

# Specification Document for The Project

“FlyAway Ticketing Portal”

Phase3: PG FSD Become a Backend Expert

Simplilearn / CalTech

MARCH 2022 COHORT

Prepared By

Bakau Onafuwa

July 8, 2022

Name	Bakau Onafuwa
Email	Bakau.onafuwa@softgineer.com
GitHub Repository	<a href="mailto:git@github.com:homozapien/flyaway.git">git@github.com:homozapien/flyaway.git</a> <a href="https://github.com/homozapien/flyaway.git">https://github.com/homozapien/flyaway.git</a>
Project Management	Agile
Agile Methodologies	SCRUM

## Objective

The main objective of this assessment project is to develop a web-based application that avails customers the opportunity to search for flights, book such flights, and make payments for such flights using a dummy payment service. For the prospective customer to be able to achieve this, an administrative account will provide the necessary backend data entities to provide the necessary domain models for the customer interactions.

Notably, this web application was developed to fulfil the core business requirements with additional features (e.g. reporting dashboard, embedded tomcat etc) to make the usage more intuitive and realistic.

Core development concepts like exception handling, code reviews, code refactoring, versioning, and SCRUM framework are equally showcased.

## Assumptions

1. It is assumed that the reviewer of the source codes, the compiler, the tester and/or runner of this application is conversant with the Java Technologies and possess some level of programming background principally Servlets, JSPs, and JSTL.
2. This application was developed in Eclipse IDE and based on JDK 17 (Temurin); it is assumed that the same environment will be available for the review and testing of this application.

```
openjdk version "17.0.2" 2022-01-18
OpenJDK Runtime Environment Temurin-17.0.2+8 (build 17.0.2+8)
OpenJDK 64-Bit Server VM Temurin-17.0.2+8 (build 17.0.2+8, mixed mode, sharing)
```

3. It is assumed that the code reviewer and the tester of this application are familiar with Git and can clone the Github repository for this project.
4. The development of this application never focused on the security and boundary contexts of the underlying OS and the development database. A simple "localhost" connection to the underlying database will suffice (refer to the hibernate.cfg.xml).

5. A Mysql RDBMS will be available in the test environment and database named: flyaway is created *ab initio* as shown thus,

```
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway master • mysql -V
mysql Ver 8.0.29 for macos10.14 on x86_64 (Homebrew)
```

```
mysql> show databases;
+-----+
| Database |
+-----+
| flyaway  |
| information_schema |
| mysql    |
| performance_schema |
| sys      |
| university_batch |
+-----+
6 rows in set (0.05 sec)
```

6. A maven infrastructure is required to be able to re-build / re-package the application as shown thus,

```
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway master • mvn -v
Apache Maven 3.8.1 (05c21c65bdfed0f71a2f2ada8b84da59348c4c5d)
Maven home: /usr/local/Cellar/maven/3.8.1/libexec
Java version: 17.0.2, vendor: Eclipse Adoptium, runtime: /Library/Java/JavaVirtualMachines/temurin-17.jdk/Contents/Home
Default locale: en_US, platform encoding: UTF-8
OS name: "mac os x", version: "10.14.6", arch: "x86_64", family: "mac"
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway master •
```

## Project Management

This application was developed within a period of 3 weeks. I had employed the SCRUM framework for an iterative development. The user stories in the Product Backlog are high-level (without task break down for the individual story) and were implemented in four iterations as shown below.

Sprint 1 Goal: Get the environment and infrastructure ready



Projects / FlyAway

### Backlog

Search:  H Epic ▾

▼ **Sprint 1 - Infrastructure Prep** 23 Jun – 25 Jun (7 issues) 0 0 0 **Start sprint** ⋮

Ensure the Java project development landscape is fully functional

FLYAWAY-1	Install Eclipse Enterprise IDE	DONE ▾	H
FLYAWAY-2	Install / Ensure MySQL database is running	DONE ▾	H
FLYAWAY-3	Install / Ensure maven is running and functional	DONE ▾	H
FLYAWAY-6	Install / Ensure git is running locally	DONE ▾	H
FLYAWAY-4	Create the GitHub remote repository	DONE ▾	H
FLYAWAY-5	Create the eclipse project / local repository	DONE ▾	H
FLYAWAY-9	Create the database: FlyAway on the MySQL database plat...	DONE ▾	H

+ Create issue

Sprint 2 Goal: Build Application Framework / Model Entities

Projects / FlyAway

### Backlog

Search:  H Epic ▾

▼ **Sprint 2 - Model Backend entit** 27 Jun – 30 Jun (6 issues) 0 0 0 **Start sprint** ⋮

Model the backend entities

FLYAWAY-7	Model the backend entities	DONE ▾	H
FLYAWAY-8	Convert the models to java entity classes	DONE ▾	H
FLYAWAY-10	Setup log4j functionalities to aid debugging	- DONE ▾	H ⋮
FLYAWAY-11	Setup the hibernate config file	DONE ▾	H
FLYAWAY-12	Configure the embedded tomcat	DONE ▾	H
FLYAWAY-13	configure the embedded tomcat launcher	DONE ▾	H

+ Create issue

## Sprint 3 Goal: Admin Features













Projects / FlyAway

## Backlog

 Epic ▾

**▼ Sprint 3 - Admin Features** 1 Jul – 5 Jul (6 issues) 0 0 0 Start sprint ...

Create Admin features

 <del>FLYAWAY-14</del>	Admin ability to setup airports in cities and countries	<span>DONE ▾</span>	
 <del>FLYAWAY-15</del>	Admin ability to setup airlines	<span>DONE ▾</span>	
 <del>FLYAWAY-16</del>	Admin ability to setup flight schedules in based on airline...	<span>DONE ▾</span>	
 <del>FLYAWAY-17</del>	Reporting dashboard for admin	<span>DONE ▾</span>	
 <del>FLYAWAY-18</del>	Admin login process (user management)	<span>DONE ▾</span>	
 <del>FLYAWAY-19</del>	Admin password change functionality	<span>DONE ▾</span>	

