

# **AIRLINE RESERVATION SYSTEM**

## **Team Members:**

- **Espoir Tomenou -**
- **Karthik Ravi -**
- **Vigneshwar Mohan -**
- **Venkataramana Hegde -**
- **Saipavan Narasaraj -**
- **Wali Hassan Khan -**

## **SOFTWARE SYSTEM DESIGN & IMPLEMENTATION**

**UNC CHARLOTTE**

**DR. A. SEVER**

**April 24, 2018**

# **Abstract**

Our project objective was to design an Airline Reservation System that allows passengers to quick search and book flights. The project was designed in various technologies such as: RESTful Web Service, MySQL Database, HTML5, CSS, Angular Material, Angular JS and many other applications. The choice of Airline Reservation System application project was based on the opportunity to learn and practice the technologies mentioned above, use an agile based incremental model with several people working on the same project, and putting in practice some of Software Development System lessons learned in class. This report contains the details of all tasks performed during the entire software development life cycle of our project.

## Table of Contents

<b>1. INTRODUCTION .....</b>	<b>4</b>
<b>2. METHODS USED .....</b>	<b>5</b>
<b>3. TECHNICAL DOCUMENT .....</b>	<b>5</b>
a. Programming Languages .....	5
b. Tools and Environment .....	5
c. Operating System .....	6
d. Web Services .....	6
e. Software Tools.....	6
f. Database & Tables.....	6
<b>4. SAMPLE RUNS WITH OUTPT .....</b>	<b>7</b>
<b>5. CONCLUSION.....</b>	<b>13</b>
<b>6. DIAGRAM.....</b>	<b>14</b>
<b>7. REFERENCES.....</b>	<b>17</b>
<b>8. APPENDIX.....</b>	<b>20</b>

## 1. INTRODUCTION

Most of existing airline reservation system we have today have many limitations related with it. As part of our requirement gathering, we conducted a survey to receive inputs on how to better the online reservation service. We run some interview questions and asked people around about their experience on booking flight online. The common problem encountered by these users were related to the amount of time it takes to reserve a flight, and security of their personal information. Our project is an enhancement of any existing booking website with a focus to eliminate the customer frustration, cut in half the amount of time customers experience when scheduling flight online. This project will provide passengers and future passengers the options for viewing different flights available along with different time for a specific date and time. It will also provide a secure and easy avenue for scheduling flight with just few clicks.

## 2. METHODS USED

A high quality of analysis done on the data obtained from the survey and interview has provided the direction for designing our application and the inputs for the features to be added. Persona, charts, and graphs were used to visualize information collected through data. These visual representations gave us a complete picture, and helped us in deciding the modules and features to be added and functions to be improved.

- **Prototyping:** An Initial Prototype was developed and had only one user interface. Review of this initial phase was done and we, “customers”, examined the prototype and provided feedback on the initial phase. One of the method used for this prototyping was Board Prototyping method. This was done using marker and white board.
- **Scrum Model:** Scrum is an iterative and incremental model based on agile values. We had sprint planning meetings (every week on Thursdays), where the team met and estimate tasks for the sprint ahead.
- The Team provided a list of work assignments that need to be accomplished. To do this, we first amended the work assignments created in **ASANA** in Epic section so that all the individual work elements are accounted for in the development plan. The next stage involved setting deliverable dates for components as well as the finished product for testing purposes.
- **Application Development:** is one of the most important step of our project. The First step in application development was web development. We choose MVC framework to follow and then developed necessary html pages and java scripts using available tools. Then, we do the Styling of the application. We developed action items and navigations, and include error handling and exception handling. Next step was the web services development. We

discussed necessary web services needed, and create them using RESTful Web Service and Spring Data Rest.

- **Database:** we identified the database to be used then created some Database Objects. Writing Complex SQL statements and creating user data then connecting database to the application.

### 3. TECHNICAL DOCUMENTATION

#### a. Programming languages.

- i. Java: “Java is a programming language and computing platform” for our project, we extensively used Java programming language to handle the business logic at the backend.
- ii. Spring Framework: Spring Framework is defined as: “an application framework and inversion of control container for Java platform”. The REST APIs of our system is developed using the Spring Data REST which is a module of Spring framework. Also, Database interaction has been accomplished using Spring JDBC. We have also efficiently made use of other features of Spring Framework such as IoC, Aspect Oriented programming etc..
- iii. XML Schema: “a language for expressing constraints about XML document”. We have used XML Schema to generate the application specific Classes (Objects) dynamically with the help of Maven plugins.
- iv. JavaScript: we used JavaScript for Client-side scripting, for web validation and also to program the behavior of the Airline Application web pages.
- v. Vuetify CSS Framework: To specify the style and look and feel of the Airline Application web pages.
- vi. HTML: “It is a standard markup language for creating web pages and web application”. HTML is the primary Markup used to develop the User Interface.
- vii. VueJS JavaScript Framework: “Open-source JavaScript framework for building user interfaces. Integration into projects that use other JavaScript libraries is made easy with Vue because it is designed to be incrementally adoptable.” We developed the Layouts, Web Pages using the VueJS framework.

#### b. Tools and Environment

- i. Eclipse IDE was used as a platform for the team to develop using Java Framework.

- ii. Postman was used to test Web Services
- iii. Atom Editor was used as another IDE for development
- iv. Webpack Module bundler was used to pack CommonJs/AMD modules; for example, the browser module. It was also used to split our codebase into multiple bundles, which can be loaded on demand.
- v. Ngrok “is secure introspectable tunnels to localhost webhook development tool and debugging tool” it was used within our development for internet and network security.

