



Week 7 - Project Report

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Topic : Spring Security & Dockerizing Flight Booking Microservices

The following document contains the description and explanation of the project **Spring Security & Dockerizing Flight Booking Microservices**. This project has all the required requirements of the Week 6 project. As well as the spring security and dockerization of each microservice and running them as containers.

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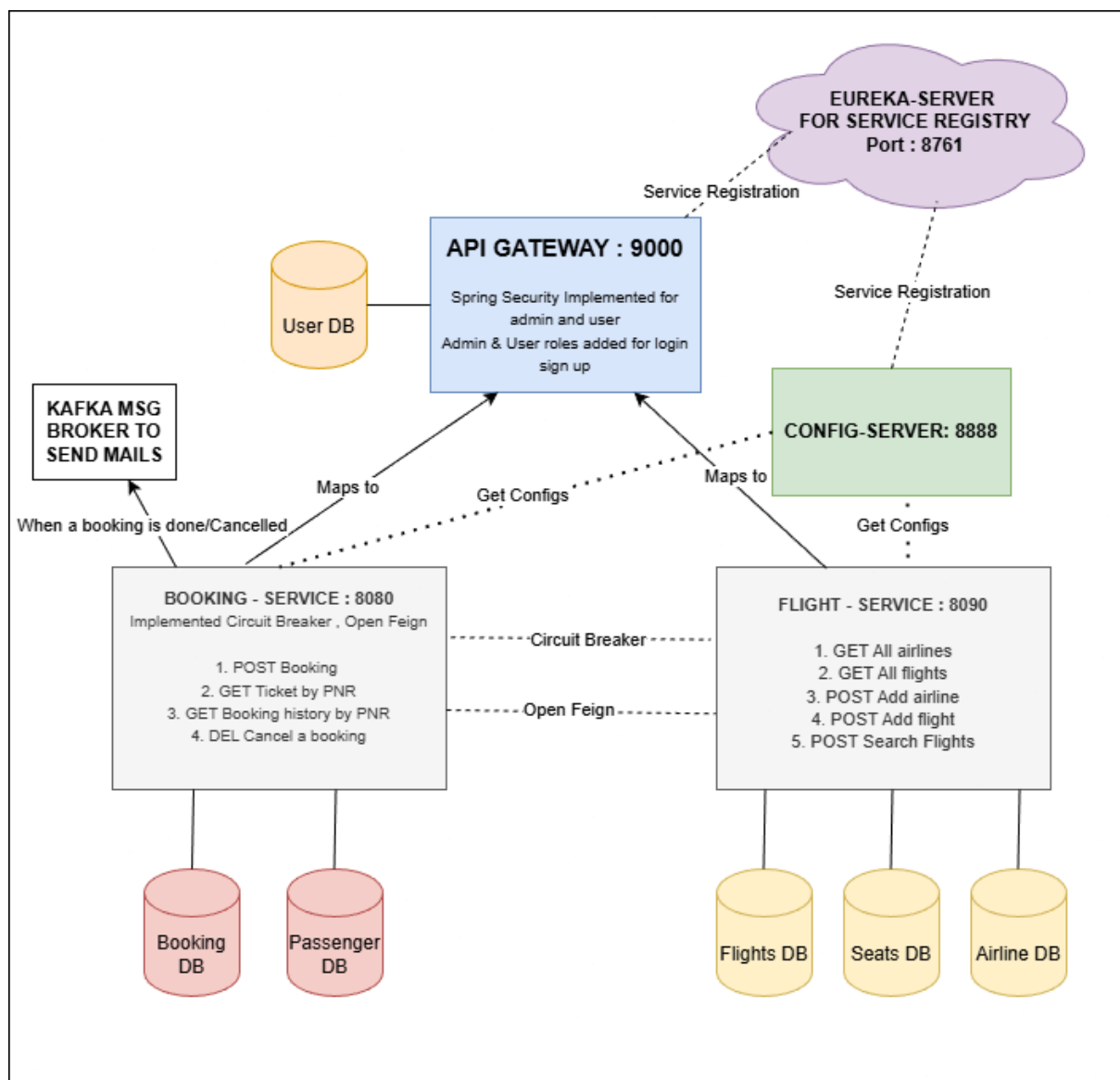
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1. Project Overview

