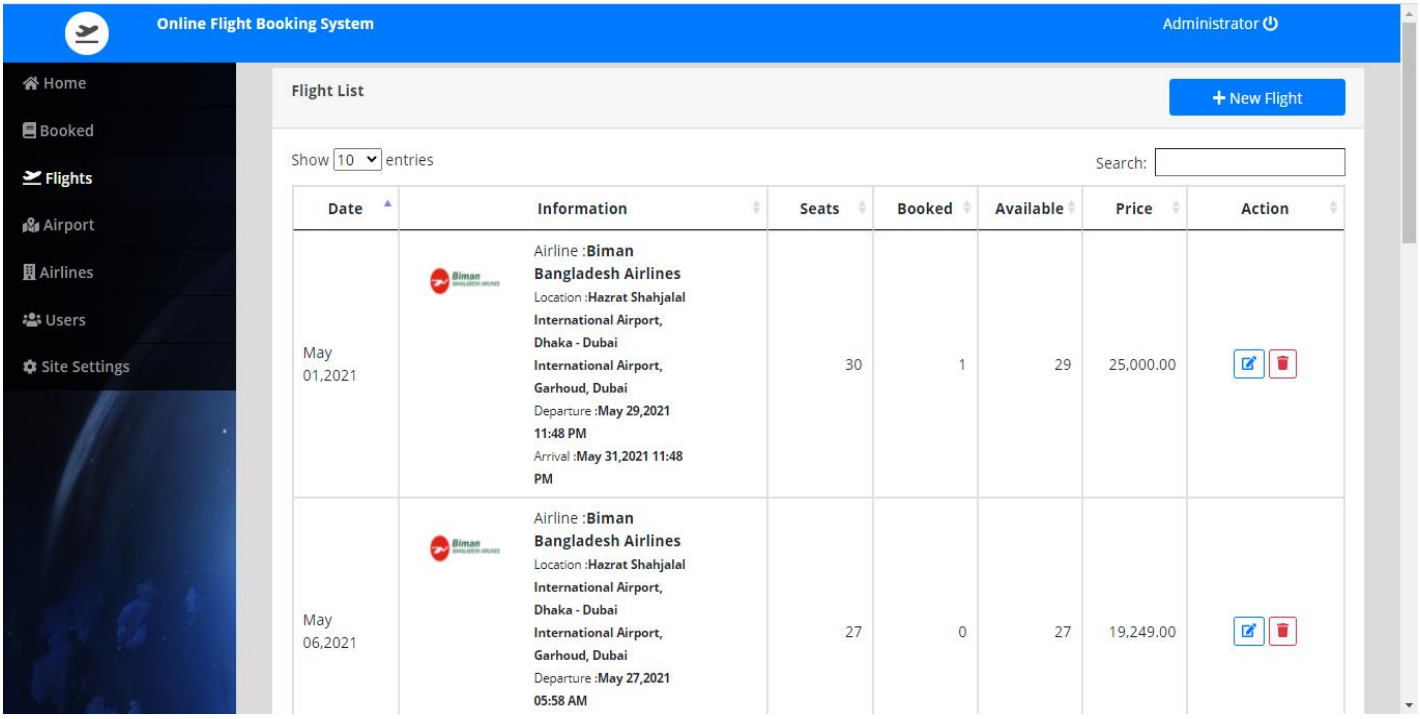
Search:
Information Flight Info Action
1 Name :Bhuiyan Shadman Wasif Contact # :01725343947 Address :House-37, Road-19, Sector-13 Uttara Passport No :B13219300 Airline :Biman Bangladesh Airlines Plane :EEE318 Location :Hazrat Shahjalal International Airport, Dhaka - Dubai International Airport, Garhoud, Dubai Departure :May 29,2021 11:48 PM Arrival :May 31,2021 11:48 PM
2 Name :John Smith Contact # :+18456-5455-55 Address :Sample Address Passport No : Airline :Regent Airways Plane :CEB10023 Location :Hazrat Shahjalal International Airport, Dhaka - Shah Amanat International Airport, Chittagong Departure :Oct 07,2020 01:00 AM Arrival :Oct 07,2020 01:45 AM