**c. Operating System**

- i. Windows 10
- ii. Mac OS

**d. Web Services**

- i. RESTful Web Service using Spring Data Rest

**e. Software Tools**

- i. Web Servers
  - 1. Apache Tomcat Web Server
  - 2. NodeJs Server

**f. Database and Table (Spring JDBC)**

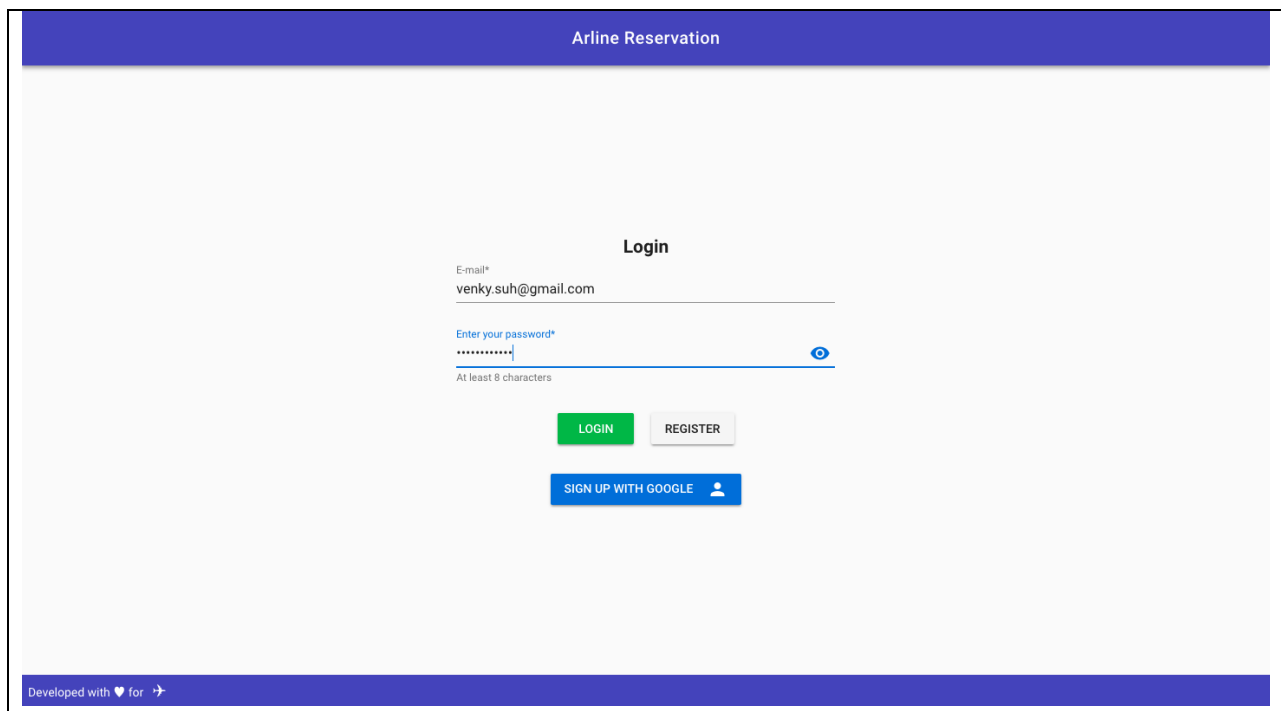
Database and Table (Spring JDBC)					
User Table	Country config	City Config	Flight Config	Itinerary Details	Booking Detail
Firstname	ID (PK)	ID (PK)	ID (PK)	ID (PK)	ID
Lastname	Country Name (Unique Key)	countryID (FK)	Flight Name	Flight ID (FK)	UserID (FK)
Password			Number of seat	Source ID (FK)	Itinerary ID
DOB			Flight type	Destination ID (FK)	Seat booked
Email (Unique Key)				From Time	Ticket Cost
Address				To Time	
ID (PK)				Date	
is Adm?				Ticket price	
				Flight number	

#### 4. SAMPLE OF RUNS WITH PROPER OUTPUT

Our product was designed in a way that anyone even with low level of computer literacy can easily run it. To start and run the application, the user needs an access to internet and the correct type of URL that refers to the index or Home Page. It doesn't matter which type of browser user choses. It can be Internet Explorer (IE) or Firefox. Once access to the home page is granted, user will be able to easily navigate within the application. The application is user friendly and was designed with a persona with both high and low technology savvy.

##### ➤ Login Page

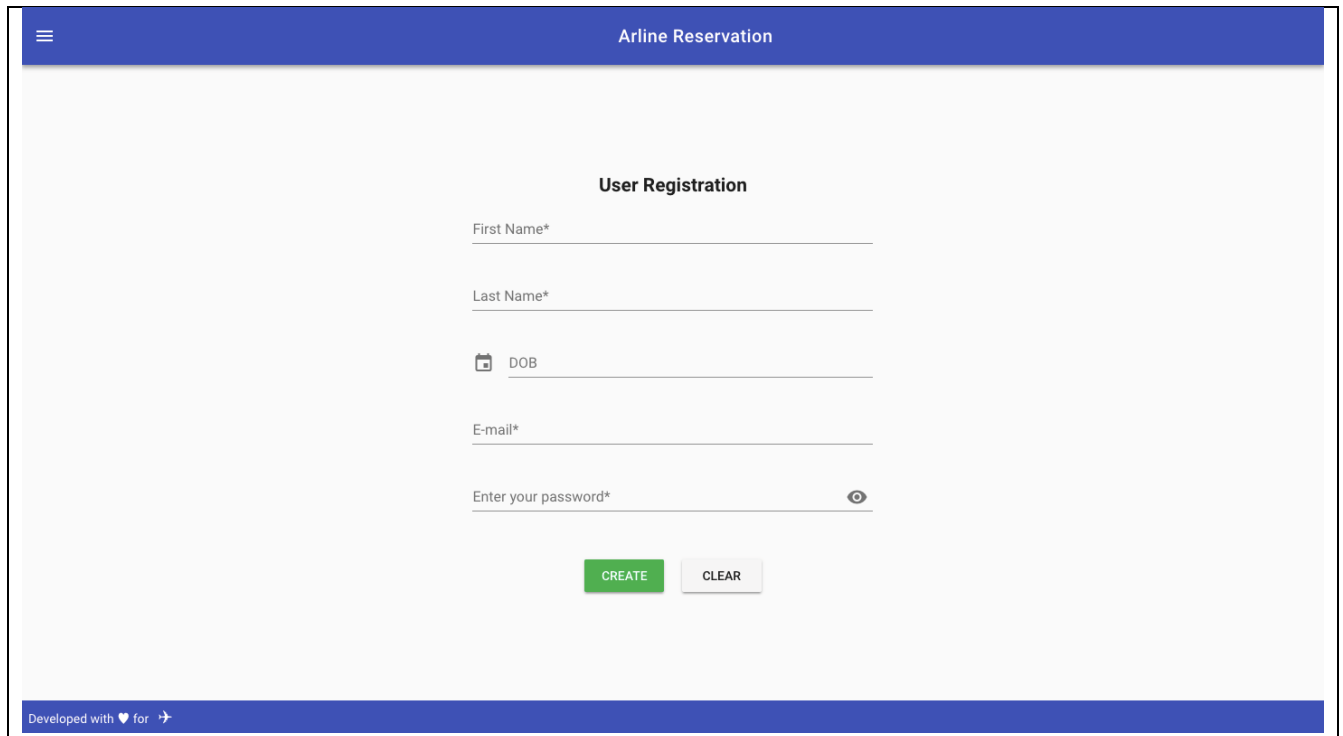
This will be the primary page which after successfully log in, will lead user to other pages. The Login Page is the first page user interacts with. If user has a valid credential (login ID and password), he/she will insert the record and click on Login. The application will verify the authenticity of the username and password the user has provided during the registration. The service will direct him/her to the flight Search Page query page; however, if user does not have a valid credential, he/she will have to click on Register.