+ Create issue

## Sprint 4: Customer Feature













Projects / FlyAway

## Backlog

 Epic ▾

**▼ Sprint 4 - Customer Features** 6 Jul – 8 Jul (6 issues) 0 0 0 Start sprint ...

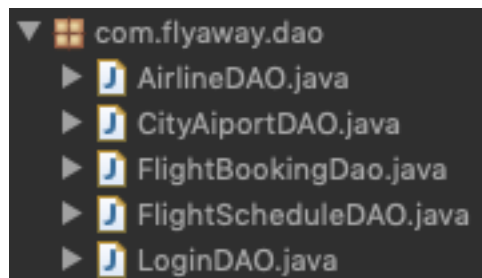
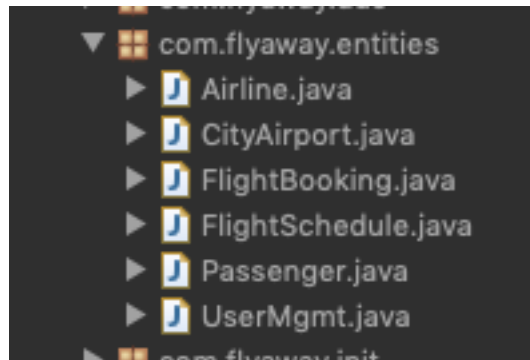
Create customer features

 <del>FLYAWAY-20</del>	Implement customer search feature	<span>DONE ▾</span>	
 <del>FLYAWAY-21</del>	Implement customer booking feature	<span>DONE ▾</span>	
 <del>FLYAWAY-22</del>	Implement booking customer confirmation	<span>DONE ▾</span>	
 <del>FLYAWAY-23</del>	Implement customer dummy payment feature	<span>DONE ▾</span>	
 <del>FLYAWAY-24</del>	Implement customer login feature	<span>DONE ▾</span>	
 <del>FLYAWAY-25</del>	Implement customer "My bookings" feature	<span>-</span> <span>DONE ▾</span>	 <span>...</span>