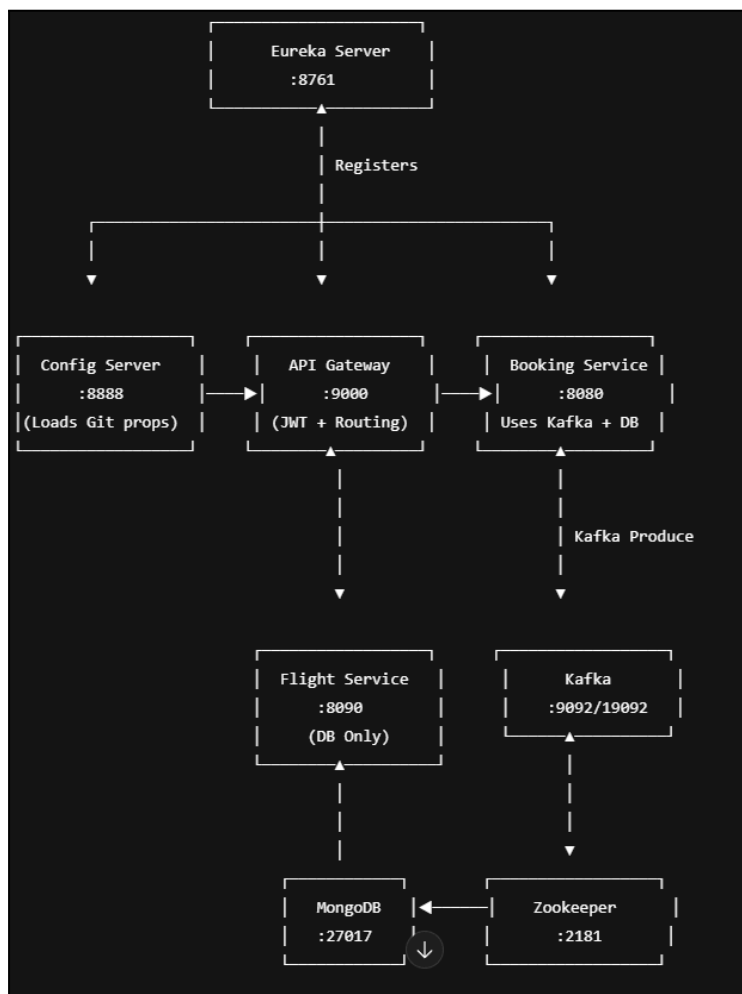
This project was a monolithic application with one single db called the “flightBookingSystem” in MongoDB, based on the reactive web flux in spring boot. The project has now been converted to a microservices architecture based project. There are two microservices namely “booking-service” and “flight-service”. These services are connected by a common api-gateway and a configuration server. In between these services proper load balancing has been applied along with the circuit breaker in between to ensure that all services stay up and running. These services have been registered on the netflix eureka server. Along with this apache-kafka message broker technique has also been applied to send notifications whenever a flight is booked or cancelled. Proper load testing using Apache JMeter and JUnit testing has been done.

1.1. System Architecture




1.2 Dockerization Architecture Diagram

The screenshot shows the Docker Desktop interface for a project named 'flightbookingsyswsecurity'. The left sidebar lists several services: mongodb (mongo:latest, 27018:27017), zookeeper (confluentinc/cp-zoo, 2181:2181), eureka-server (flightbookingsysw, 8761:8761), kafka (confluentinc/cp-kaf, 19092:19092), config-server (flightbookingsysw, 8888:8888), api-gateway (flightbookingsysw, 9000:9000), and flight-service (flightbookingsysw, 8090:8090). The right pane shows the logs for the 'booking-service' and 'flight-service' containers. The 'booking-service' logs show a successful connection to MongoDB. The 'flight-service' logs show a successful connection to MongoDB. The bottom status bar indicates RAM 3.58 GB, CPU 56.27%, and Disk 8.07 GB used (limit 1006.85 GB).



1.3 Eureka Registering

 HOME LAST 1000 SINCE STARTUP

System Status

Environment	test	Current time	2025-12-01T22:49:44 +0530
Data center	default	Uptime	00:05
		Lease expiration enabled	false
		Renews threshold	8
		Renews (last min)	8

DS Replicas

[localhost](#)

Instances currently registered with Eureka

Application	AMIs	Availability Zones	Status
API-GATEWAY	n/a (1)	(1)	UP (1) - 192.168.1.6:api-gateway:9000
BOOKING-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.6:booking-service:8080
CONFIG-SERVER	n/a (1)	(1)	UP (1) - 192.168.1.6:config-server:8888
FLIGHT-SERVICE	n/a (1)	(1)	UP (1) - 192.168.1.6:flight-service:8090

General Info









Name	Value
total-avail-memory	90mb
num-of-cpus	12

This is the Eureka Server where all four services are successfully registered, namely flight-service, booking-service, config-server, and api-gateway.