The screenshot displays the 'Arline Reservation' login interface. At the top, a dark blue header bar contains the text 'Arline Reservation'. The main content area is white and features a 'Login' section. This section includes an 'E-mail\*' field with the text 'venky.suh@gmail.com' entered. Below it is a password field labeled 'Enter your password\*' with masked characters '\*\*\*\*\*' and a blue eye icon for toggling visibility. A small note 'At least 8 characters' is positioned below the password field. Two buttons, 'LOGIN' (green) and 'REGISTER' (grey), are located below the password field. A third button, 'SIGN UP WITH GOOGLE' (blue), is positioned below the 'LOGIN' and 'REGISTER' buttons and includes a Google profile icon. At the bottom of the page, a dark blue footer bar contains the text 'Developed with ♥ for' followed by a right-pointing arrow.

## ➤ Registration Page

This page will allow registration for new users. The application will present to the user a custom registration details page to allow user to enter his/her detail to register, create user name and password. The form will consist of fields such as Name, Last name, address, create username password. After the form is filled out, user has to click on Register. Upon successfully registering, user will be redirect to the Login Page.



The image shows a web application interface for "Arline Reservation". At the top is a blue header bar with a hamburger menu icon on the left and the text "Arline Reservation" in the center. Below the header is a light gray background area containing a "User Registration" form. The form has the following fields: "First Name\*" with a text input field, "Last Name\*" with a text input field, "DOB" with a calendar icon and a text input field, "E-mail\*" with a text input field, and "Enter your password\*" with a text input field and a toggle eye icon. Below the password field are two buttons: a green "CREATE" button and a gray "CLEAR" button. At the bottom of the page is a blue footer bar with the text "Developed with ❤ for" followed by a small airplane icon.

Arline Reservation

**User Registration**

First Name\*

Last Name\*

DOB

E-mail\*

Enter your password\*

CREATE CLEAR

Developed with ❤ for



## ➤ Flight Search Page

This page will allow user to search flight, by entering the source airport, destination airport, date of travel, number of seats. These provided informations will be checked up in the database for existence. After user fill out the form, he/she will click on **Search**. If by mistake user entered wrong information, the **Reset** button will be used to clear all the data that was entered.


