AIRLINE TRAVEL WEBSITE WITH SPRING MVC

A web based flight schedule displaying website built using Spring

Abstract

In the digital age , every bit of information is available to us on the internet ,ranging from entertainment timings like movie timings ,sports timings to work like flight and train schedules .This is a humble attempt a building a flight schedule website using Spring MVC. HTML was also used for front end development.

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Problem Statement:

Implement a web application for “Travel Thru Air” based on Spring MVC framework to support any of the following two use cases

1. A list of current special deals must appear on the home page. Each special deal must display the departure city, the arrival city, and the cost. These special deals are set up by the marketing

department and change during the day, so it can’t be static. Special deals are only good for a limited amount of time.

2. A user may search for flights, given a departure city, time and an arrival city. The results must display the departure city, the arrival city, the total cost, and how many legs the flight will have.

Provide a login controller for user login facility. The solution should reflect each layer of the spring framework.

Generate trace using log4j.

Key Strategies of Spring :

1. Spring is a light weight framework and It minimally invasive development with POJO.
2. Spring achieves the loose coupling through dependency injection and interface based programming.
3. Spring supports declarative programming through aspects and common conventions.
4. Boilerplate reduction through aspects and templates.

Above are the 4 key strategies of spring framework simplifying the development of Java enterprise application.

Advantages of Spring Framework:

The Spring framework addresses most of the infrastructure functionalities of the Enterprise applications. Following are the few major advantages of Spring Framework.

1. Spring enables the developers to develop enterprise applications using POJOs (Plain Old Java Object). The benefit of developing the applications using POJO is, that we do not need to have an enterprise container such as an application server but we have the option of using a robust servlet container.
2. Spring provides an abstraction layer on existing technologies like servlets, jsps, jdbc, jndi, rmi, jms and Java mail etc., to simplify the develpment process.
3. Spring comes with some of the existing technologies like ORM framework, logging framework, J2EE and JDK Timers etc, Hence we don’t need to integrate explicitly those technologies.
4. Spring WEB framework has a well-designed web MVC framework, which provides a great alternate to lagacy web framework.
5. Spring can eliminate the creation of the singleton and factory classes.

6. Spring provides a consistent transaction management interface that can scale down to a local transaction and scale up to global transactions (using JTA).
7. Spring framework includes support for managing business objects and exposing their services to the presentation tier components, so that the web and desktop applications can access the same objects.
8. Spring framework has taken the best practice that have been proven over the years in several applications and formalized as design patterns.
9. Spring application can be used for the development of different kind of applications, like standalone applications, standalone GUI applications, Web applications and applets as well.
10. Spring supports both xml and anotation configurations.
11. Spring Framework allows to develop standalone, desktop, 2 tire – n-tire architecture and distributed applications.
12. Spring gives built in middleware services like Connection pooling, Transaction management and etc.,
13. Spring provides a light weight container which can be activated without using webserver or application server.

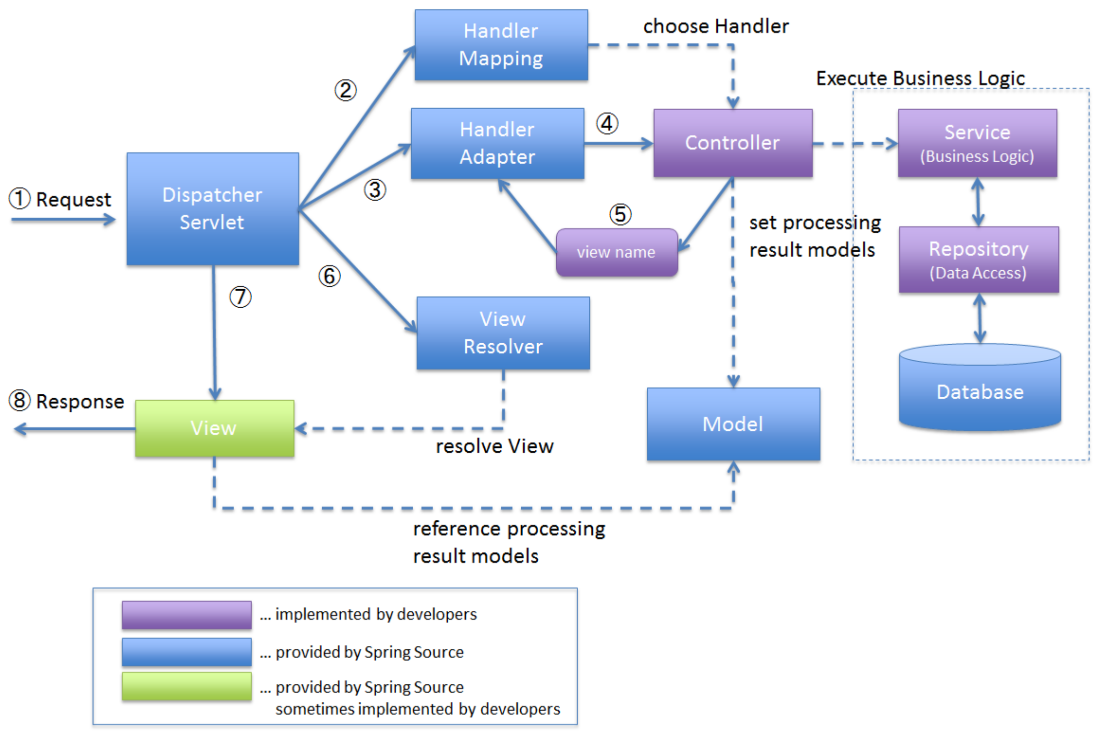
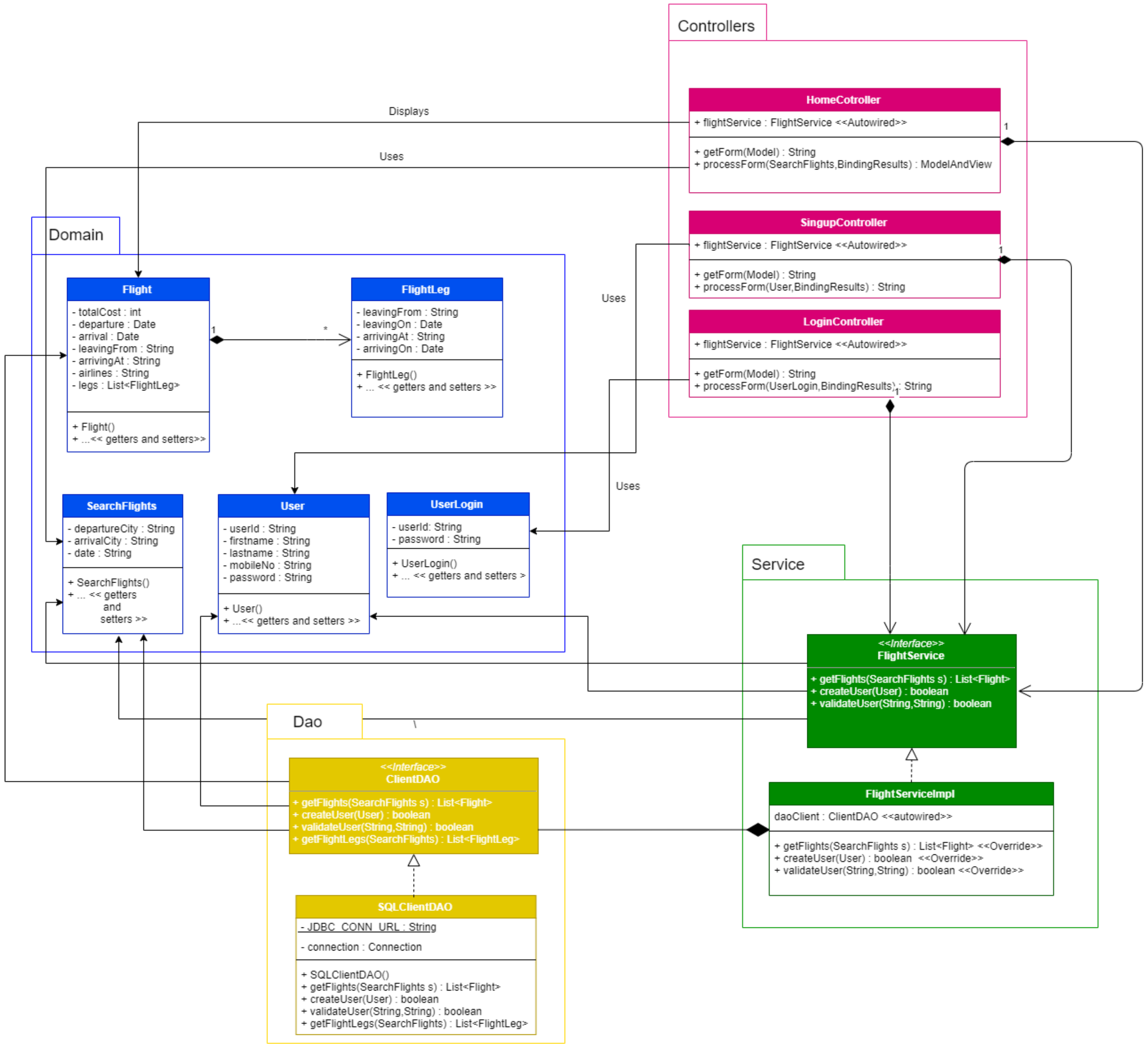