This project also implements Message Broker using Apache Kafka which is used whenever a flight is booked or cancelled in the booking service and a mail is sent to the passenger.

2. JCoco Coverage Report -







Coverage Report for FlightService - 96%

FlightService												
FlightService												
Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
com.flightservice.service		96%		83%	10	46	2	100	1	19	0	3
com.flightservice.controller		70%	n/a		2	7	2	7	2	7	0	1
com.flightservice		37%	n/a		1	2	2	3	1	2	0	1
com.flightservice.request		100%	n/a		0	39	0	57	0	39	0	3
com.flightservice.exceptions		100%		90%	1	14	0	30	0	9	0	3
com.flightservice.model		100%	n/a		0	2	0	18	0	2	0	2
Total	32 of 867	96%	10 of 64	84%	14	110	6	215	4	78	0	13

Coverage Report for BookingService - 92%

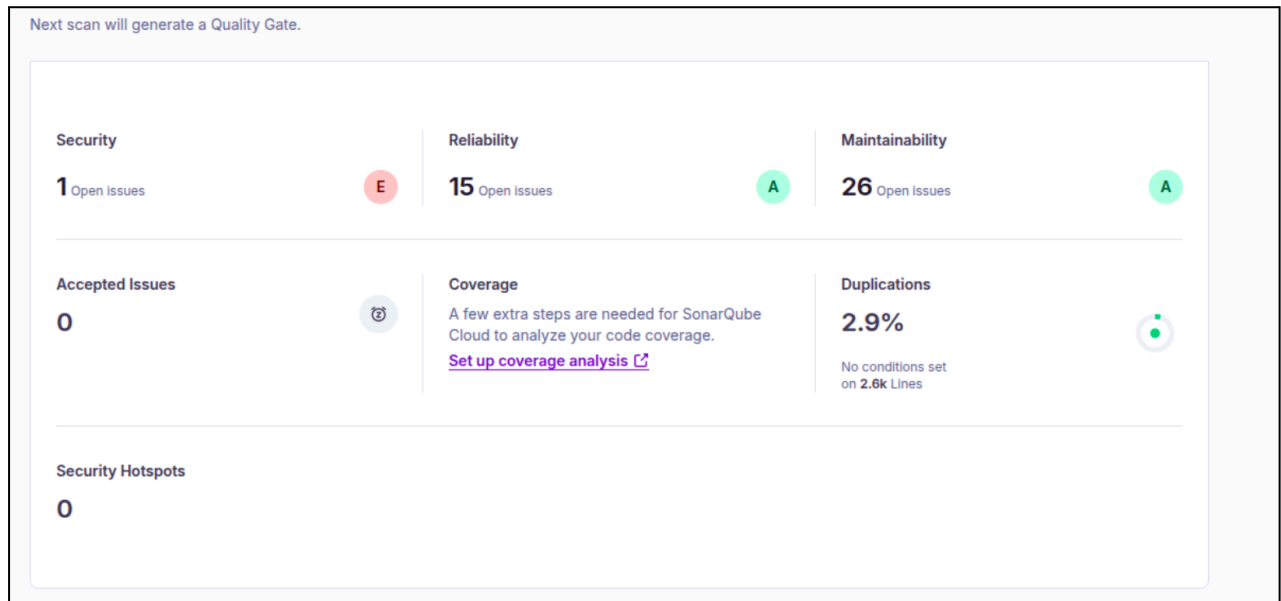
BookingService												
BookingService												
Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
com.booking.service.service		91%		82%	16	67	10	184	6	38	0	4
com.booking.service.model		86%	n/a		10	30	10	53	10	30	0	6
com.booking.service.requests		84%	n/a		4	24	5	35	4	24	0	2
com.booking.service		37%	n/a		1	2	2	3	1	2	0	1
com.booking.service.exceptions		100%		92%	1	16	0	42	0	9	0	3
com.booking.service.client		100%	n/a		0	15	0	42	0	15	0	3
com.booking.service.controller		100%	n/a		0	5	0	5	0	5	0	1
Total	110 of 1,384	92%	11 of 72	84%	32	159	27	364	21	123	0	20