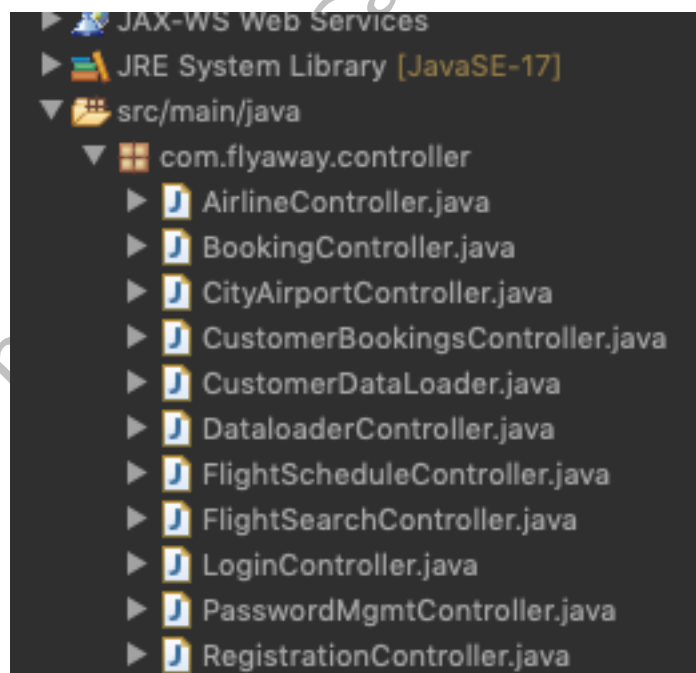
+ Create issue

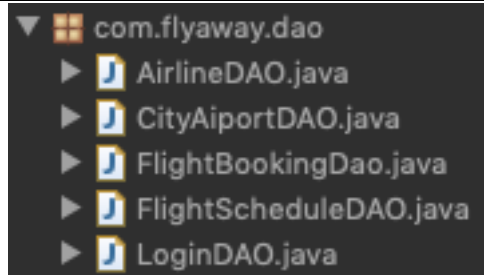
## Project Structure

1. Backend: The backend models comprises of Hibernate entities, DAOs, and MySQL database for storage.

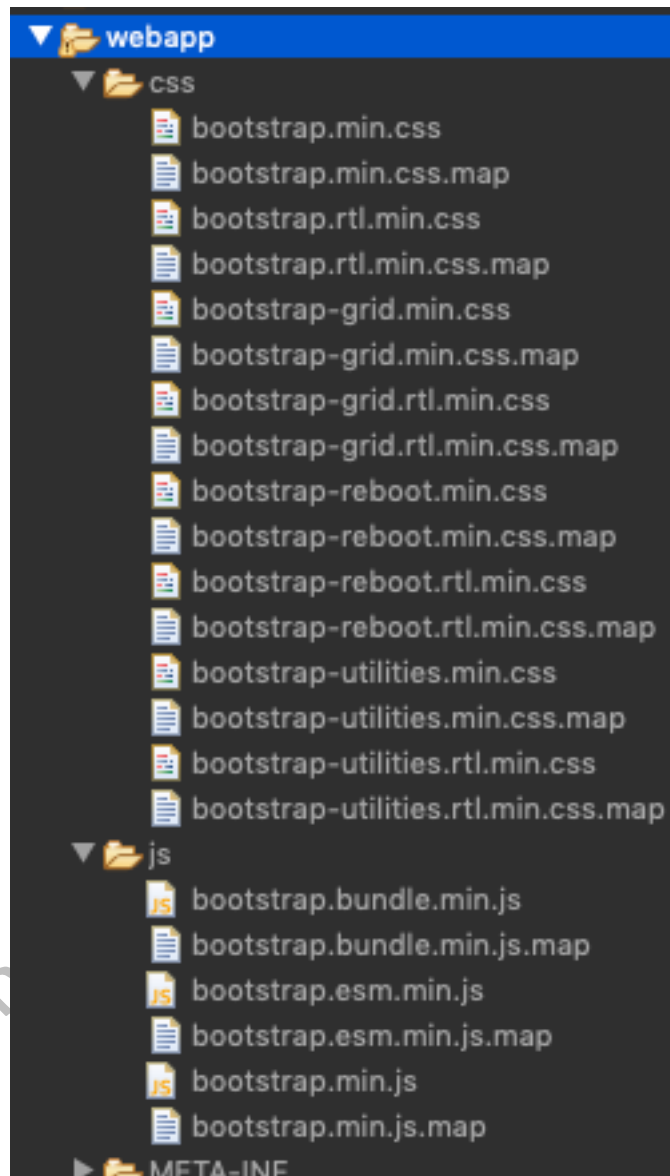


2. Business Logic: The logic is implemented using the Java Servlet (controllers), Service Layers, and POJOs

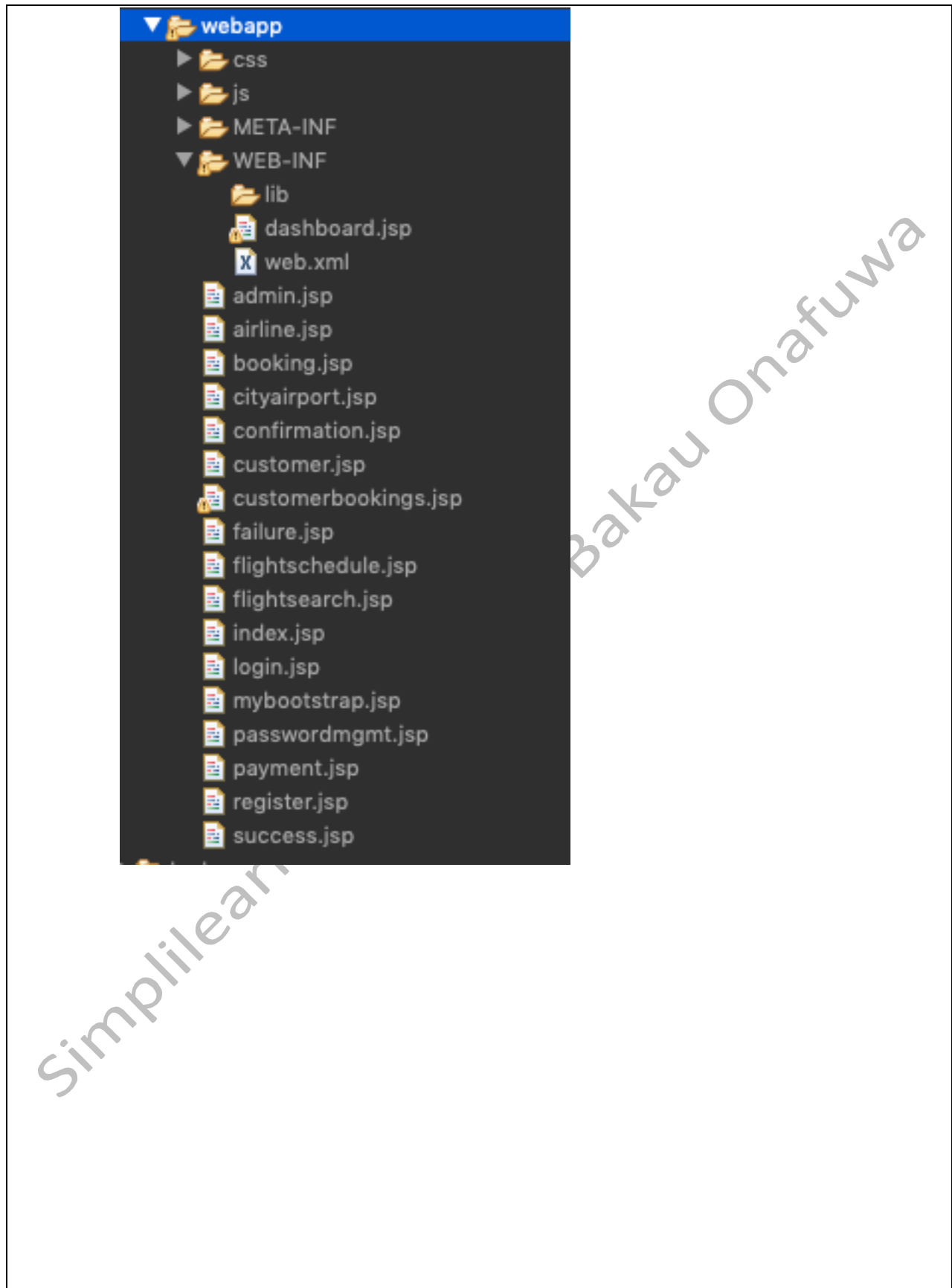




3. Front end: The views are implemented with JSP with some bootstrap inclusion.







## Execution Flow

This is a web-based application and there is some degree of free typing in some of the UI controls however, these view inputs are validated against the relationships amongst the backing entity beans.

Two types of user roles are allowed during authentication viz:

- Admin: to perform the setup and admin functionalities.
- Customer: use the application based off the setup by the admin.