Arline Reservation

Search

From :  
Charlotte, CLT

To :  
Jacksonville, JAX

Picker in menu  
2018-04-26

Delta Air Lines

From : Charlotte, CLT

To : Jacksonville, JAX

Date : 04-26-2018


Duration : 8h 39m

Depature: 10 AM

Arrival : 2 PM

Cost : 160\$

BOOK

American Airlines

From : Charlotte, CLT

To : Jacksonville, JAX

Date : 04-26-2018


Duration : 5h 2m

Depature: 10 AM

Arrival : 2 PM

Cost : 176\$

BOOK

Delta Air Lines

From : Charlotte, CLT

To : Jacksonville, JAX

Date : 04-26-2018


Duration : 11h 25m

Depature: 10 AM

Arrival : 2 PM

Cost : 244\$

BOOK

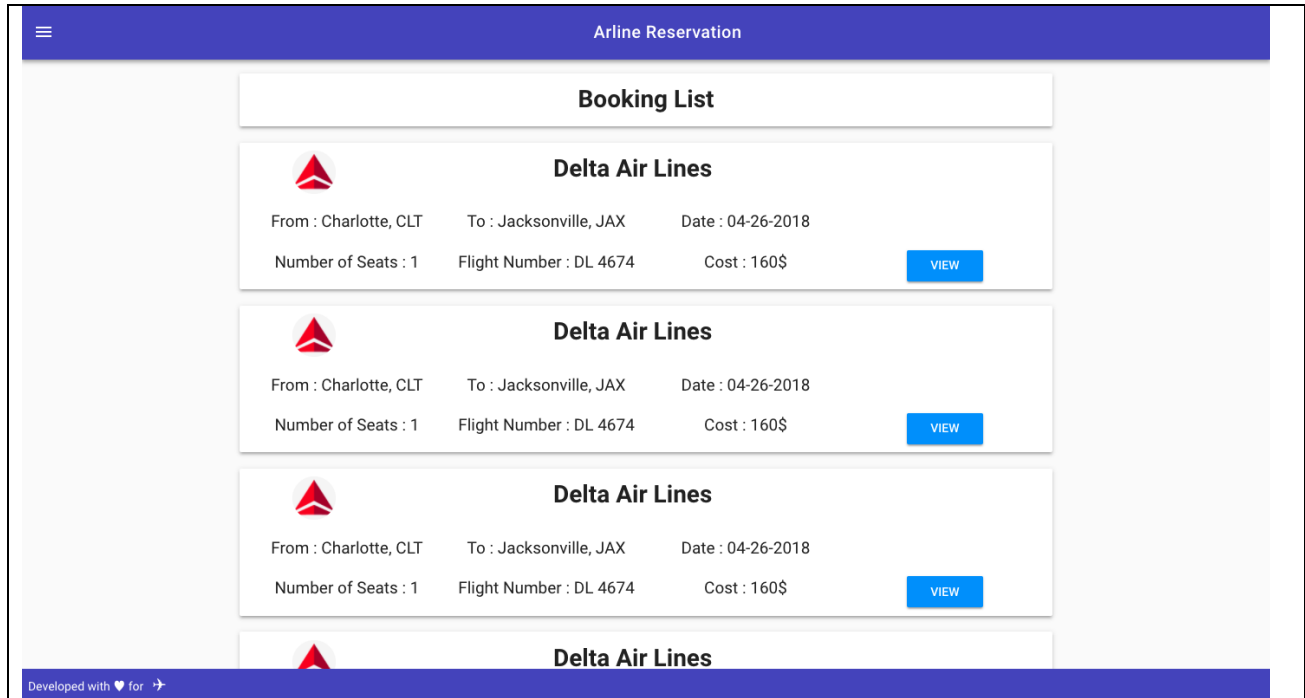
United Airlines

Developed with ❤️ for ✈️

9

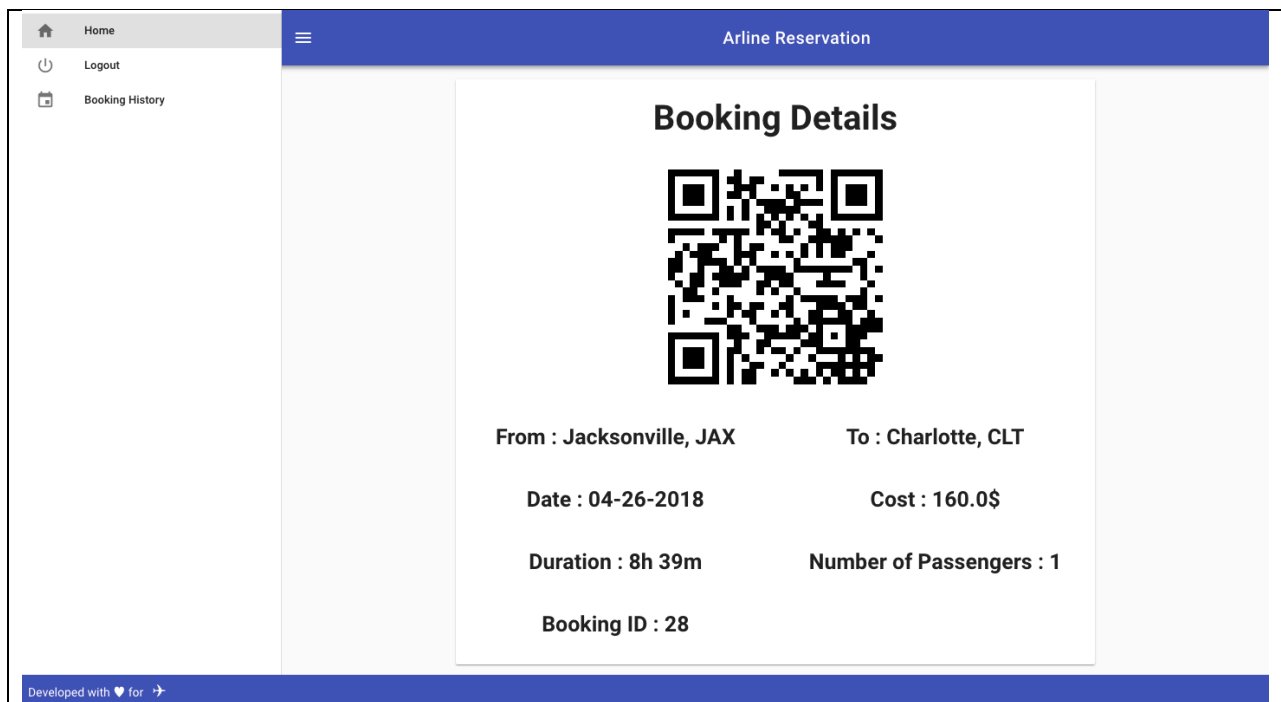
## ➤ Booking Page

Based on data entered by user on the Flight Search Page, a search query and a server-side scripting will be conducted and the result will be displayed on the Booking Page. The user will look up the information related to various flight number and will check the availability of seat of each flight. At this point, user will have the choice to select the seat that best fit his/her need.



## ➤ Confirmation Page

Upon clicking on Seat, application will present to the user the Confirmation Page with other user details that needs to be entered such as: number of traveler, infant, adult, date of birth, gender and the ***Confirm My Seat Selection*** button. If user is satisfy with the flight result on the Confirmation Page, he/she will click on ***Confirm My Seat Selection*** button to proceed with the payment; otherwise, he/she will click on the ***Back*** button to go back to the previous page or can click on the ***Home*** button to go back to the Home page.



### ➤ Payment Page

On this page, user has to enter valid bank information such as: account holder name, routing number, account number, and expiry date. Once the information is entered correctly, user will click **Confirm** button to proceed with the payment. If for some reason, user has to cancel the payment, he/she will click on the **Cancel** button


The screenshot shows a web application titled "Arline Reservation" in a blue header. A central white box titled "Payment" contains the following fields:

- Card Number\*: 12345678910999
- Pin\*: 28262
- Month\*: 12
- Year\*: 2022


A green "PAY" button is located below the fields. The footer of the application states "Developed with ❤️ for ➔".

## ➤ Itinerary Page

This page provide user with details of his/her flight ticket.