Coverage Report for Api Gateway -

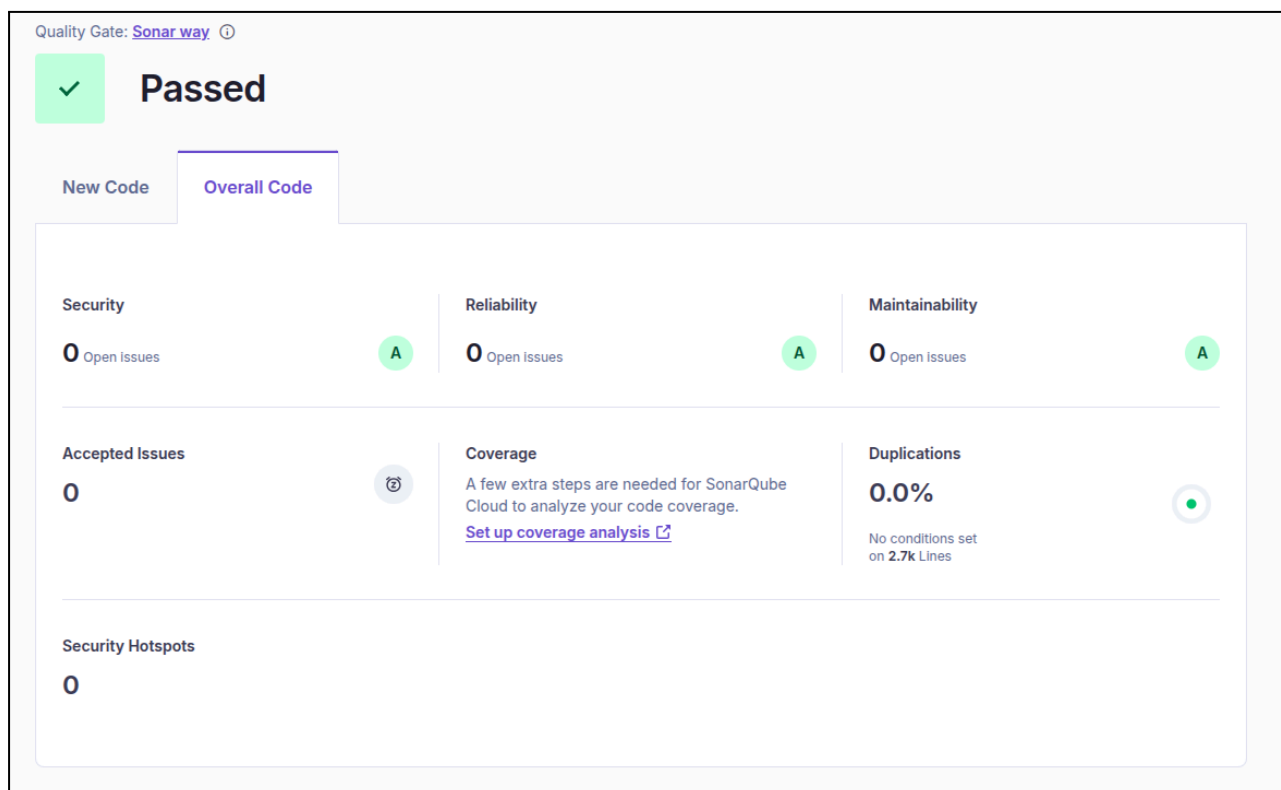
ApiGateway												
ApiGateway												
Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
com.apigateway.controller		12%		0%	4	5	9	11	3	4	0	1
com.apigateway.model		25%	n/a		13	14	19	22	13	14	1	2
com.apigateway.security		93%		61%	10	25	6	72	0	12	0	3
com.apigateway		37%	n/a		1	2	2	3	1	2	0	1
Total	127 of 451	71%	12 of 28	57%	28	46	36	108	17	32	1	7