Fig 1 : Spring Web MVC workflow

Design:



Controllers
HomeCotroller
+ flightService : FlightService <<Autowired>>
+ getForm(Model) : String
+ processForm(SearchFlights,BindingResults) : ModelAndView
SingupController
+ flightService : FlightService <<Autowired>>
+ getForm(Model) : String
+ processForm(User,BindingResults) : String
LoginController
+ flightService : FlightService <<Autowired>>
+ getForm(Model) : String
+ processForm(UserLogin,BindingResults) : String
Displays
Uses
Uses
Uses
1
1
1
1
*
Domain
Flight
- totalCost : int
- departure : Date
- arrival : Date
- leavingFrom : String
- arrivingAt : String
- airlines : String
- legs : List<FlightLeg>
+ Flight()
+ ...<< getters and setters>>
FlightLeg
- leavingFrom : String
- leavingOn : Date
- arrivingAt : String
- arrivingOn : Date
+ FlightLeg()
+ ... << getters and setters >>
SearchFlights
- departureCity : String
- arrivalCity : String
- date : String
+ SearchFlights()
+ ... << getters and setters >>
User
- userId : String
- firstname : String
- lastname : String
- mobileNo : String
- password : String
+ User()
+ ...<< getters and setters >>
UserLogin
- userId: String
- password : String
+ UserLogin()
+ ... << getters and setters >
Service
<<Interface>>
FlightService
+ getFlights(SearchFlights s) : List<Flight>
+ createUser(User) : boolean
+ validateUser(String,String) : boolean
FlightServiceImpl
daoClient : ClientDAO <<autowired>>
+ getFlights(SearchFlights s) : List<Flight> <<Override>>
+ createUser(User) : boolean <<Override>>
+ validateUser(String,String) : boolean <<Override>>
Dao
<<Interface>>
ClientDAO
+ getFlights(SearchFlights s) : List<Flight>
+ createUser(User) : boolean
+ validateUser(String,String) : boolean
+ getFlightLegs(SearchFlights) : List<FlightLeg>
SQLClientDAO
- JDBC_CONN_URL : String
- connection : Connection
+ SQLClientDAO()
+ getFlights(SearchFlights s) : List<Flight>
+ createUser(User) : boolean
+ validateUser(String,String) : boolean
+ getFlightLegs(SearchFlights) : List<FlightLeg>

Fig 2: Class Diagram

Configuration Files:

The front-controller *DispatcherServlet* is configured with servlet name “spring” . All requests(“/”) are forwarded to *DispatcherServlet* “spring” . The web specific beans are declared in “spring-servlet.xml”. For mapping view-names to views , path prefix and path suffix are declared .The packages are scanned using <contex:component-scan base-package=”” > tag.

web.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns="http://xmlns.jcp.org/xml/ns/javaee"
        xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee
http://xmlns.jcp.org/xml/ns/javaee/web-app_3_1.xsd"
        id="WebApp_ID" version="3.1">
        <display-name>XXXX</display-name>
        <absolute-ordering/>
        <servlet>
                <servlet-name>spring</servlet-name>
                <servlet-
class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
                <load-on-startup>1</load-on-startup>
        </servlet>
        <servlet-mapping>
                <servlet-name>spring</servlet-name>
                <url-pattern>/</url-pattern>
        </servlet-mapping>
        <context-param>
          <param-name>contextConfigLocation</param-name>
          <param-value>
              /WEB-INF/spring-servlet.xml
          </param-value>
       </context-param>
       <listener>
          <listener-class>
              org.springframework.web.context.ContextLoaderListener
          </listener-class>
       </listener>

