Flight Management System

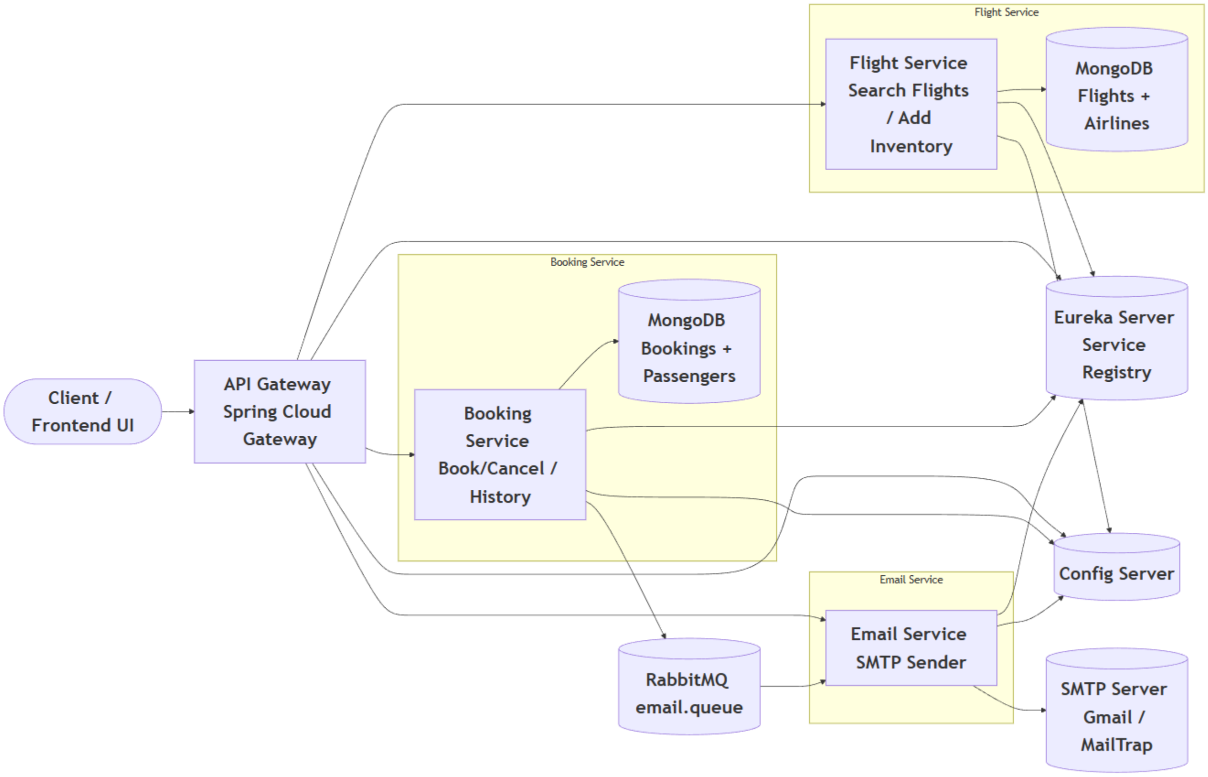
MicroServices

Week - 6

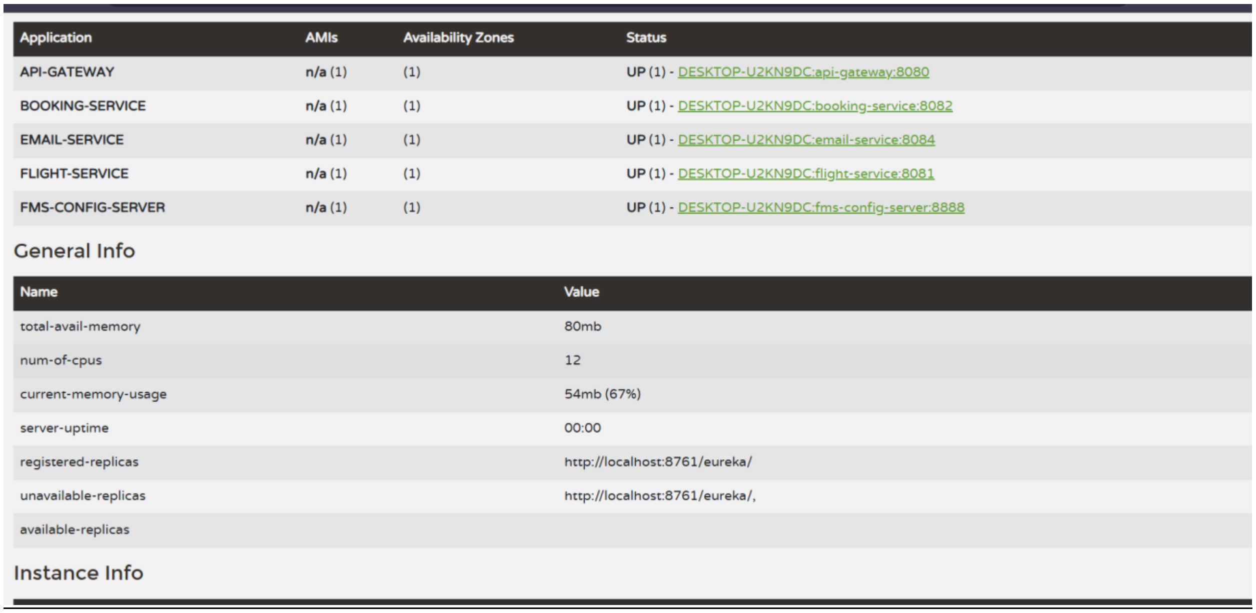
Assignment

Project Report

The Architecture: -


Flight Service
Flight Service Search Flights / Add Inventory
MongoDB Flights + Airlines
Booking Service
MongoDB Bookings + Passengers
Eureka Server Service Registry
Client / Frontend UI
API Gateway Spring Cloud Gateway
Booking Service Book/Cancel / History
Config Server
Email Service
Email Service SMTP Sender
RabbitMQ email.queue