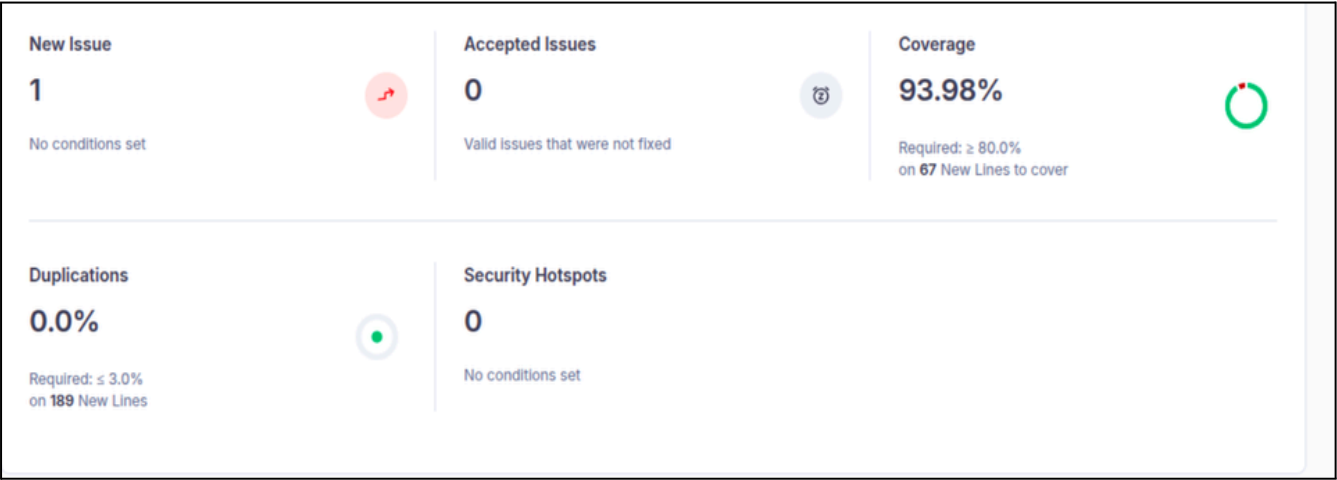
3. SonarQube Report

1. Before Fixing



Before fixing the project had 1 security issue, 15 reliability, 26 open issues and 2.9% code duplication. After fixing everything was reduced to 0.





4. JMeter Load Testing

4.1 With 20 Threads

The JMeter testing for 20 threads across the get,post, and delete requests have been carried out successfully through CLI as well as GUI.

Command used and result stored in a csv file -

```
jmeter -n -t 'LoadTesting20.jmx' -l result20.csv
```

```
dreamdust@kanchan-pc:~/Chubb - Weekly Assignments/MicroServicesFlightBooking/MicroServicesFlightBooking$ jmeter -n -t 'LoadTesting20.jmx' -l results20.csv
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
Creating summariser <summary>
Created the tree successfully using LoadTesting20.jmx
Starting standalone test @ 2025 Dec 2 02:08:34 IST (1764621514274)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
summary + 1 in 00:00:00 = 2.9/s Avg: 108 Min: 108 Max: 108 Err: 0 (0.00%) Active: 7 Started: 7 Finished: 0
summary + 119 in 00:00:01 = 146.0/s Avg: 33 Min: 1 Max: 109 Err: 40 (33.61%) Active: 0 Started: 20 Finished: 20
summary = 120 in 00:00:01 = 103.1/s Avg: 34 Min: 1 Max: 109 Err: 40 (33.33%)
Tidying up ... @ 2025 Dec 2 02:08:35 IST (1764621515599)
... end of run
dreamdust@kanchan-pc:~/Chubb - Weekly Assignments/MicroServicesFlightBooking/MicroServicesFlightBooking$
```

Result CSV-

timeStamp	elapsed	label	responseCode	responseMessage
1764621514660	108	Get All Flights		200 OK
1764621514660	108	Get All Flights		200 OK
1764621514715	53	Get All Flights		200 OK
1764621514660	108	Get All Flights		200 OK
1764621514660	109	Get All Flights		200 OK
1764621514664	104	Get All Flights		200 OK
1764621514763	33	Get All Flights		200 OK
1764621514778	35	Get All Airlines		200 OK
1764621514778	36	Get All Airlines		200 OK
1764621514778	43	Get All Airlines		200 OK
1764621514778	44	Get All Airlines		200 OK
1764621514782	40	Get All Airlines		200 OK
1764621514778	43	Get All Airlines		200 OK

4.2 With 50 Threads

The JMeter testing for 50 threads across the get,post, and delete requests have been carried out successfully through CLI as well as GUI.