</web-app>
```

spring-servlet.xml

```xml
<?xml version="1.0" encoding="UTF-8"?>

<beans xmlns="http://www.springframework.org/schema/beans"
       xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
       xmlns:context="http://www.springframework.org/schema/context"
       xmlns:mvc="http://www.springframework.org/schema/mvc"
       xsi:schemaLocation="
             http://www.springframework.org/schema/beans
       http://www.springframework.org/schema/beans/spring-beans.xsd
       http://www.springframework.org/schema/context
       http://www.springframework.org/schema/context/spring-context.xsd
       http://www.springframework.org/schema/mvc
        http://www.springframework.org/schema/mvc/spring-mvc.xsd">


<context:component-scan base-package="controllers" />
<context:component-scan base-package="dao" />
<context:component-scan base-package="domain" />
<context:component-scan base-package="service" />
<bean class="org.springframework.web.servlet.view.InternalResourceViewResolver">
        <property name="prefix">
            <value>/WEB-INF/view/</value>
        </property>
        <property name="suffix">
            <value>.jsp</value>
        </property>
</bean>
<mvc:annotation-driven/>
```

Views :

Views for login ,signup and home page are defined.

signup.jsp

```jsp
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
   pageEncoding="ISO-8859-1"%>
<%@ taglib prefix="form" uri="http://www.springframework.org/tags/form"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<title>Signup</title>
<style>
        .error{color:red}
</style>
```

```
</head>
<body>
<h1>Signup</h1>
        <form:form action="/TravelThruAir_Spring/signup/processForm"
modelAttribute="user">
                <Label>UserId :</Label><br>
                <form:input path ="userId" type = "text" /><form:errors path="userId"
cssClass="error"/><br>

                <Label>Firstname :</Label><br>
                <form:input path ="firstname" type = "text" /><form:errors
path="firstname" cssClass="error"/><br>
                <Label>Lastname :</Label><br>
                <form:input path ="lastname" type = "text" /><form:errors
path="lastname" cssClass="error"/><br>
                <Label>Mobile No :</Label><br>
                <form:input path ="mobileNo" type = "text" /><form:errors
path="mobileNo" cssClass="error"/><br>
                <Label>Password :</Label><br>
                <form:input path ="password" type = "password" /><form:errors
path="password" cssClass="error"/><br>
                <input type="submit" value="submit">
        </form:form>
        <a href="./login">Login</a>
</body>
</html>
```

login.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
    <%@ taglib prefix="form" uri="http://www.springframework.org/tags/form"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<title>Login</title>
<style>
        .errors{color:red}
</style>
</head>
<body>
<h1>Login</h1>
        <form:form action="/TravelThruAir_Spring/login/processForm"
modelAttribute="user">
                <Label>UserId :</Label><br>
                <form:input path ="userId" type = "text" /><form:errors path="userId"
cssClass="errors"/><br>
```

```
		<Label>Password :</Label><br>
		<form:input path ="password" type = "password" /><form:errors
path="password" cssClass="errors"/><br>
		<input type="submit" value="submit">
	</form:form>

	<a href="./signup">signup</a>
</body>
</html>
```

welcome.jsp

```
<%@ taglib prefix="form" uri="http://www.springframework.org/tags/form"%>
<%@page import="java.util.List" %>
<%@page import="domain.*" %>
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<title>Home</title>
<style>
	.errors{color:red}
</style>
</head>
<body>
	<h1>Welcome ${user.userId} to Travel Thru Air</h1>
	<h3>Search for flights</h3>
	<form:form action="/TravelThruAir_Spring/home/processForm" modelAttribute =
"search">
		<Label>Departure :</Label><br>
		<form:input path = "departureCity" type="text"/><form:errors
path="departureCity" cssClass="errors"/><br>
		<Label>Arrival :</Label><br>
		<form:input path = "arrivalCity" type="text"/><form:errors
path="arrivalCity" cssClass="errors"/><br>
		<Label>Date :</Label><br>
		<form:input path = "date" type="text"/><form:errors path="date"
cssClass="errors"/><br>
		<input type="submit" value="submit"><br>
	</form:form>
	<h2>Flights</h2>
	<table border="1">
		<tr>
		<th>Flight Number</th>
		<th>Airline</th>
		<th>Departing</th>
		<th>Arrival</th>
		<th>TicketPrice(Rs.)</th>
		</tr>
	<%
	if(request.getAttribute("flights") != null){
		List<Flight> flights= (List<Flight>)request.getAttribute("flights");
		for(Flight f:flights){
```

```
                    out.print("<tr>");
                    out.print("<td>");
                    out.print(f.flightID);
                    out.print("</td>");
                    out.print("<td>");
                    out.print(f.airlines);
                    out.print("</td>");
                    out.print("<td>");
                    out.print(f.getDeparture());
                    out.print("</td>");
                    out.print("<td>");
                    out.print(f.getArrival());
                    out.print("</td>");
                    out.print("<td>");
                    out.print(f.getTotalCost());
                    out.print("</td>");
                    out.print("</tr>");
                    if(f.getLegs()!= null && f.getLegs().size() > 1){
                          List<FlightLeg> legs = f.getLegs();
                          out.print("<tr class=\"break\"><td 
colspan=\"5\">Legs</td></tr>");
                          out.print("<table border=\"1\"><tr><th>Leaving 
from</th><th>Leaving On</th><th>Arriving At</th><th>Arriving On</th>");
                          for(FlightLeg leg: legs){
                                out.print("<tr>");
                                out.print("<td>");
                                out.print(leg.getLeavingFrom());
                                out.print("</td>");
                                out.print("<td>");
                                out.print(leg.getLeavingOn());
                                out.print("</td>");
                                out.print("<td>");
                                out.print(leg.getArrivingAt());
                                out.print("</td>");
                                out.print("<td>");
                                out.print(leg.getArrivingOn());
                                out.print("</td>");
                                out.print("</tr>");
                          }
                    }
              }
        }
        %>
        </table>
        <a href="/TravelThruAir_Spring/login">Logout</a>
</body>
</html>
```

invalidCredentials.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html>
```

```
<html>
<head>
<meta charset="ISO-8859-1">
<title>Invalid Credentials</title>
</head>
<body>
	<h2>Sorry Invalid username or password</h2>
	<a href="/TravelThruAir_Spring/login">back</a>
</body>
</html>
```

usernameExists.jsp

```
<%@ page language="java" contentType="text/html; charset=ISO-8859-1"
    pageEncoding="ISO-8859-1"%>
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<title>Username exists</title>
</head>
<body>
	<h2>Sorry! that username is taken</h2>
	<a href="/TravelThruAir_Spring/signup">back</a>
</body>
</html>
```

Controllers

All controllers have a "flightService" property which is autowired . This provides loose coupling between the service and the web layer.

SignupController.jsp