SMTP Server Gmail / MailTrap

These are my services which are registered in service registry



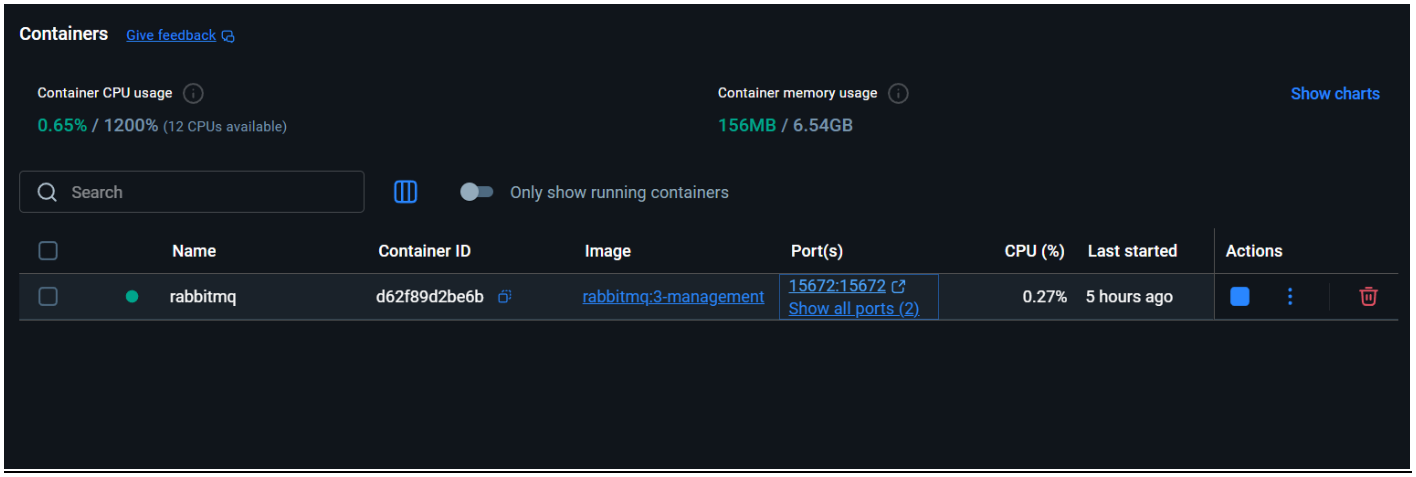
Application	AMIs	Availability Zones	Status
API-GATEWAY	n/a (1)	(1)	UP (1) - DESKTOP-U2KN9DC:api-gateway:8080
BOOKING-SERVICE	n/a (1)	(1)	UP (1) - DESKTOP-U2KN9DC:booking-service:8082
EMAIL-SERVICE	n/a (1)	(1)	UP (1) - DESKTOP-U2KN9DC:email-service:8084
FLIGHT-SERVICE	n/a (1)	(1)	UP (1) - DESKTOP-U2KN9DC:flight-service:8081
FMS-CONFIG-SERVER	n/a (1)	(1)	UP (1) - DESKTOP-U2KN9DC:fms-config-server:8888