To use the application, the admin must first login to setup the domain data using the following credential:

- Username: [admin@flyaway.com](mailto:admin@flyaway.com)
- Password: flyaway
- UserType: Admin

These values should be inserted automatically by hibernate during bootstrapping processes (otherwise, insert manually from the command prompt using the following insert statement:

```
public class UserMgmt implements Serializable
{
    private static final long serialVersionUID = 3756680645803624405L;
    @Id
    @ColumnDefault("'admin@flyaway.com'")
    private String emailId;
    @ColumnDefault("'flyaway'")
    private String password;
    @ColumnDefault("'Admin'")
    private String typeOfUser;

    public UserMgmt() {
        super();
    }
}
```

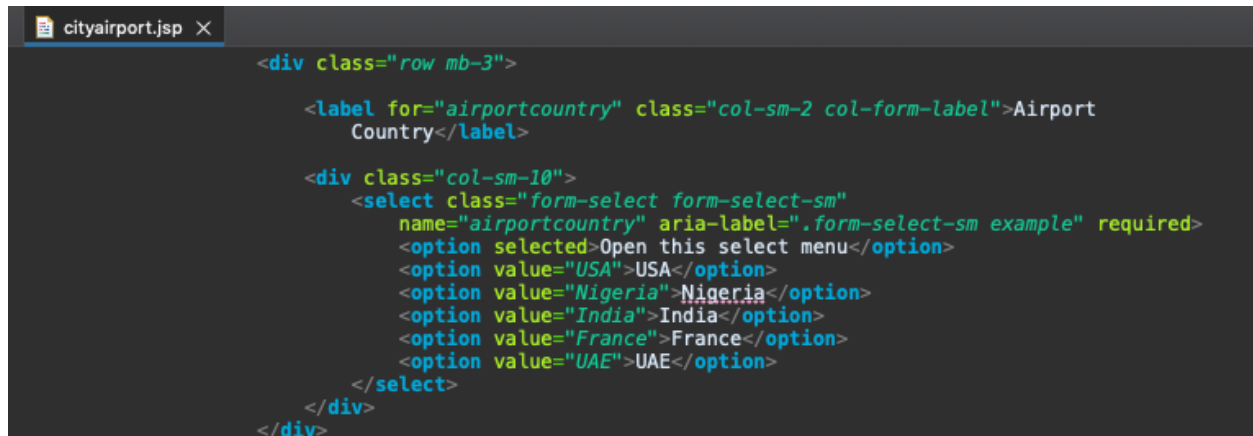
Mysql prompt > Use flyway;

Insert into usermgmt ("emailid", "password", "typeofuser")  
Values ('admin@flyway.com', "flyaway", "Admin")

Note: You may change the admin password with the application

The admin has the responsibility to create the airport, create airlines, and schedule flights.

Note: From the view, airport could only be created in the following countries: USA, India, Nigeria, France, and UAE.



```
<div class="row mb-3">
  <label for="airportcountry" class="col-sm-2 col-form-label">Airport
  Country</label>
  <div class="col-sm-10">
    <select class="form-select form-select-sm"
      name="airportcountry" aria-label=".form-select-sm example" required>
      <option selected>Open this select menu</option>
      <option value="USA">USA</option>
      <option value="Nigeria">Nigeria</option>
      <option value="India">India</option>
      <option value="France">France</option>
      <option value="UAE">UAE</option>
    </select>
  </div>
</div>
```

Note: The entity relationships ensure that the input values are validated based on the Foreign Key relationships / joinColumns.

The customer may use the application by searching and booking flights accordingly.

## Setup for re-build / re-packaging

Compiling / building the application requires maven to be available on the local machine.

From the project folder, run the following maven goals:

```
[INFO] org/apache/tomcat/util/threads/ThreadPoolExecutor$Worker.class already added, skipping
[INFO] org/apache/tomcat/util/threads/ThreadPoolExecutor.class already added, skipping
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 15.669 s
[INFO] Finished at: 2022-07-08T11:00:46+01:00
[INFO] -----
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway [?] master • [?] mvn clean compile package
```

During the first-run, the launcher will require the tomcat port for the embedded tomcat server for a successful start as shown here:

Project folder: > java -jar ./target/flyaway-jar-with-dependencies.jar 9191

```
baknaf@baknaf1:~/WorkShop/DEV/eclipse/current/workspace/flyaway
Compressing objects: 100% (17/17), done.
Writing objects: 100% (29/29), 238.56 KiB | 393.00 KiB/s, done.
Total 29 (delta 8), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (8/8), completed with 8 local objects.
To github.com:homozapien/flyaway.git
0f880b7..97f53f0 master -> master
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway [?] master [?] clear
baknaf@baknaf1 ~/WorkShop/DEV/eclipse/current/workspace/flyaway [?] master • [?] java -jar ./target/flyaway-jar-with-dependencies.jar 9191
```

where 9191 is your desired port on which to run the embedded tomcat. If no port is specified (from the command line), a default of 8080 would be used.

Database:

The hibernate config file is defined as thus:

```
hibernate.cfg.xml
1 <?xml version="1.0" encoding="UTF-8"?>
2 <!DOCTYPE hibernate-configuration PUBLIC
3 "http://www.hibernate.org/dtd/hibernate-configuration-3.0.dtd">
4 <hibernate-configuration>
5 <session-factory>
6 <property name="hibernate.connection.driver_class">com.mysql.cj.jdbc.Driver</property>
7 <property name="hibernate.connection.password"></property>
8 <property name="hibernate.connection.url">jdbc:mysql://localhost:3306/flyaway?serverTimezone=America/Chicago</property>
9 <property name="hibernate.connection.username">root</property>
10 <property name="hibernate.dialect">org.hibernate.dialect.MySQL8Dialect</property>
11 <property name="hibernate.hbm2ddl.auto">update</property>
12 <property name="hibernate.show_sql">true</property>
13 <property name="hibernate.format_sql"> true </property>
14 <mapping class="com.flyaway.entities.CityAirport"/>
15 <mapping class="com.flyaway.entities.Airline"/>
16 <mapping class="com.flyaway.entities.FlightSchedule"/>
17 <mapping class="com.flyaway.entities.FlightBooking"/>
18 <mapping class="com.flyaway.entities.Passenger"/>
19 <mapping class="com.flyaway.entities.UserMgmt"/>
20 </session-factory>
21 </hibernate-configuration>
22
```

The database name to be created in mysql is: flyaway

All mapped entities (i.e. tables) will be created in this database.