```
package controllers;
import javax.validation.Valid;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.ui.Model;
import org.springframework.validation.BindingResult;
import org.springframework.web.bind.annotation.ModelAttribute;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.servlet.ModelAndView;
import domain.*;
import service.*;
```

```
@Controller
@RequestMapping("/signup")
public class SignupController {
        @Autowired
        FlightService flightService;
        @RequestMapping("")
        public String getForm(Model model) {
                User u = new User();
                model.addAttribute("user",u);
                return "signup";
        }
        @RequestMapping("/processForm")
        public String processForm(@Valid @ModelAttribute("user") User u,BindingResult
br) {
                if(br.hasErrors()) return "signup";
                if(flightService.createUser(u)) return "redirect:/home";
                return "usernameExists";
        }
}
```

LoginController.java

```
package controllers;
import javax.validation.Valid;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.ui.Model;
import org.springframework.validation.BindingResult;
import org.springframework.web.bind.annotation.ModelAttribute;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.servlet.ModelAndView;
import domain.*;
import service.*;
@Controller
@RequestMapping("/login")
public class LoginController {
        @Autowired
        FlightService flightService;
        @RequestMapping("")
        public String getForm(Model model) {
                UserLogin u = new UserLogin();
                model.addAttribute("user",u);
                return "login";
        }
        @RequestMapping("/processForm")
```

```
	public String processForm(@Valid @ModelAttribute("user") UserLogin 
u,BindingResult br) {
		System.out.println(u.getUserId().length());
		if(br.hasErrors()) {
			System.out.println(br.toString());
			return "login";
		}
		if(flightService.validateUser(u.getUserId(),u.getPassword())) return 
"redirect:/home";
		else return "invalidCredentials";
		}
}
```

HomeController.java

```
@Controller
@RequestMapping("/home")
public class HomeController {
	FlightService flightservice;
	@Autowired
	public void setFlightService(FlightService fs) {
		flightservice = fs;
	}
	@RequestMapping("")
	public String getForm(Model model) {
		SearchFlights s= new SearchFlights();
		model.addAttribute("search",s);
		System.out.println("in home getForm");
		return "home";
	}
	@RequestMapping("/processForm")
	public ModelAndView processForm(@Valid @ModelAttribute("search") 
SearchFlights s,BindingResult br) {
		if(br.hasErrors()) {

			ModelAndView mav = new ModelAndView("home");
			return mav;
		}
		List<Flight> flights = flightservice.getFlights(s);
		ModelAndView mav = new ModelAndView("home");
		mav.addObject("flights",flights);
		return mav;
	}
}
```

DAO:

The ClientDAO sets up the blueprint for the DAO layer. The SQLClientDAO, implementation connects to a relational MSSQL database. There are 2 tables used- i. Flight(flightId, start,departTime,end,arrivalTime,totalCost,airlines)

ii .FlightLeg(flightId(f.k),departFrom,departOn,arriveAt,arriveOn)

ClientDAO.java

```
package dao;
import domain.*;
import java.util.List;

import org.springframework.stereotype.Component;
@Component
public interface ClientDAO {
        List<Flight> getFlights(SearchFlights s);
        List<FlightLeg> getFlightLegs(String flightId);
        boolean createUser(User u);
        boolean validateUser(String userId,String password);
}
```

SQLClientDAO.java

```
package dao;

import java.util.List;

import org.springframework.stereotype.Component;

import java.util.ArrayList;

import domain.Flight;
import domain.SearchFlights;
import domain.FlightLeg;
import domain.User;
import java.sql.*;
import java.text.ParseException;
import java.text.SimpleDateFormat;
@Component
public class SQLClientDAO implements ClientDAO {
        private static final String JDBC_CONNECTION_URL =
"jdbc:sqlserver://localhost\\MSSQLSERVER:60768;databaseName=travelThruAir;us
er=achoudhury98;password=1234";;
        private static final String GET_FLIGHTS = "SELECT * FROM Flight
WHERE departure = ? AND arrival = ? AND CAST(departureTime AS Date) = ?";
        private static final String GET_FLIGHT_LEGS = "SELECT
departFrom,departOn,arriveAt,arriveOn FROM  FlightLeg WHERE flightID = ? ";
        private static final String CREATE_USER = "INSERT INTO Users
Values(?,?,?,?,?)";
        private static final String VALIDATE_USER = "SELECT * FROM Users
WHERE userId = ? AND password = ?";
        private Connection connection;
        SQLClientDAO(){
                try {

        Class.forName("com.microsoft.sqlserver.jdbc.SQLServerDriver");
                        connection =
DriverManager.getConnection(JDBC_CONNECTION_URL);
                }
                catch (SQLException e) {
                        e.printStackTrace();
                }
                catch(ClassNotFoundException e) {
                        e.printStackTrace();
                }
        }

        @Override
        public boolean createUser(User u) {
                boolean complete = false;
                try {
                        PreparedStatement p =
connection.prepareStatement(CREATE_USER);
                        p.setString(1, u.getId());
                        p.setString(2, u.firstname());
                        p.setString(3, u.lastname());
                        p.setString(4, u.mobileNo());
                        p.setString(5, u.password());
                        p.executeUpdate();
                        complete = true;
                }
                catch(SQLException e) {
                        e.printStackTrace();
                }
                return complete;
        }

        @Override
        public boolean validateUser(String userId,String password) {
                boolean validated = false;
                try {
                        PreparedStatement p =
connection.prepareStatement(VALIDATE_USER);
                        p.setString(1,userId);
                        p.setString(2, password);
                        ResultSet res = p.executeQuery();
                        if(res.next()) validated = true;
                }
                catch(SQLException e) {

                }
                return validated;
        }
        @Override
        public List<Flight> getFlights(SearchFlights s){
                System.out.println(s.getDepartureCity() + s.getArrivalCity()
+s.getDate().toString());
                List<Flight> flights = null;
                try {
                        PreparedStatement p =
connection.prepareStatement(GET_FLIGHTS);
                        p.setString(1, s.getDepartureCity());
                        p.setString(2, s.getArrivalCity());
                        SimpleDateFormat format = new SimpleDateFormat("yyyy-
MM-dd");