3 Name :James Smith Contact # :+4545 6456 Address :Sample Address Airline :Regent Airways Plane :CEB-1101 Location :Shah Amanat International Airport, Chittagong - Hazrat Shahjalal International Airport, Dhaka


Online Flight Booking System
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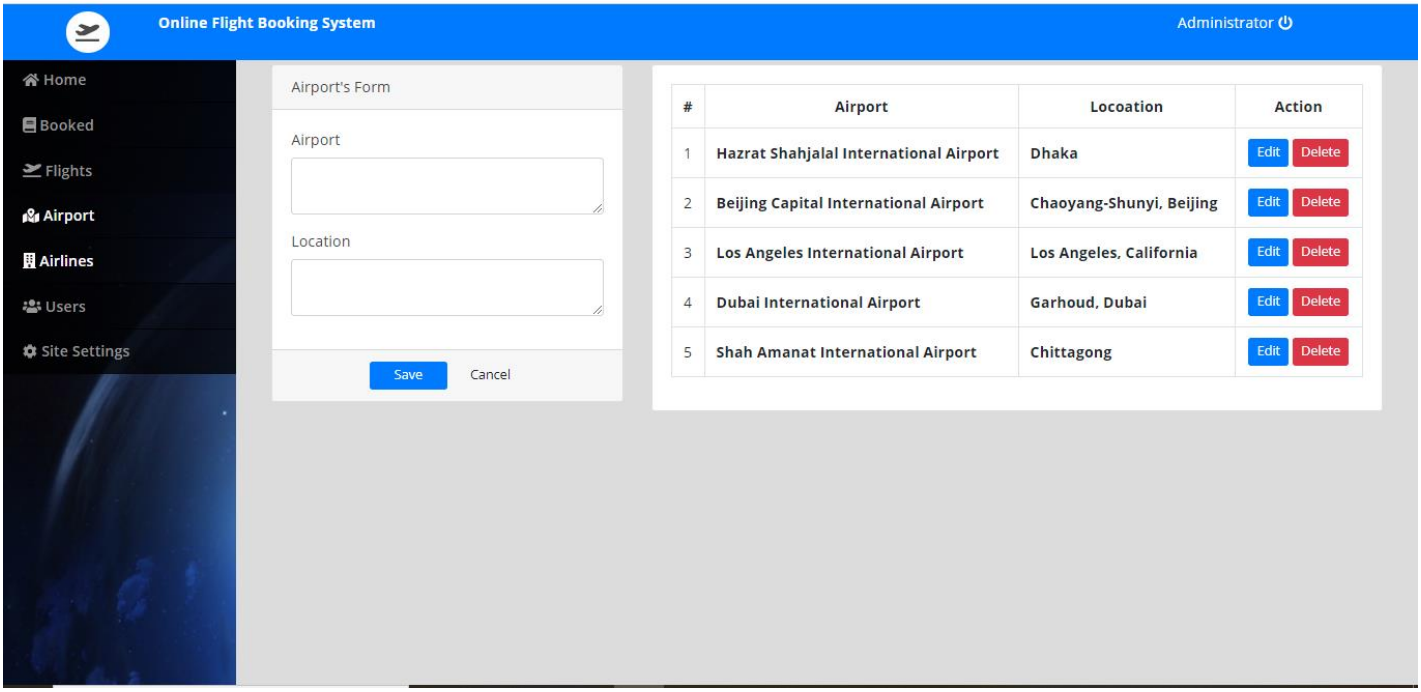
+ New Flight
Show 10 entries
Search:
Date Information Seats Booked Available Price Action
May 01,2021 Airline :Biman Bangladesh Airlines Location :Hazrat Shahjalal International Airport, Dhaka - Dubai International Airport, Garhoud, Dubai Departure :May 29,2021 11:48 PM Arrival :May 31,2021 11:48 PM 30 1 29 25,000.00
May 06,2021 Airline :Biman Bangladesh Airlines Location :Hazrat Shahjalal International Airport, Dhaka - Dubai International Airport, Garhoud, Dubai Departure :May 27,2021 05:58 AM 27 0 27 19,249.00


Online Flight Booking System