 Arline Reservation

### Booking Details

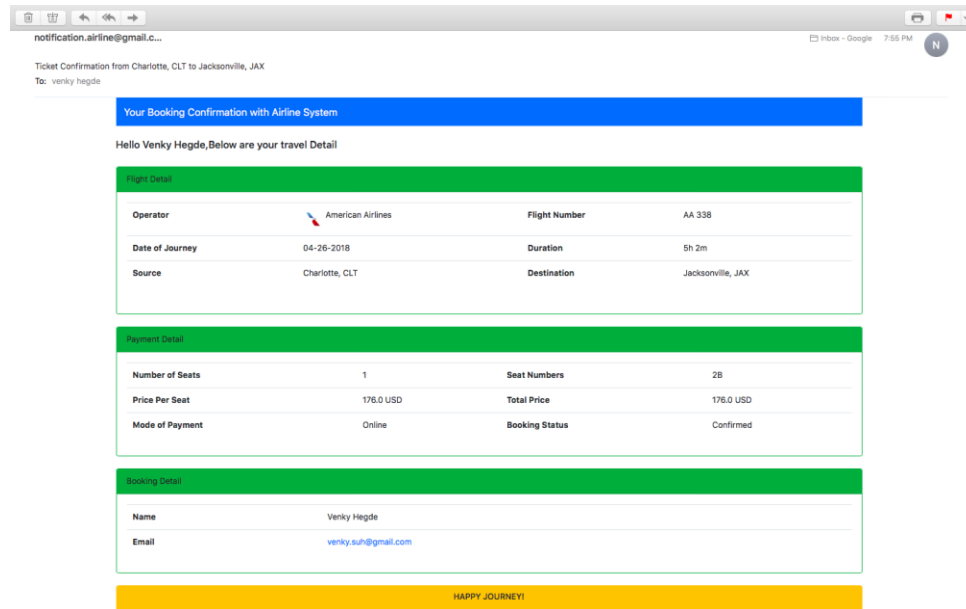


From : Jacksonville, JAX	To : Charlotte, CLT
Date : 04-26-2018	Cost : 160.0\$
Duration : 8h 39m	Number of Passengers : 1
Booking ID : 28	

Developed with ♥ for →

## ➤ E-Mail Notification

Once the payment is done and confirmed, the information regarding the ternary is emailed to the customer with the ticket. Below is the sample email conformation received by the user.



## 5. CONCLUSION

At the first meeting, a group of six strangers came together in Software System Design and Implementation class. From our first interaction, we introduced ourselves, discussed schedules and had friendly conversation to get to know one another. We had a brainstorming for our Term Project. From our second meeting, we came up with our product: Airline Reservation System. This project has been one of the rewarding experiences for each and one of us. We have learned a lot in this class and more importantly during the development life cycle of our product. Our desire to learn today's fast evolving technologies like: Spring Framework, XML Schema Definition, JavaScript, VueJS JavaScript Framework, RESTful Web Service using Spring Data Rest, and various Model Design, has been satisfied.

Over the course of this project, we have also promoted team communication, individual leadership skills, and continue to learn how to work together under strict schedule. There have been highs and lows that all teams at one point have gone through. We were able to overcome the various weaknesses we have encountered.

## 6. REFERENCES

1. “What Is Java Technology and Why Do I Need It?” What Is Java and Why Do I Need It?, 30 July 2014, [www.java.com/en/download/faq/whatis\\_java.xml](http://www.java.com/en/download/faq/whatis_java.xml).
2. Tutorials Point. “Spring Framework Overview.” [www.tutorialspoint.com](http://www.tutorialspoint.com), Tutorials Point, 8 Jan. 2018, [www.tutorialspoint.com/spring/spring\\_overview.htm](http://www.tutorialspoint.com/spring/spring_overview.htm).
3. “Understanding XML Schema.” Understanding XML Schema, [msdn.microsoft.com/en-us/library/aa468557.aspx](http://msdn.microsoft.com/en-us/library/aa468557.aspx).
4. “HTML Basics.” MDN Web Docs, [developer.mozilla.org/en-US/docs/Learn/Getting\\_started\\_with\\_the\\_web/HTML\\_basics](http://developer.mozilla.org/en-US/docs/Learn/Getting_started_with_the_web/HTML_basics).
5. “Vue.js.” Vue.js, [vuejs.org/](http://vuejs.org/).
6. <https://ngrok.com/>



## 7. Diagrams:

Figure 1: Class Diagram

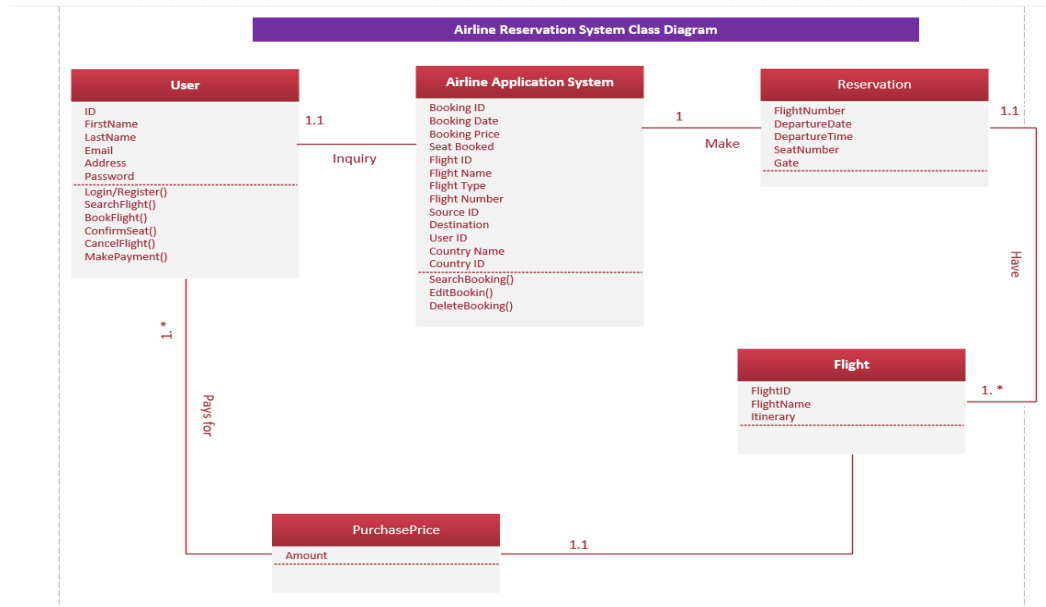
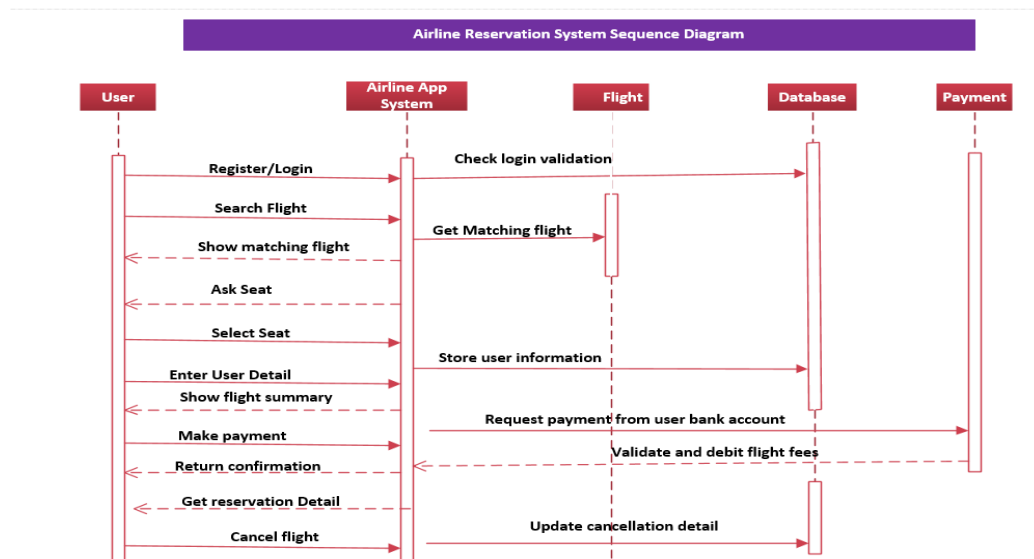
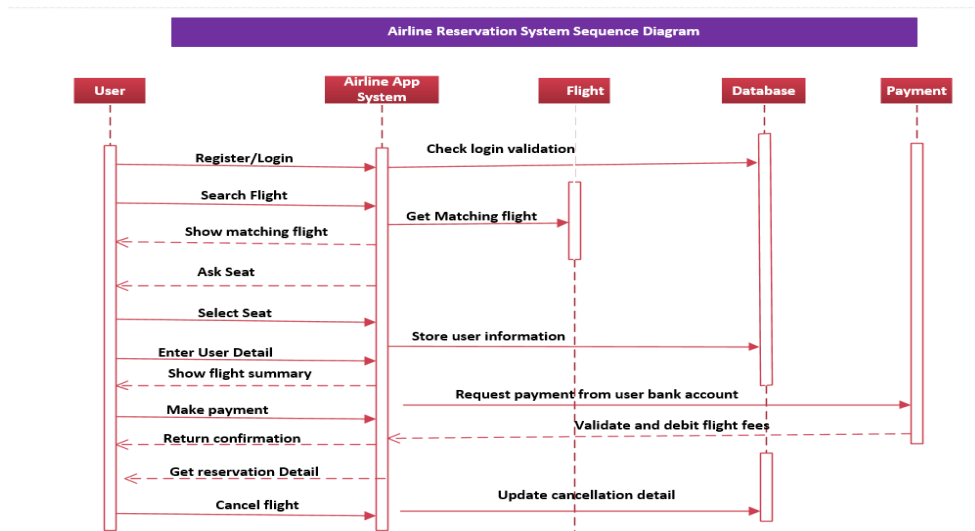