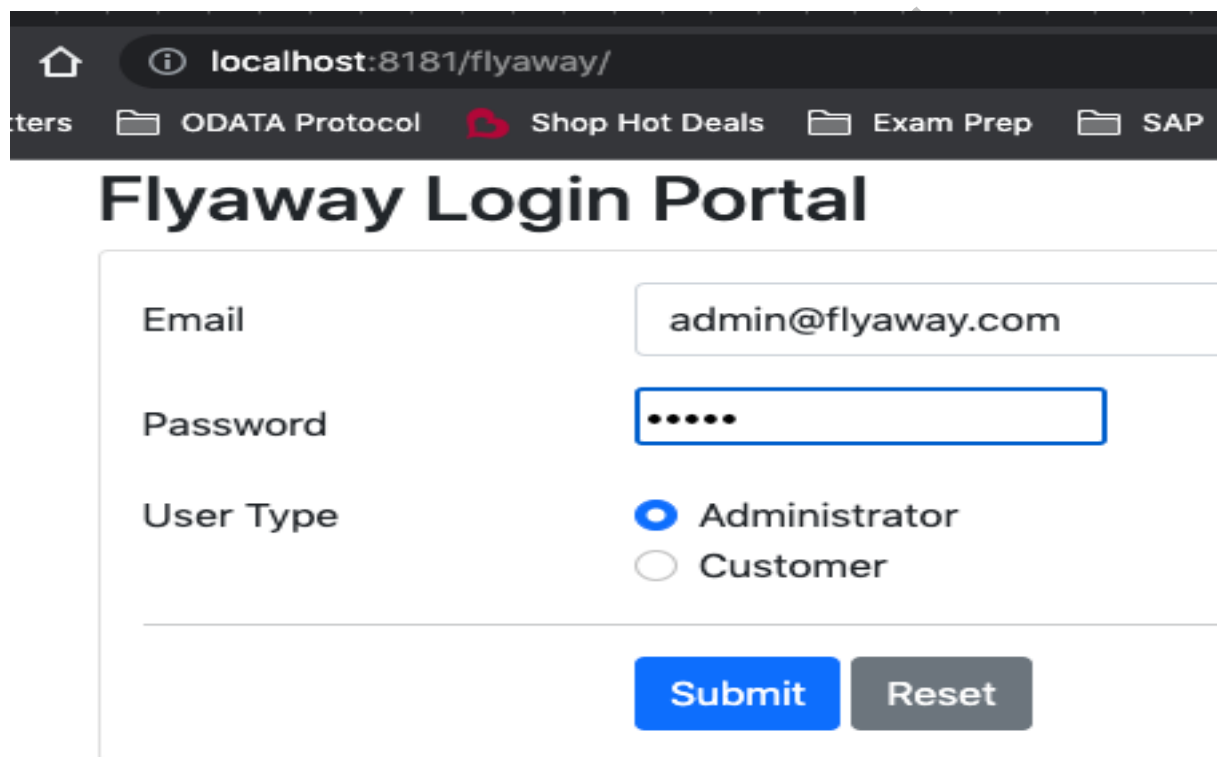
## Data Structure & Algorithms

No special algorithms were used.

## Unit Testing

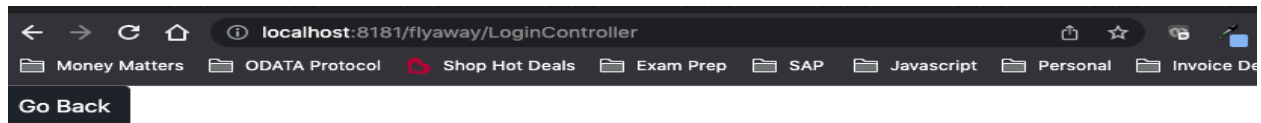
To successfully compile and run this program, minimum of JDK 1.8 must be running in the test environment.

1. Login Page



The screenshot shows a web browser window with the address bar displaying 'localhost:8181/flyaway/'. The browser's bookmark bar includes 'ODATA Protocol', 'Shop Hot Deals', 'Exam Prep', and 'SAP'. The main heading of the page is 'Flyaway Login Portal'. Below the heading is a login form with three input fields: 'Email' containing 'admin@flyaway.com', 'Password' with masked characters '.....', and 'User Type' with two radio button options: 'Administrator' (selected) and 'Customer'. At the bottom of the form are two buttons: a blue 'Submit' button and a grey 'Reset' button.

2. Admin Operation



## FlyAway Administrative Operations

Name	Operation Description
<a href="#">Change Password</a>	Password Management
<a href="#">Airports</a>	Setup airports in cities in countries
<a href="#">Airline</a>	Setup Airlines
<a href="#">Flight Schedule</a>	Setup Airlines flight Schedule
<a href="#">Reporting Dashboard</a>	Show readonly reporting dashboard

### 3. Password Change Management

A screenshot of a web browser showing the 'localhost:8181/flyaway/passwordmgmt.jsp' page. The browser's address bar and tabs are visible at the top. Below the browser window, there is a dark 'Go Back' button. The main content area is titled 'Flyaway Admin Password Management' and contains a form with three input fields: 'Email' (pre-filled with 'admin@flyaway.com'), 'Current Password' (placeholder 'Enter current password'), and 'New Password' (placeholder 'Enter new password'). At the bottom of the form are two buttons: 'Submit' (blue) and 'Reset' (grey).