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Get All Flights	50	568	245	1134	195.83	0.00%	26.8/sec	69.49	5.45	2654.3
Get All Airlines	50	622	248	1397	246.03	0.00%	31.0/sec	80.24	6.29	2653.8
Post Add a flight	50	10	1	41	10.26	100.00%	39.4/sec	84.92	0.00	2208.7
Post Search a ...	50	11	1	44	12.41	100.00%	40.7/sec	87.45	0.00	2203.0
Post Book a fl...	50	295	56	702	204.29	0.00%	38.7/sec	8.47	17.50	224.0
Del Cancel a b...	50	231	46	650	149.71	0.00%	43.3/sec	4.22	9.00	100.0
TOTAL	300	290	1	1397	291.80	33.33%	124.1/sec	202.91	22.06	1674.0

4.3 With 100 Threads

```
jmeter -n -t 'LoadTesting100.jmx' -l result100.csv
```

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Get All Flights	200	553	203	806	139.40	0.00%	151.2/sec	391.82	30.71	2654.1
Get All Airlines	200	667	215	1081	213.94	0.00%	150.0/sec	389.13	30.48	2655.8
Post Book a fli...	200	283	20	738	190.77	0.00%	103.2/sec	22.57	46.66	224.0
Del Cancel a b...	200	157	47	668	127.68	0.00%	107.0/sec	10.45	22.26	100.0
TOTAL	800	415	20	1081	266.72	0.00%	249.4/sec	343.01	66.48	1408.5

5. Running the docker container

API Gateway on port 9000

5.1 Public Routes (No authorization required)

1. GET All flights

The screenshot shows a REST client interface with the following details:

- URL:** `http://localhost:9000/flight/api/flight/getAllFlights`
- Method:** `GET`
- Status:** `200 OK` (1.13 s, 1.19 KB)
- Response Body (JSON):**

```
1  [
2    {
3      "flightId": "6936d7ee514e9c2f3cb343c4",
4      "flightNumber": "6E304",
5      "airlineCode": "INDG",
6      "sourceCity": "LUCKNOW",
7      "destinationCity": "KOCHI",
8      "departureDate": "2025-12-15",
9      "arrivalDate": "2025-12-15",
10     "departureTime": "13:30:00",
11     "arrivalTime": "15:45:00",
12     "mealAvailable": true,
13     "totalSeats": 180,
14     "availableSeats": 180,
15     "price": 3200.0
16   },
17   {
18     "flightId": "6936d804514e9c2f3cb34479",
19     "flightNumber": "6E304",
20     "airlineCode": "INDG",
21     "sourceCity": "LUCKNOW",
22     "destinationCity": "MUMBAI",
23     "departureDate": "2025-12-16",
24     "arrivalDate": "2025-12-16"
```

2. POST Search Flights

The screenshot shows a REST client interface for a POST request to `http://localhost:9000/flight/api/flight/search`. The request body is a JSON object with the following fields:

```
1 {
2   "sourceCity": "LUCKNOW",
3   "destinationCity": "KOCHI",
4   "travelDate": "2025-12-15",
5   "tripType": "ONE_WAY"
6 }
7
```

The response is a 200 OK status with a JSON body containing flight details:

```
1 [
2   {
3     "flightId": "6936d7ee514e9c2f3cb343c4",
4     "flightNumber": "6E304",
5     "airlineCode": "INDG",
6     "sourceCity": "LUCKNOW",
7     "destinationCity": "KOCHI",
8     "departureDate": "2025-12-15",
9     "arrivalDate": "2025-12-15",
10    "departureTime": "13:30:00",
11    "arrivalTime": "15:45:00",
12    "mealAvailable": true,
13    "totalSeats": 180,
14    "availableSeats": 180,
15    "price": 3200.0
16  }
17 ]
```

3. GET All Airlines

The screenshot shows a REST client interface for a GET request to `http://localhost:9000/flight/api/flight/getAllAirlines`. The response is a 200 OK status with a JSON body containing a list of airlines:

```
1 [
2   {
3     "airlineCode": "VIS",
4     "airlineName": "Vistaara"
5   },
6   {
7     "airlineCode": "INDG",
8     "airlineName": "Indigo"
9   },
10  {
11    "airlineCode": "AI",
12    "airlineName": "Air India"
13  },
14  {
15    "airlineCode": "SJ",
16    "airlineName": "Spice Jet"
17  }
18 ]
```

5.2 Sign Up & Login

1. Admin Sign Up

The screenshot shows a REST client interface with the following details:

- Method:** POST
- URL:** http://localhost:9000/auth/register
- Body:** A JSON object with the following fields:

```
1 {
2   "username": "admin",
3   "password": "pass123",
4   "fullName": "Admin User",
5   "email": "admin@example.com",
6   "role": "ROLE_ADMIN"
7 }
```
- Response:** 201 Created. The response body is:

```
1 User registered successfully
```