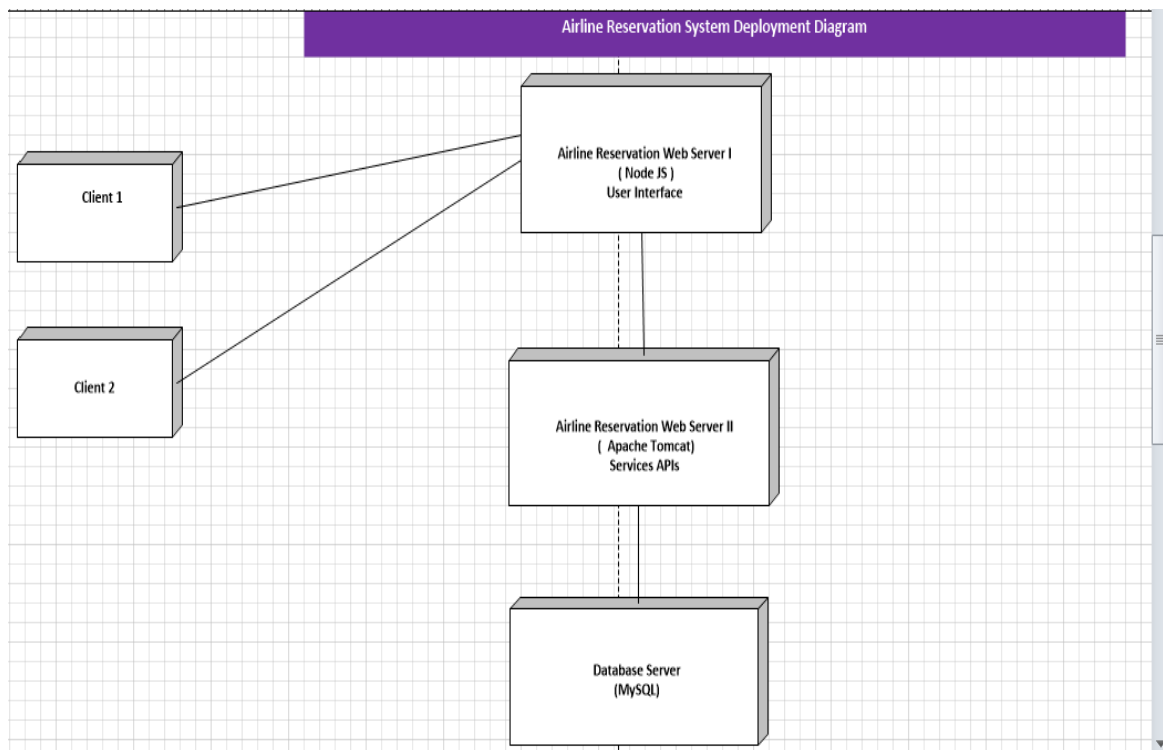
Figure 2: Sequence Diagram



**Figure 3: Component Diagram**



**Figure 4: Deployment Diagram**



## 8. APPENDIX

**Fig 1: Meeting Agenda and minute**

**Project Name Description:** *Airline Reservation System*

**Group Member:**  
Espoir Tomenou  
Karthik Ravi  
Vigneshwar Mohan  
Venkataramana Hegde  
Saipavan Narasaraj  
Wali Hassan Khan

**Date:** *February 15, 2018*

### Meeting

**Date:** *February 16, 2018*

### Meeting Objectives:

#### Agenda:

- Persona -- **Done**
- Airline Reservation System main features -- **Done**
- Those listed features will be the Epic -- **Done**
- Draw the persona with the different function (customer use case diagram) -- **Done**
- Mock up graphic -- **To do**
- Functional requirement -- **To do**
- Architecture design (user input {HTML} – logic behind {Coding} – database {MySQL}) -- **To do**
- Assign tasks -- **To do**