General Info

Name	Value
total-avail-memory	80mb
num-of-cpus	12
current-memory-usage	54mb (67%)
server-uptime	00:00
registered-replicas	http://localhost:8761/eureka/
unavailable-replicas	http://localhost:8761/eureka/,
available-replicas	

Instance Info

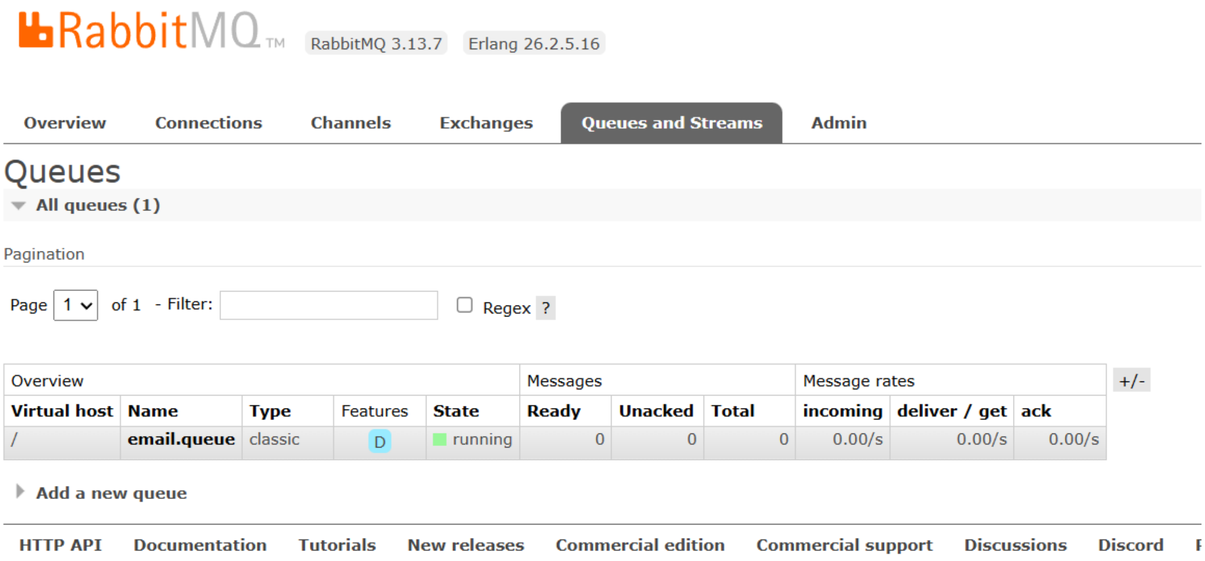
I have used RabbitMQ as my Message Broker to send emails



Container CPU usage
0.65% / 1200% (12 CPUs available)

Container memory usage
156MB / 6.54GB

□		Name	Container ID	Image	Port(s)	CPU (%)	Last started	Actions
□	●	rabbitmq	d62f89d2be6b	rabbitmq:3-management	15672:15672 Show all ports (2)	0.27%	5 hours ago	