Flyaway Admin Password Management

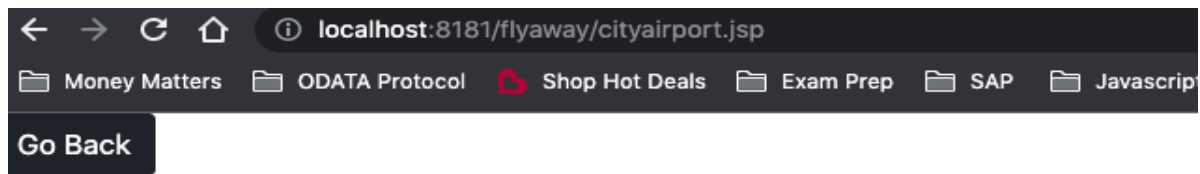
Email: admin@flyaway.com

Current Password: Enter current password

New Password: Enter new password

Submit Reset

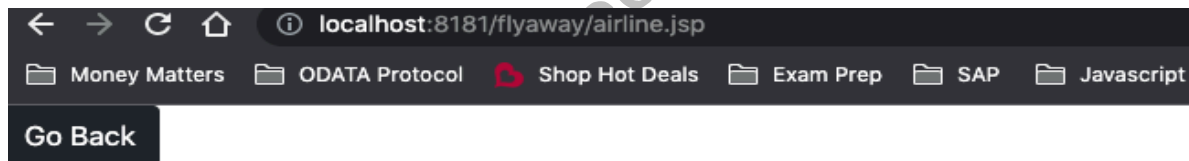
### 4. Airport Setup



## FlyAway City Airport Admin Setup

Airport Code	<input type="text" value="IAH"/>
Airport City	<input type="text" value="Houston City"/>
Airport Country	<div><div>✓ Open this select menu</div><div>USA Nigeria India France UAE</div></div>

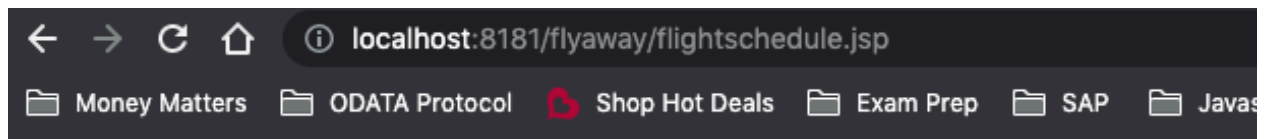
### 5. Airline Admin Setup




## FlyAway Airline Administrative Setup

Airline Code	<input type="text" value="ALIEN001"/>
Airline Name	<input type="text" value="Alien Airways"/>
<div><div>Submit</div><div>Reset</div></div>	

### 6. Admin Flight Scheduler

[Go Back](#)

## FlyAway Flight Scheduler

Flight Id	<input type="text" value="Enter Airline Flight Id"/>
Airline Id	<input type="text" value="Enter Airline Id"/>
Departure Airport	<input type="text" value="Enter Flight Departure Airport code"/>
Destination Airport	<input type="text" value="Enter Flight Destination Airport code"/>
Flight Connections	<input type="text" value="0"/>
Ticket Price	<input type="text" value="Enter ticket price"/>
Available Date	<input type="text" value="mm/dd/yyyy"/> 
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

7. Admin Report Dashboard



localhost:8181/flyaway/DataloaderController

Money Matters | ODATA Protocol | Shop Hot Deals | Exam Prep | SAP | Javascript | Personal | Invoice Des

GO back

## Admin Report Dashboard

### Available Airport

Code	City
DAL	Dallas
DUBAI	Dubai
FLYAWAY	Flyaway City
IAH	Houston
IND	Kolkata
LOS	Lagos
FRA	Paris
TEST	Test City
TESTAIRPORT	TESTING TESTING

### Available Airlines

Id	Name
----	------

localhost:8181/flyaway/DataloaderController

Matters ODATA Protocol Shop Hot Deals Exam Prep SAP Javascript Personal Invoice Design So...

LOS	Lagos
FRA	Paris
TEST	Test City
TESTAIRPORT	TESTING TESTING

### Available Airlines

Id	Name
ALIEN	Alien Space Shuttle
FAST	Very Fast Airline
RISKY	Risky Airways
TEST	Test World Airways
UNIQUE	Unique World Airways

### Available Schedules

Flight Id	Airline Id	Departure Airport	Destination Airport	Available Date
flight001	RISKY	DAL	IAH	2022-07-14
flight002	UNIQUE	IAH	LOS	2022-07-14
flight003	RISKY	IAH	LOS	2022-07-14

flight004	FAST	IAH	LOS	2022-07-14
flight005	RISKY	LOS	FRA	2022-07-21
flight006	ALIEN	DAL	IAH	2022-07-14
flight007	TEST	LOS	IAH	2022-07-14
flight008	TEST	IAH	LOS	2022-07-14