                        p.setDate(3,new
java.sql.Date(format.parse(s.getDate()).getTime()));
                        ResultSet res  = p.executeQuery();
                        while(res.next()) {
                                if(flights == null) flights = new
ArrayList<Flight>();
                                flights.add(new
Flight(res.getString(1),res.getString(2),res.getString(3),new
java.util.Date(res.getTimestamp(4).getTime()),new
java.util.Date(res.getTimestamp(5).getTime()),res.getInt(6),res.getString(7)
));
                        }
                }
                catch(SQLException e) {
                        e.printStackTrace();
                } catch (ParseException e) {
                        // TODO Auto-generated catch block
                        e.printStackTrace();
                }
                return flights;
        }
        @Override
        public List<FlightLeg> getFlightLegs(String flightID){
                List<FlightLeg> legs = null;
                try {
                        PreparedStatement p =
connection.prepareStatement(GET_FLIGHT_LEGS);
                        p.setString(1, flightID);
                        ResultSet res = p.executeQuery();
                        while(res.next()) {
                                if(legs == null) legs = new ArrayList<>();
                                legs.add(new FlightLeg(res.getString(1),new
java.util.Date(res.getTimestamp(2).getTime()),res.getString(3),new
java.util.Date(res.getTimestamp(4).getTime())));
                        }
                }
                catch(SQLException e) {
                        e.printStackTrace();
                }
                return legs;
        }
}
```

Service

FlightService method defines all the coarse grained functionality of the backend . It is structured in such a way that all method calls are independent (ie. No state preservation between calls).

FlightService.java

```
package service;
import java.util.List;

import org.springframework.stereotype.Component;

import domain.*;
@Component
public interface FlightService {
	List<Flight> getFlights(SearchFlights s);
	boolean createUser(User u);
	boolean validateUser(String userId,String password);
}
```

The implementation of the flight service .It uses an instance of ClientDAO , which is again autowired. This provides loose coupling between the dao layer and the service .

FlightServiceImpl.java

```
package service;

import java.util.List;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Component;

import domain.*;
import dao.*;
@Component
public class FlightServiceImpl implements FlightService {
	ClientDAO daoclient;

	@Autowired
	void setClient(ClientDAO client) {
		this.daoclient = client;
	}
	@Override
	public List<Flight> getFlights(SearchFlights s) {
		List<Flight> flights = daoclient.getFlights(s);
		try {
		for(Flight flight:flights) {
			flight.legs = daoclient.getFlightLegs(flight.flightID);
		}
		}
		catch(NullPointerException e) {
```

```
                        e.printStackTrace();
                }
                return flights;
        }
        @Override
        public boolean createUser(User u) {
                return daoclient.createUser(u);
        }
        @Override
        public boolean validateUser(String userId,String password) {
                return daoclient.validateUser(userId, password);
        }
}
```

Domain:

A Flight class stands for a single flight instance . A flight has one or more flight legs .A SearchFlight is used to find flights by date , departure city and arrival city.A UserLogin is a class used for login , where user sends only userId and password

Flight.java

```
package domain;
import java.util.List;
import java.util.ArrayList;
import java.util.Date;
import dao.*;
public class Flight {
        public String flightID;
        public List<FlightLeg> legs;

        private int totalCost;
        private Date departure;
        private Date arrival;
        private String leavingFrom;
        private String arrivingAt;
        public String airlines;

        public Flight(String flightID,String leavingFrom,String
arrivingAt,Date departure,Date arrival,int totalCost,String airlines){
                this.flightID = flightID;
                this.leavingFrom = leavingFrom;
                this.arrivingAt = arrivingAt;
                this.departure = departure;
                this.arrival = arrival;
                this.totalCost = totalCost;
                this.airlines = airlines;
                legs = null;
        }
        public String getFlightID() {
                return flightID;
        }
        public void setFlightID(String flightID) {
                this.flightID = flightID;
        }
        public List<FlightLeg> getLegs() {
                return legs;
        }
        public void setLegs(List<FlightLeg> legs) {
                this.legs = legs;
        }
        public int getTotalCost() {
                return totalCost;
        }
        public void setTotalCost(int totalCost) {
                this.totalCost = totalCost;
        }
        public Date getDeparture() {
                return departure;
        }
        public void setDeparture(Date departure) {
                this.departure = departure;
        }
        public Date getArrival() {
                return arrival;
        }
        public void setArrival(Date arrival) {
                this.arrival = arrival;
        }
        public String getLeavingFrom() {
                return leavingFrom;
        }
        public void setLeavingFrom(String leavingFrom) {
                this.leavingFrom = leavingFrom;
        }
        public String getArrivingAt() {
                return arrivingAt;
        }
        public void setArrivingAt(String arrivingAt) {
                this.arrivingAt = arrivingAt;
        }
        public String getAirlines() {
                return airlines;
        }
        public void setAirlines(String airlines) {
                this.airlines = airlines;
        }
        public String getFlightId() {
                return flightID;
        }
}
```

FlightLeg.java

```
package domain;
import java.util.Date;
public class FlightLeg {
        String leavingFrom;
        Date leavingOn;
        String arrivingAt;
        Date arrivingOn;
        public FlightLeg(String leavingFrom,Date leavingOn,String arrivingAt,Date
arrivingOn) {
                this.leavingFrom = leavingFrom;
                this.leavingOn = leavingOn;
                this.arrivingAt = arrivingAt;
                this.arrivingOn = arrivingOn;
        }
        public String getLeavingFrom() {
                return leavingFrom;
        }
        public void setLeavingFrom(String leavingFrom) {
                this.leavingFrom = leavingFrom;
        }
        public Date getLeavingOn() {
                return leavingOn;
        }
        public void setLeavingOn(Date leavingOn) {
                this.leavingOn = leavingOn;
        }
        public String getArrivingAt() {
                return arrivingAt;
        }
        public void setArrivingAt(String arrivingAt) {
                this.arrivingAt = arrivingAt;
        }
        public Date getArrivingOn() {
                return arrivingOn;
        }
        public void setArrivingOn(Date arrivingOn) {
                this.arrivingOn = arrivingOn;
        }
}
```

SearchFlight.java

```
package domain;
import java.util.Date;

import javax.validation.constraints.NotEmpty;
import javax.validation.constraints.NotNull;

import org.springframework.format.annotation.DateTimeFormat;

import java.text.ParseException;
import java.text.SimpleDateFormat;
public class SearchFlights {
        @NotEmpty(message = "is required")
        String departureCity;
        @NotEmpty(message ="is required")
        String arrivalCity;
        @NotEmpty(message ="is required")
        String date;
        SearchFlights(String departure,String arrival,String dt){
                SimpleDateFormat formatter = new SimpleDateFormat("dd-MM-yyyy");
                this.departureCity = departure;
                this.arrivalCity = arrival;
                try {
                Date dat = formatter.parse(dt);
                this.date=dt;
                }
                catch(ParseException e) {
                        e.printStackTrace();
                }
        }
        public SearchFlights() {
```