Queues

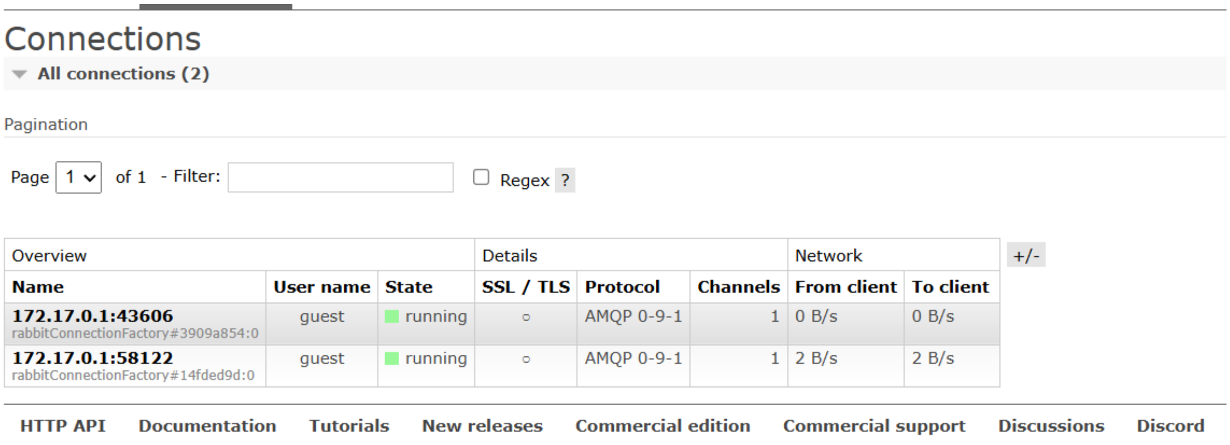
▼ All queues (1)

Pagination

Page 1 ⌄ of 1 - Filter: □ Regex ?

Overview					Messages			Message rates			+/-
Virtual host	Name	Type	Features	State	Ready	Unacked	Total	incoming	deliver / get	ack	
/	email.queue	classic	D	🟩 running	0	0	0	0.00/s	0.00/s	0.00/s	