### All FlyAway Bookings

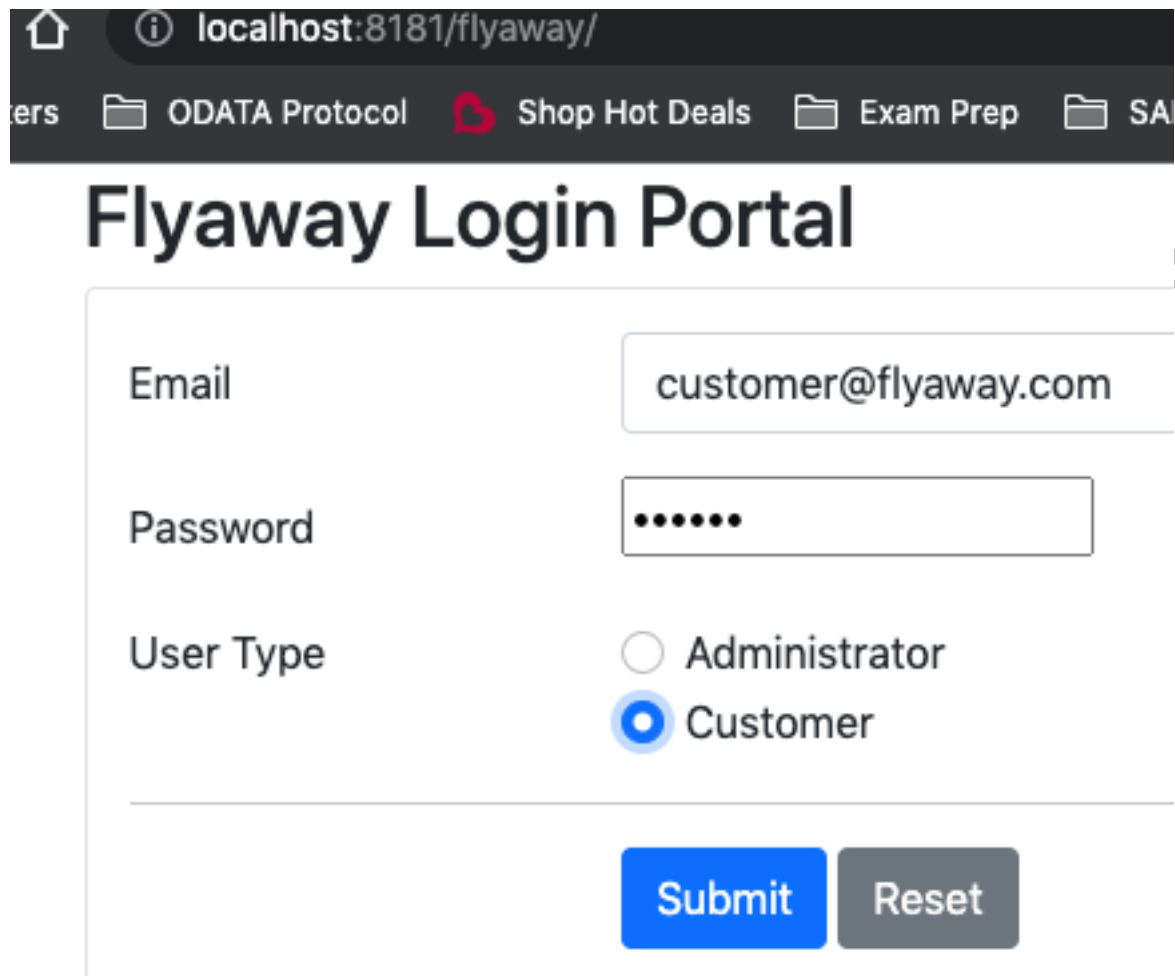
Booking Reference	Flight Id	Passenger#	Booked By
EDOFSUHv8o	flight003	1	khlaeed@khameel.com

### All Booked Passenger Details

Booking Id	Passenger Id	Firstname	Lastname
EDOFSUHv8o	KK001	Khaleed	Khameel

[Admin Home](#)

## 8. FlyAway Customer Login



The screenshot shows a web browser at localhost:8181/flyaway/. The browser's bookmark bar includes 'ers', 'ODATA Protocol', 'Shop Hot Deals', 'Exam Prep', and 'SA'. The page title is 'Flyaway Login Portal'. The login form contains three fields: 'Email' with the value 'customer@flyaway.com', 'Password' with masked characters, and 'User Type' with radio buttons for 'Administrator' and 'Customer' (selected). Below the form are 'Submit' and 'Reset' buttons.

localhost:8181/flyaway/

ers ODATA Protocol Shop Hot Deals Exam Prep SA

# Flyaway Login Portal

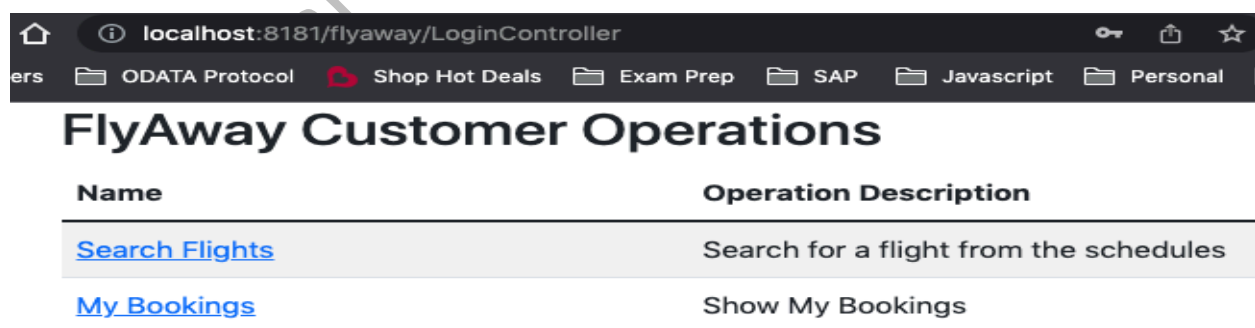
Email customer@flyaway.com

Password .....

User Type ☐ Administrator ☒ Customer

Submit Reset

## 9. FlyAway Customer Operation



The screenshot shows a web browser at localhost:8181/flyaway/LoginController. The browser's bookmark bar includes 'ers', 'ODATA Protocol', 'Shop Hot Deals', 'Exam Prep', 'SAP', 'Javascript', and 'Personal'. The page title is 'FlyAway Customer Operations'. Below the title is a table with two columns: 'Name' and 'Operation Description'.

Name	Operation Description
<a href="#">Search Flights</a>	Search for a flight from the schedules
<a href="#">My Bookings</a>	Show My Bookings

## 10. Customer Flight Search

localhost:8181/flyaway/CustomerDataLoader

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Go Back

### FlyAway Customer Flight Search

Departure Airport: IAH

Destination Airport: LOS

Travel Date: 07/14/2022

Search Reset

#### Schedule List (to be searched)

Flight Id	Airline Id	Depart Airport	Dest Airp
flight001	RISKY	DAL	IAH
flight002	UNIQUE	IAH	LOS