```java
	}
	public void setDepartureCity(String departureCity) {
		this.departureCity = departureCity;
	}
	public void setArrivalCity(String arrivalCity) {
		this.arrivalCity = arrivalCity;
	}
	public void setDate(String date) {
		System.out.println(date);
		SimpleDateFormat formatter = new SimpleDateFormat("yyyy-MM-dd");
		this.date = date;
	}
	/*public void setDate(Date date) {
		this.date = date;
	}*/
	public String getDepartureCity() {
		return departureCity;
	}
	public String getArrivalCity() {
		return arrivalCity;
	}
	public String getDate() {
		return date;
	}
}
```

User.java

```java
package domain;

import javax.validation.constraints.NotEmpty;
import javax.validation.constraints.NotNull;
import javax.validation.constraints.Size;
public class User {
	@NotEmpty(message="is required")
	String userId;
	@NotEmpty(message="is required")
	String firstname;
	@NotEmpty(message="is required")
	String lastname;
	@NotEmpty(message="is required")
	@Size(min=10, max=10,message="must be 10 digits")
	String mobileNo;
```

```
        @NotEmpty(message="is required")
        String password;
        public User(String userId,String firstname,String lastname,String
mobileNo,String password){
                this.userId = userId;
                this.firstname = firstname;
                this.lastname = lastname;
                this.mobileNo = mobileNo;
                this.password = password;
        }
        public User(){

        }
        public User(String userId,String password) {
                this.userId = userId;
                this.password = password;
        }
        public String getId() {
                return userId;
        }
        public String firstname() {
                return firstname;
        }
        public String lastname() {
                return lastname;
        }
        public String getUserId() {
                return userId;
        }
        public void setUserId(String userId) {
                this.userId = userId;
        }
        public String getFirstname() {
                return firstname;
        }
        public void setFirstname(String firstname) {
                this.firstname = firstname;
        }
        public String getLastname() {
                return lastname;
        }
        public void setLastname(String lastname) {
                this.lastname = lastname;
        }
        public String getMobileNo() {
                return mobileNo;
        }
        public void setMobileNo(String mobileNo) {
                this.mobileNo = mobileNo;
        }
        public String getPassword() {
                return password;
        }
        public void setPassword(String password) {
                this.password = password;
        }
        public String mobileNo() {
                return mobileNo;
        }
        public String password() {
                return password;
        }
}
```

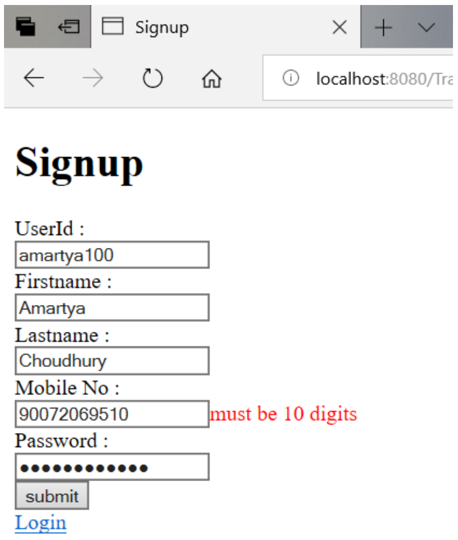
UserLogin.java

```
package domain;

import javax.validation.constraints.NotBlank;
import javax.validation.constraints.NotEmpty;
import javax.validation.constraints.NotNull;

public class UserLogin {
        //@NotNull(message="is required")
        @NotEmpty(message="User name cannot be empty")
        String userId;
        //@NotNull(message="is required")
        @NotEmpty(message="Password cannot be empty")
        String password;
        public UserLogin(){
        }
        public String getUserId() {
                return userId;
        }
        public void setUserId(String userId) {
                this.userId = userId;
        }
        public String getPassword() {
                return password;
        }
        public void setPassword(String password) {
                this.password = password;
        }