### February 22, 2018 Team Meeting

- Define Epics and Stories
- Assign Tasks

Action Item	Assigned To	Due Date
Login & Registration Page	Wali and Saipavan	March 5
Registration Service	Venky	March 5
Login Service	Venky	March 5
Database Design -- done	Viki	March 5

Database Implementation -- on going	Karthik	March 5
Documentation -- on going	Espoir	March 5

### Still to do as of February 22, 2018:

#### a) Programming

1. Login & Registration UI Page -- **On going** - done
2. Application connections to database -- **To Do**
3. Registration & Login -- **On going** -- done
4. Managing Sessions -- **To Do**
5. Integrating Business Logic -- **To Do** -- On going
6. Flight Search and Detail Page -- **To Do**
7. Transaction Details & Confirmation Page -- **To Do**
8. Booking Histories -- **To Do**
9. Database Design & Implementation -- **On going**
10. Documentations -- **On going**

#### b) Documentation

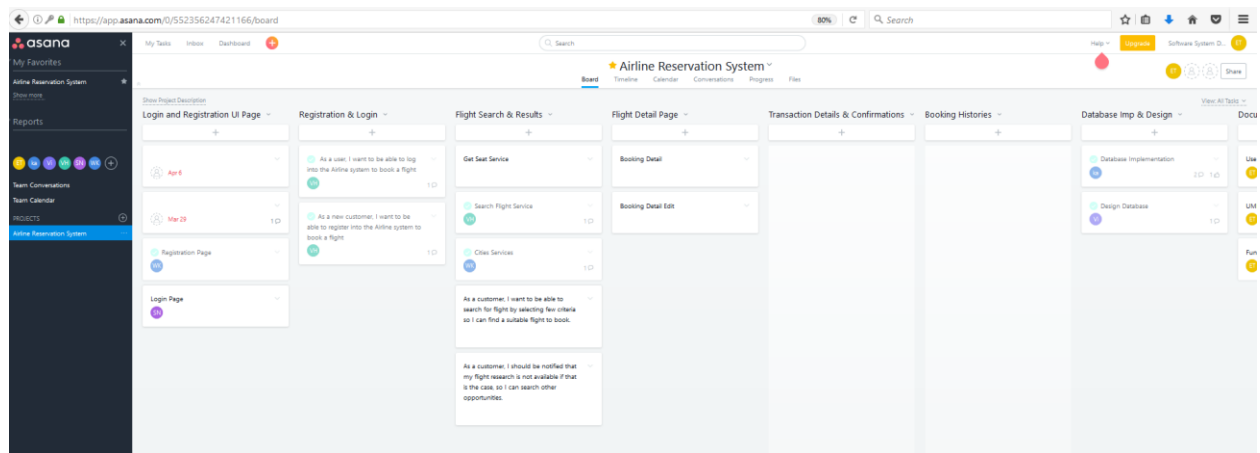
1. Design Document -- Passenger Use Case Diagram
2. Functional Requirement