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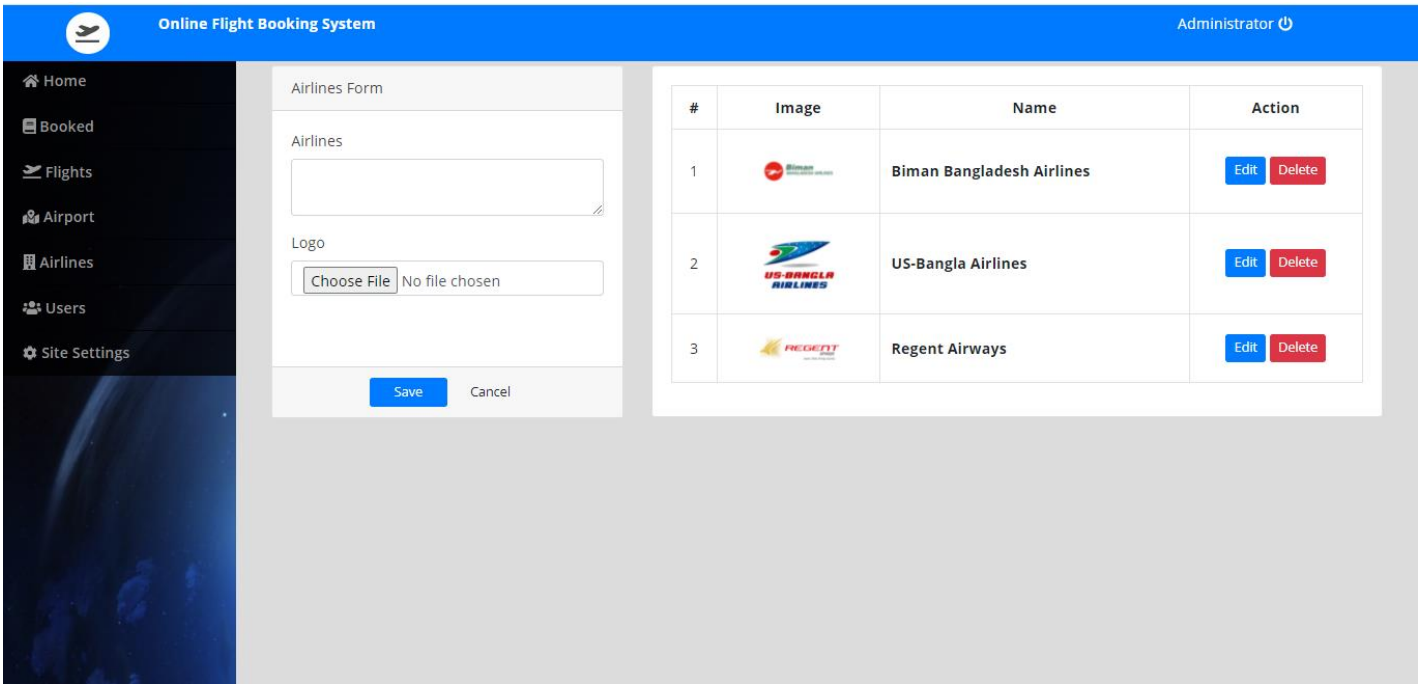
Airport Locoation Action
1 Hazrat Shahjalal International Airport Dhaka Edit Delete
2 Beijing Capital International Airport Chaoyang-Shunyi, Beijing Edit Delete
3 Los Angeles International Airport Los Angeles, California Edit Delete
4 Dubai International Airport Garhoud, Dubai Edit Delete
5 Shah Amanat International Airport Chittagong Edit Delete


Online Flight Booking System
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Choose File No file chosen
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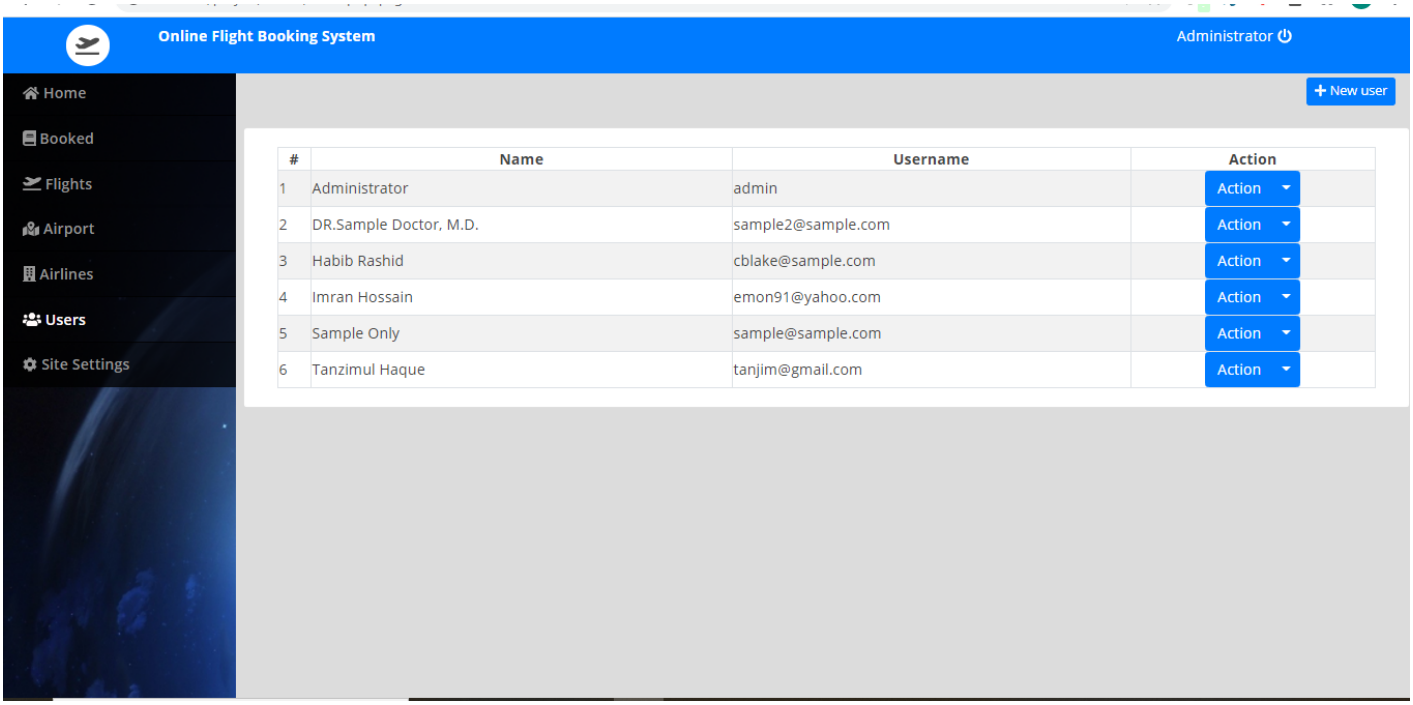
Image Name Action
1 Biman Bangladesh Airlines Edit Delete
2 US-Bangla Airlines Edit Delete
3 Regent Airways Edit Delete


Online Flight Booking System
Administrator
Home