}
```

Form Validation:

The input provided by the user is validated before further processing is done .Hibernate validator is used for this purpose and the validation rule is hardcoded along with the property for a class . For eg the “mobileNo: property of a User must be of 10 letters and so an annotation @size(max=10 , min=10) is coded above it .Also <form:errors> tag in the jsp file show text that is to be displayed if error occurs . Spring provides automatic binding of form input to bean properties , but if an error occurs during validation , then the BindingResult object br would have errors and the same page is displayed , along with the error that occurred .

Output:



Signup

UserId : amartya100

Firstname : Amartya

Lastname : Choudhury

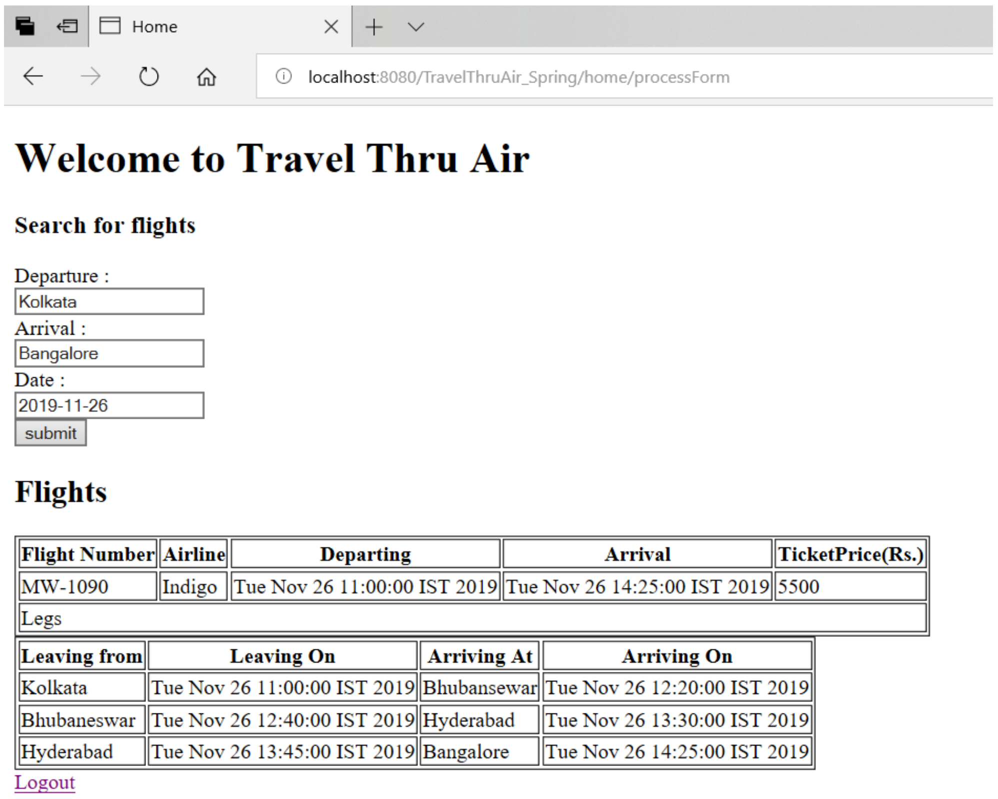
Mobile No : 90072069510 must be 10 digits

Password : •••••••••••••

submit

Login

Fig 2 : Signup form displaying validation



Welcome to Travel Thru Air

Search for flights

Departure : Kolkata

Arrival : Bangalore

Date : 2019-11-26

submit

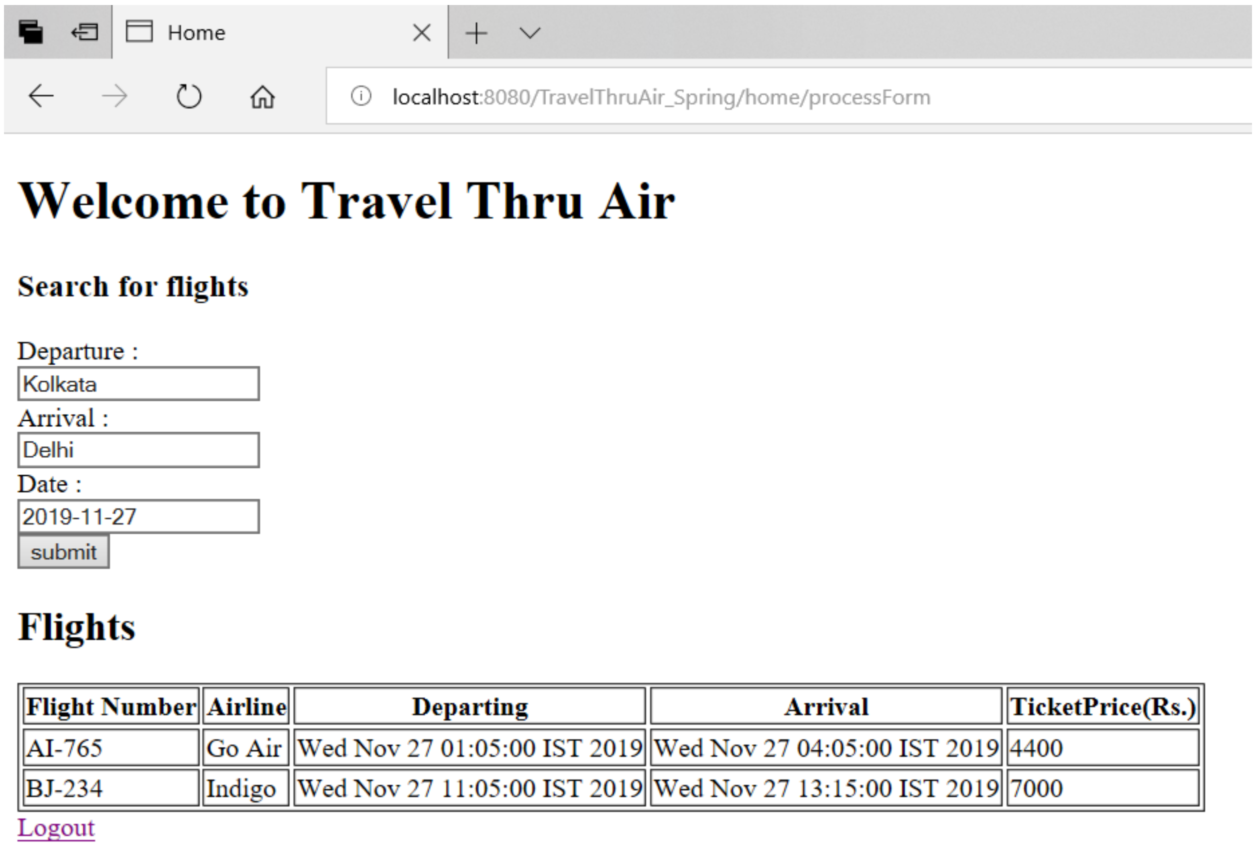
Flights

Flight Number	Airline	Departing	Arrival	TicketPrice(Rs.)
MW-1090	Indigo	Tue Nov 26 11:00:00 IST 2019	Tue Nov 26 14:25:00 IST 2019	5500
Legs				

Leaving from	Leaving On	Arriving At	Arriving On
Kolkata	Tue Nov 26 11:00:00 IST 2019	Bhubansewar	Tue Nov 26 12:20:00 IST 2019
Bhubaneswar	Tue Nov 26 12:40:00 IST 2019	Hyderabad	Tue Nov 26 13:30:00 IST 2019
Hyderabad	Tue Nov 26 13:45:00 IST 2019	Bangalore	Tue Nov 26 14:25:00 IST 2019

Logout

Fig 3 : Flight schedule showing breaks



Welcome to Travel Thru Air

Search for flights

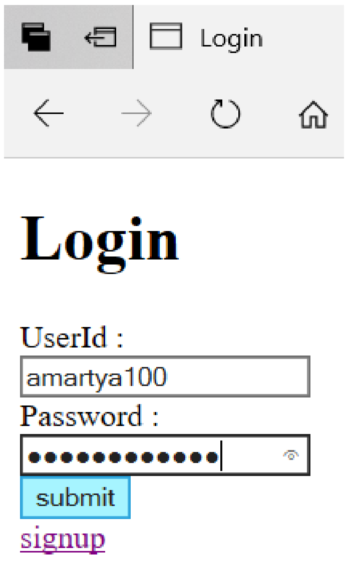
Departure : Kolkata
Arrival : Delhi
Date : 2019-11-27
submit

Flights

Flight Number	Airline	Departing	Arrival	TicketPrice(Rs.)
AI-765	Go Air	Wed Nov 27 01:05:00 IST 2019	Wed Nov 27 04:05:00 IST 2019	4400
BJ-234	Indigo	Wed Nov 27 11:05:00 IST 2019	Wed Nov 27 13:15:00 IST 2019	7000

Logout

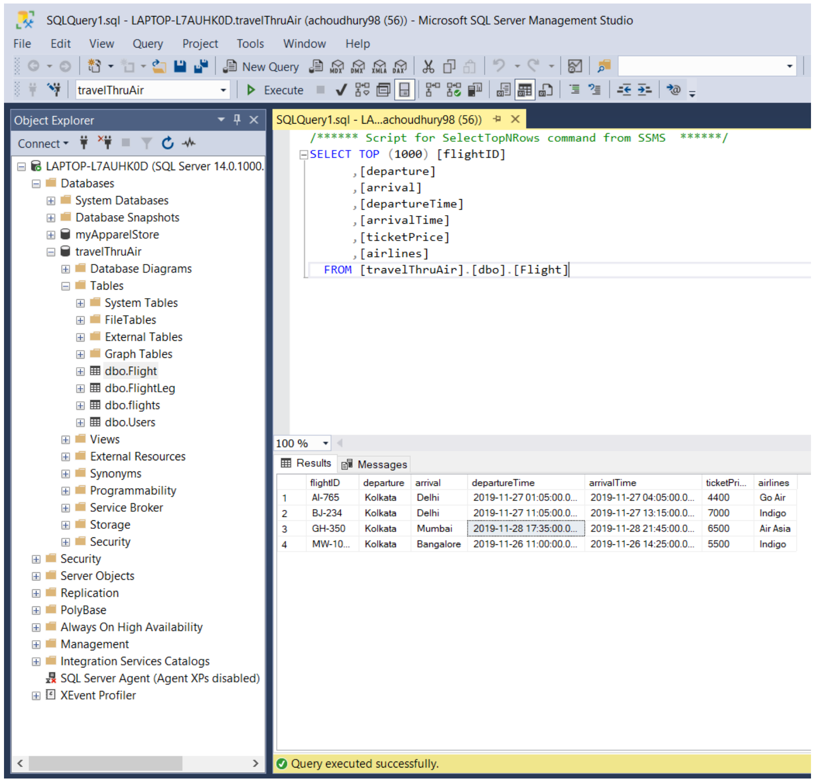
Fig 4: More flights without breaks



Login

UserId : amartya100
Password : ●●●●●●●●●●●●
submit
signup

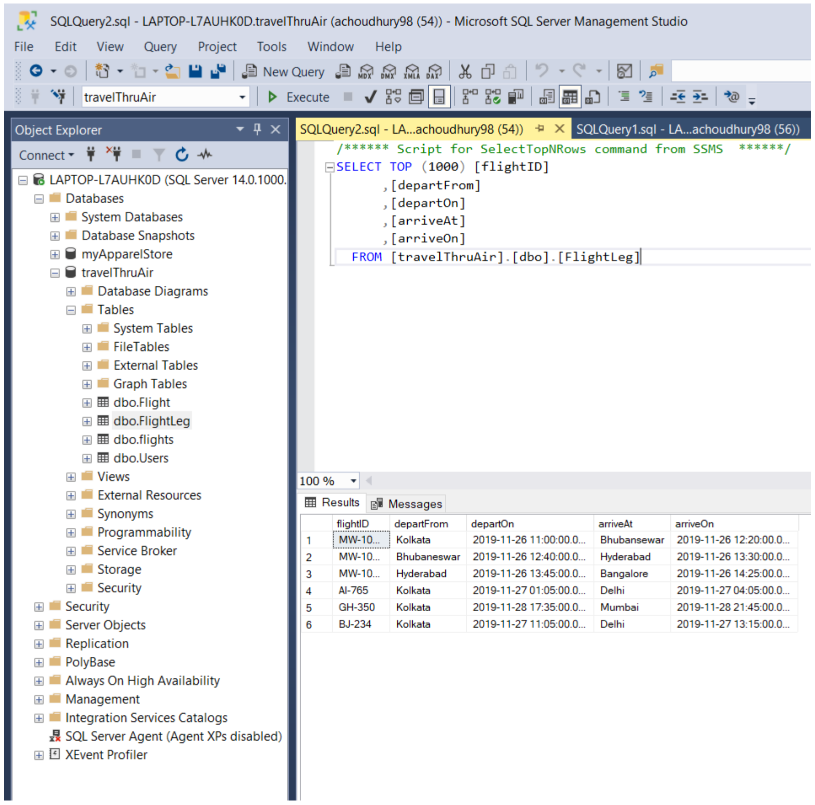
Fig 5 : Login Form