**March 13, 2018 Meeting**

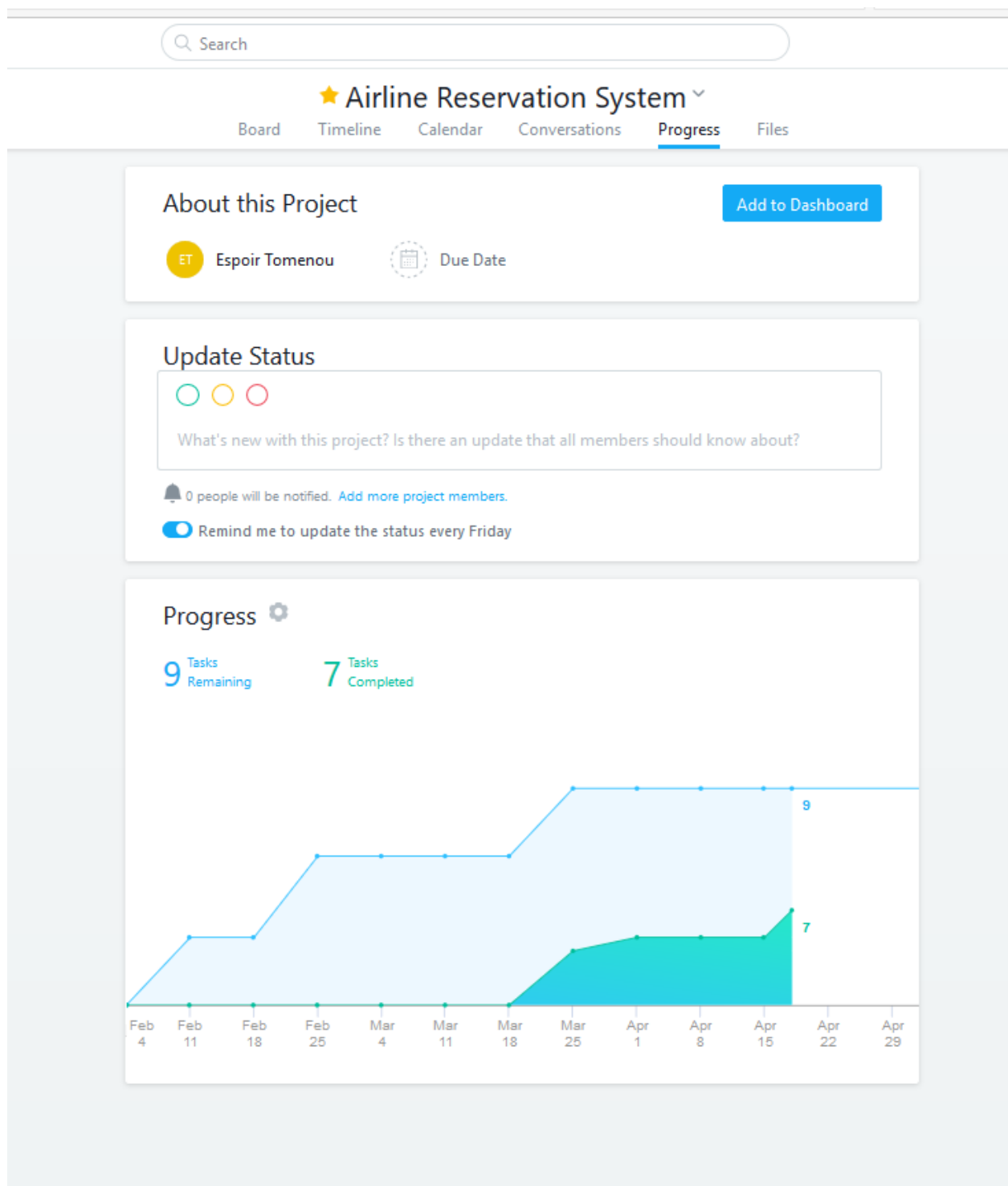
#### Attendees

Espoir Tomenou  
Karthik Ravi  
Vigneshwar Mohan  
Venkataramana Hegde  
Saipavan Narasaraj  
Wali

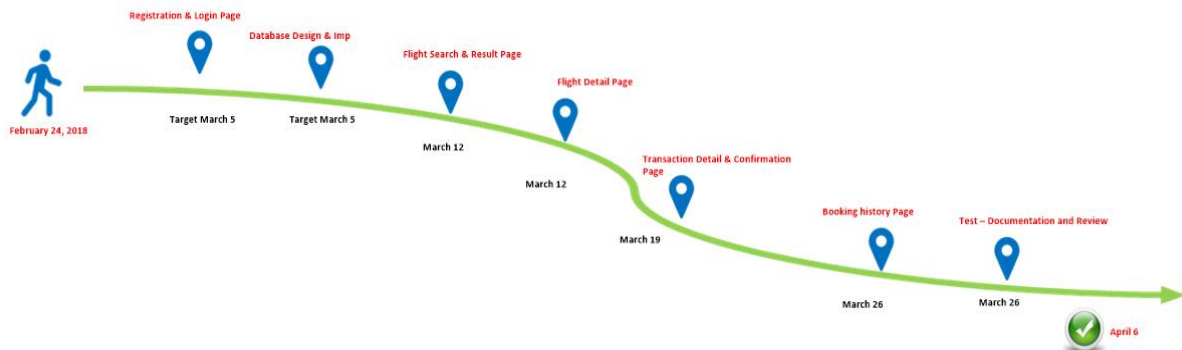
**Fig 2: Sample of the project board using ASANA**



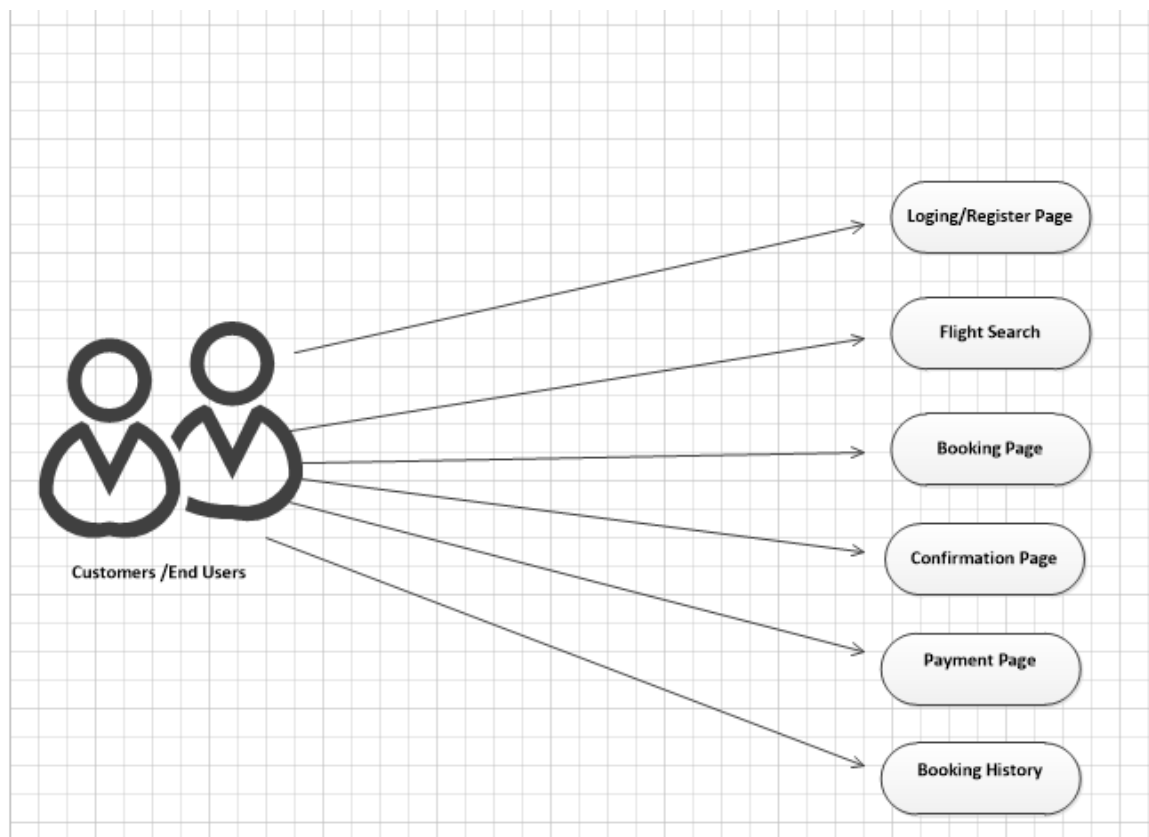
**Fig 3: Project progress**



**Fig 4: Work Progress**



**Fig 5: Use-Case Diagram**



**Fig 6: User Story**

Actors	Action
Customer	1) As a customer I would like to be able to Login or Register so that I can have full access into the Airline Reservation System
	2) As a customer I would like to be able to access the Airline reservation system Home page after I log in so that I can look up information regarding flights.
	3) As a customer I would like to be able to search for flights available and reserve my place on a flight of my choice.
	4) As a customer I should be able to previous my flight selection before moving on the payment option
	5) As a customer I should be able to pay for the flight of my choice
	6) As a customer, I would like to be able to view all my flight histories so that I can use that functionality to book flight based on my previous booking.