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Airport
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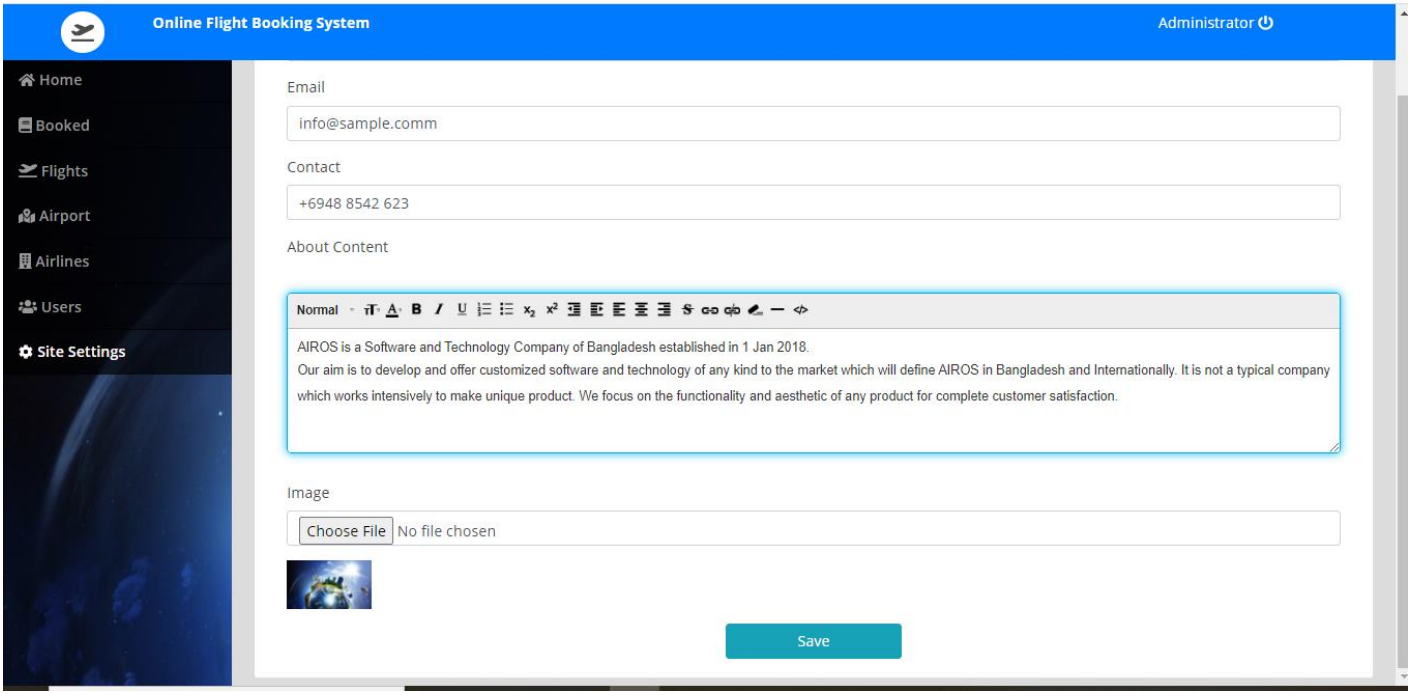
Users
Site Settings
+ New user
# Name Username Action
1 Administrator admin Action
2 DR.Sample Doctor, M.D. sample2@sample.com Action
3 Habib Rashid cblake@sample.com Action
4 Imran Hossain emon91@yahoo.com Action
5 Sample Only sample@sample.com Action
6 Tanzimul Haque tanjim@gmail.com Action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info@sample.comm
Contact
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About Content
Normal
AIROS is a Software and Technology Company of Bangladesh established in 1 Jan 2018.
Our aim is to develop and offer customized software and technology of any kind to the market which will define AIROS in Bangladesh and Internationally. It is not a typical company which works intensively to make unique product. We focus on the functionality and aesthetic of any product for complete customer satisfaction.
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AIROS is a software and tech company. It was founded in Jan1 2018. Our aim is to develop and offer customized software and technology of and kind to the market which will define AIROS in Bangladesh internationally. We focus on the functionality and the aesthetic feature of any product for complete customer satisfaction. We are very excited about AIROS Online Ticket Booking website. We already have some partner airlines who have agreed to work with us. We hope to increase the number of airlines partnership more as our website continues to please the customer.