2. Admin Login

The screenshot shows a REST client interface with the following details:

- Method:** POST
- URL:** http://localhost:9000/auth/login
- Body:** A JSON object with the following fields:

```
1 {
2   "username": "admin",
3   "password": "pass123"
4 }
5
```
- Response:** 200 OK. The response body is a long JWT token:

```
1 eyJhbGciOiJIUzI1NiJ9.eyJzdWIiOiJhZG1pbGlzInJvbGUiOiJST0xFOX0FETU10IiwiaWF0IjoxNzY1MjAxODAwLCJleHAiOiE3NjUyMDU0MDh9.
   yVGIKFHarGtu3gAwygtIF_JYb1GYzG7BLcv0e_8nkcA
```

3. User Signup

The screenshot shows a Postman interface for a POST request to `http://localhost:9000/auth/register`. The request body is a JSON object with the following fields: `username` (user2), `password` (pass1), `fullName` (User1), `email` (admin@example.com), and `role` (ROLE_USER). The response is a 201 Created status with the message "User registered successfully".

```
POST http://localhost:9000/auth/register
```

Body (raw):

```
1 {
2   "username": "user2",
3   "password": "pass1",
4   "fullName": "User1",
5   "email": "admin@example.com",
6   "role": "ROLE_USER"
7 }
```

Response: 201 Created

Body (raw):

```
1 User registered successfully
```

4. User Login

The screenshot shows a Postman interface for a POST request to `http://localhost:9000/auth/login`. The request body is a JSON object with the following fields: `username` (user2) and `password` (pass1). The response is a 200 OK status with a long JWT token.

```
POST http://localhost:9000/auth/login
```

Body (raw):

```
1 {
2   "username": "user2",
3   "password": "pass1"
4 }
```

Response: 200 OK

Body (raw):

```
1 eyJhbGciOiJIUzI1NiJ9.eyJzdWIiOiI1c2VyMiIsInJvbGUiOiJST0xFOX1VTRVIiLCJpYXQiOiJlE3NjUyMDUzNzQsImV4cCI6MTc2NTIwODk3NH0.E9lmPSQhhrUqt9Q8RVe6i-9WPrsEmab1j00eFS6uYA
```

5.3 Admin Endpoints

1. POST Add an airline

API Gateway - 9000 / ADMIN Endpoints / Add an airline

POST ▼ <http://localhost:9000/flight/api/flight/addAirline>

Docs Params Authorization Headers (10) Body Scripts Settings

☐ none ☐ form-data ☐ x-www-form-urlencoded ☒ raw ☐ binary ☐ GraphQL JSON ▼

```
1 {
2   "airlineCode": "SJ",
3   "airlineName": "Spice Jet"
4 }
```

Body Cookies Headers (9) Test Results ↺ 201 Created

{} JSON ▼ ▶ Preview 🖼 Visualize ▼

```
1 {
2   "airlineCode": "SJ",
3   "airlineName": "Spice Jet"
4 }
```

2. POST Add a flight

API Gateway - 9000 / ADMIN Endpoints / Add a flight

POST ▼ <http://localhost:9000/flight/api/flight/airline/inventory/add>

Docs Params Authorization Headers (10) Body Scripts Settings

☐ none ☐ form-data ☐ x-www-form-urlencoded ☒ raw ☐ binary ☐ GraphQL JSON ▼

```
1 {
2   "airlineCode": "AI",
3   "flightNumber": "AI304",
4   "sourceCity": "KOCHI",
5   "destinationCity": "MUMBAI",
6   "departureDate": "2025-12-16",
7   "departureTime": "10:50",
8   "arrivalDate": "2025-12-16",
9   "arrivalTime": "12:55",
10  "totalSeats": 180,
11  "price": 3200,
12  "mealAvailable": true
13 }
```

Body Cookies Headers (9) Test Results ↺ 201 Created

{} JSON ▼ ▶ Preview 🖼 Visualize ▼

```
1 {
2   "flightId": "6936d81c514e9c2f3cb3452e"
3 }
```