```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP (1000) [flightID]
      ,[departure]
      ,[arrival]
      ,[departureTime]
      ,[arrivalTime]
      ,[ticketPrice]
      ,[airlines]
  FROM [travelThruAir].[dbo].[Flight]
```

	flightID	departure	arrival	departureTime	arrivalTime	ticketPri...	airlines
1	AI-765	Kolkata	Delhi	2019-11-27 01:05:00.0...	2019-11-27 04:05:00.0...	4400	Go Air
2	BJ-234	Kolkata	Delhi	2019-11-27 11:05:00.0...	2019-11-27 13:15:00.0...	7000	Indigo
3	GH-350	Kolkata	Mumbai	2019-11-28 17:35:00.0...	2019-11-28 21:45:00.0...	6500	Air Asia
4	MW-10...	Kolkata	Bangalore	2019-11-26 11:00:00.0...	2019-11-26 14:25:00.0...	5500	Indigo

Fig 6 : Flight table



```
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP (1000) [flightID]
      ,[departFrom]
      ,[departOn]
      ,[arriveAt]
      ,[arriveOn]
  FROM [travelThruAir].[dbo].[FlightLeg]
```

	flightID	departFrom	departOn	arriveAt	arriveOn
1	MW-10...	Kolkata	2019-11-26 11:00:00.0...	Bhubansewar	2019-11-26 12:20:00.0...
2	MW-10...	Bhubaneswar	2019-11-26 12:40:00.0...	Hyderabad	2019-11-26 13:30:00.0...
3	MW-10...	Hyderabad	2019-11-26 13:45:00.0...	Bangalore	2019-11-26 14:25:00.0...
4	AI-765	Kolkata	2019-11-27 01:05:00.0...	Delhi	2019-11-27 04:05:00.0...
5	GH-350	Kolkata	2019-11-28 17:35:00.0...	Mumbai	2019-11-28 21:45:00.0...
6	BJ-234	Kolkata	2019-11-27 11:05:00.0...	Delhi	2019-11-27 13:15:00.0...

Fig 7 : FlightLeg table

References:

1. Expert Spring MVC and Web Flow - A