## 11. Flight Search Result

localhost:8181/flyaway/FlightSearchController

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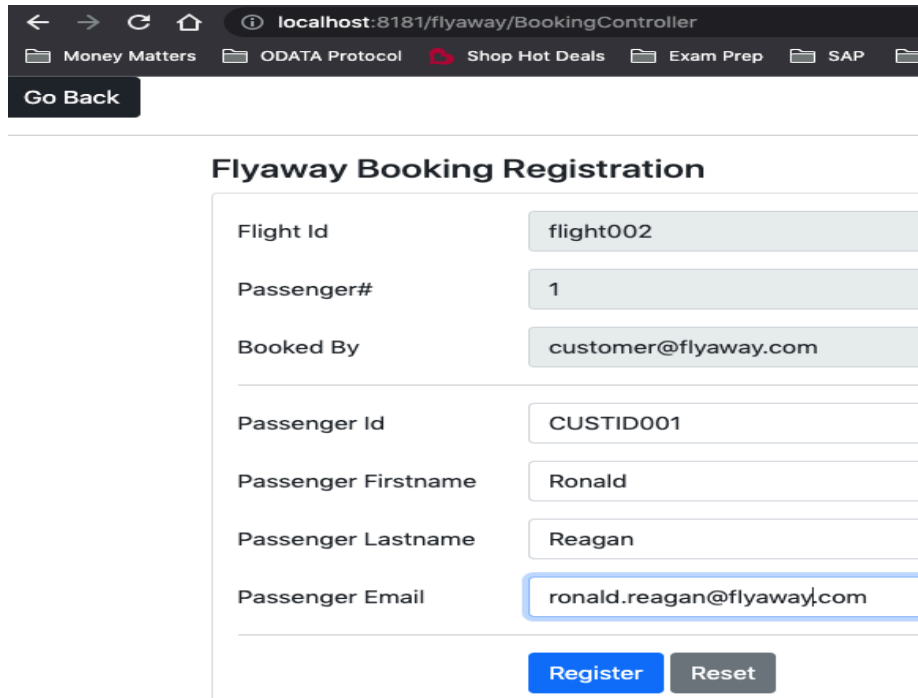
Go Back

#### Matching Flight(s) from Schedule

Passenger# 1

Flight Id	Airline Id	Departure Airport	Destination Airport	Available Date	Connections	Ticket Price	Action
flight002	UNIQUE	IAH	LOS	2022-07-14	2	1233.0	Book Me
flight003	RISKY	IAH	LOS	2022-07-14	1	1000.0	Book Me
flight004	FAST	IAH	LOS	2022-07-14	3	800.0	Book Me
flight008	TEST	IAH	LOS	2022-07-14	1	1200.0	Book Me

## 12. Customer Flight Booking Registration



localhost:8181/flyaway/BookingController

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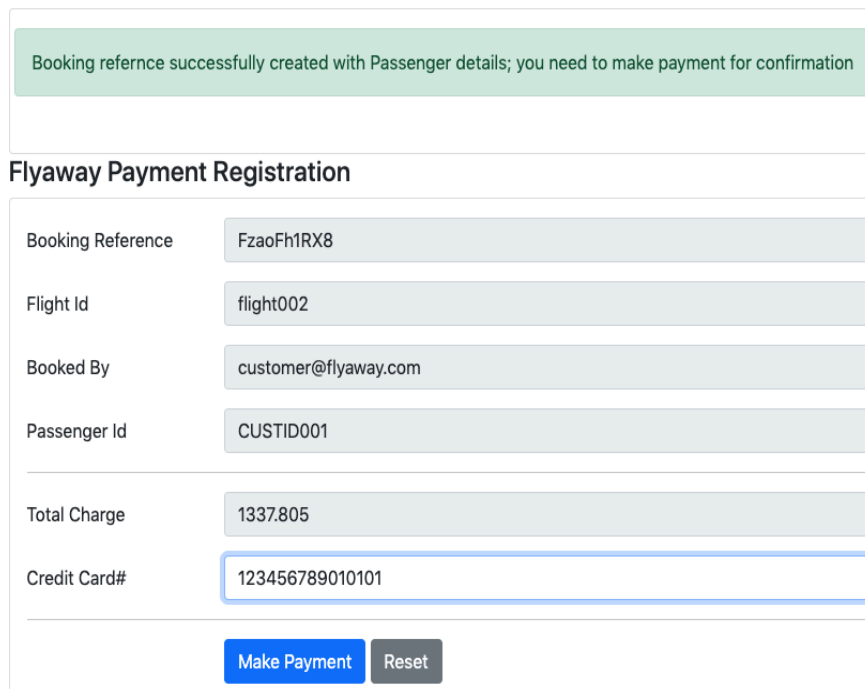
Go Back

### Flyaway Booking Registration

Flight Id	flight002
Passenger#	1
Booked By	customer@flyaway.com
Passenger Id	CUSTID001
Passenger Firstname	Ronald
Passenger Lastname	Reagan
Passenger Email	ronald.reagan@flyaway.com

Register Reset

## 13. Booking Reference / Payment



Booking reference successfully created with Passenger details; you need to make payment for confirmation

### Flyaway Payment Registration

Booking Reference	FzaoFh1RX8
Flight Id	flight002
Booked By	customer@flyaway.com
Passenger Id	CUSTID001
Total Charge	1337.805
Credit Card#	123456789010101

Make Payment Reset

## 14. Payment / Booking confirmation

Booking payment was successful and your flight booking is confirmed!

#### Confirmed Booking Details

Booking Reference	Flight Id	Passenger#	Booked By	IsFlightConfirmed ?
FzaoFh1RX8	flight002	1	customer@flyaway.com	Y

#### Confirmed Booking Schedule

Flight Id	Airline Id	From	To	Connection#	Ticket Price	Departure Date
flight002	UNIQUE	IAH	LOS	2	1233.0	2022-07-14

#### Confirmed Passenger Details

Booking Id	Passenger Id	Firstname	Lastname	Email Id
FzaoFh1RX8	CUSTID001	Ronald	Reagan	ronald.reagan@flyaway.com

### Limitations

The application will only allow 1 passenger to be booked at a time against a booking Id (though the relationship between a booking entity and passengers is 1 to many).

Future enhancement is planned to refactor the UI to allow for multiple passengers' profile to be applied to a booking Id.