5.4 User Endpoints

1. POST Book a flight

The screenshot shows a REST client interface for a POST request to the endpoint `http://localhost:9000/booking/api/booking/6936d7ee514e9c2f3cb343c4`. The request body is a JSON object with the following structure:

```
1 {
2   "tripType": "ONE_WAY",
3   "contactName": "Kanchan",
4   "contactEmail": "kanchanrai2307@gmail.com",
5   "passengers": [
6     {
7       "name": "John",
8       "age": 26,
9       "gender": "MALE",
10      "seatOutbound": "S1"
11    }
12  ]
13 }
```

The response status is **201 Created** with a content length of **5.88**. The response body is a JSON object:

```
1 {
2   "bookingId": "6936f09f48beee49f4f6ab6a",
3   "tripType": "ONE_WAY",
4   "outboundFlightId": "6936d7ee514e9c2f3cb343c4",
5   "returnFlight": null,
6   "pnrOutbound": "4D6C79",
7   "passengers": null,
8   "warnings": [],
9   "pnrReturn": null,
10  "contactName": "Kanchan",
11  "contactEmail": "kanchanrai2307@gmail.com",
12  "totalPassengers": 1,
13 }
```

The screenshot shows an email notification titled "Ticket booked - PNR 4D6C79". The email is from **kanchanrai2307@gmail.com** and is addressed to the user. The body of the email contains the following information:

Your ticket is booked.
PNR: 4D6C79
Return PNR: N/A
Outbound flight: 6936d7ee514e9c2f3cb343c4
Return flight: N/A
Passengers: 1
Status: CONFIRMED

2. DEL Cancel a flight by pnr

HTTP Api Gateway - 9000 / USER Endpoints / Cancel a booking by pnr

DELETE | http://localhost:9000/booking/api/booking/cancel/4D6C79

Docs Params Authorization Headers (8) **Body** Scripts Settings

☒ none ☐ form-data ☐ x-www-form-urlencoded ☐ raw ☐ binary ☐ GraphQL

This request does not have a body


Body Cookies Headers (9) Test Results | 200 OK • 4.6

{ } JSON Preview Visualize

```
1 {
2   "message": "Booking cancelled"
3 }
```

Ticket cancelled - PNR 4D6C79 Inbox x

Summarise this email

 **kanchanrai2307@gmail.com**
to me ▾

Your ticket is cancelled.
PNR: 4D6C79
Return PNR: N/A
Outbound flight: 6936d7ee514e9c2f3cb343c4
Return flight: N/A
Passengers: 1
Status: CANCELLED

5.4 User + Admin points

1. GET Ticket by pnr with validation
2. GET Booking History by mail

API Gateway - 9000 / USER + ADMIN Endpoints / Get ticket by pnr

GET ▼ | http://localhost:9000/booking/api/booking/ticket/0409F2

Docs Params Authorization • Headers (8) Body Scripts Settings

Body Cookies Headers (9) Test Results | ↻ 404

{ } JSON ▼ ▶ Preview ⚙ Debug with AI ▼

```
1 {
2   "error": "PNR not found"
3 }
```

API Gateway - 9000 / USER + ADMIN Endpoints / Booking history by email

GET ▼ | http://localhost:9000/booking/api/booking/history/kanchanrai2307@gmail.com

Docs Params Authorization • Headers (8) Body Scripts Settings

Body Cookies Headers (9) Test Results | ↻ 200 OK • 94 ms • 3.29 KB •

{ } JSON ▼ ▶ Preview 🖼 Visualize ▼

```
1 [
2   {
3     "bookingId": "6936d87cd2308978ca9f246f",
4     "tripType": "ONE_WAY",
5     "outboundFlightId": "6936d7ee514e9c2f3cb343c4",
6     "returnFlight": null,
7     "pnrOutbound": "CD9B13",
8     "passengers": null,
9     "warnings": null,
10    "pnrReturn": null,
11    "contactName": "Kanchan",
12    "contactEmail": "kanchanrai2307@gmail.com",
13    "totalPassengers": 1,
14    "status": "CONFIRMED"
15  },
16  {
17    "bookingId": "6936df61c7e6700af5a8e199",
18    "tripType": "ONE_WAY",
19    "outboundFlightId": "6936d7ee514e9c2f3cb343c4",
20    "returnFlight": null,
21    "pnrOutbound": "8EC7F6",
22    "passengers": null,
23    "warnings": null,
24    "pnrReturn": null,
25    "contactName": "Kanchan",
26    "contactEmail": "kanchanrai2307@gmail.com",
27    "totalPassengers": 1,
28    "status": "CONFIRMED"
29  }
30 ]
```