▸ Add a new queue



Connections

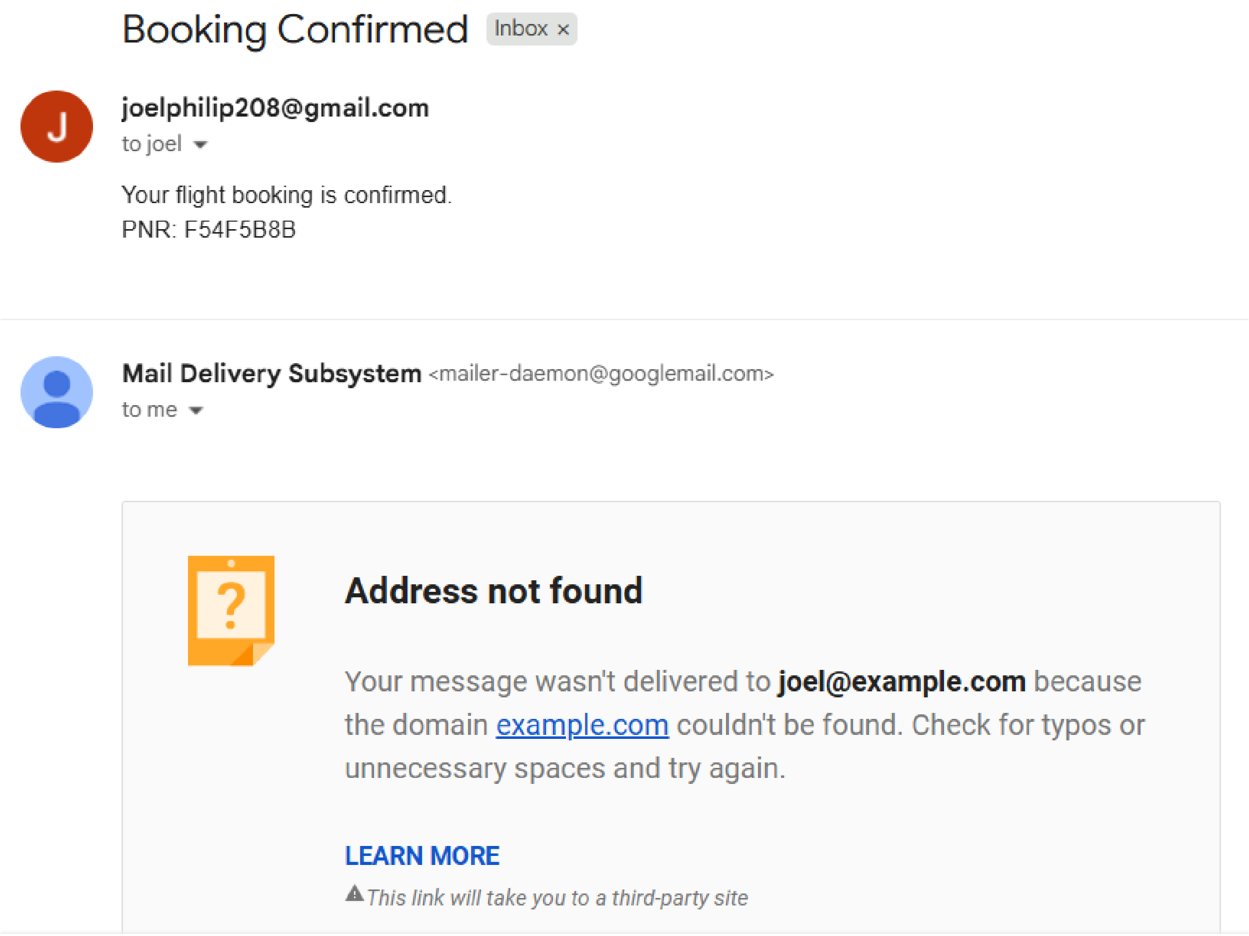
▼ All connections (2)

Pagination

Page 1 ⌄ of 1 - Filter: □ Regex ?

Overview			Details			Network		+/-
Name	User name	State	SSL / TLS	Protocol	Channels	From client	To client	
172.17.0.1:43606 rabbitConnectionFactory#3909a854:0	guest	🟩 running	○	AMQP 0-9-1	1	0 B/s	0 B/s	
172.17.0.1:58122 rabbitConnectionFactory#14fded9d:0	guest	🟩 running	○	AMQP 0-9-1	1	2 B/s	2 B/s	

This is the email that it will send when you book or cancel a ticket



Booking Confirmed

joelphilip208@gmail.com

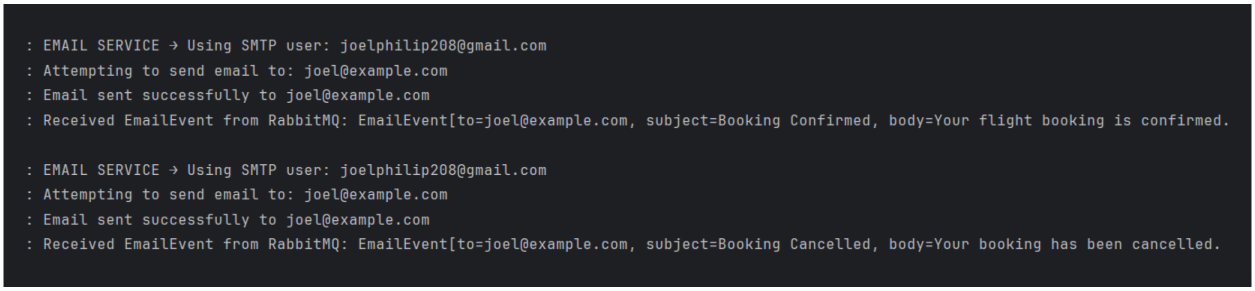
Your flight booking is confirmed.
PNR: F54F5B8B

Mail Delivery Subsystem <mailer-daemon@googlemail.com>

Address not found

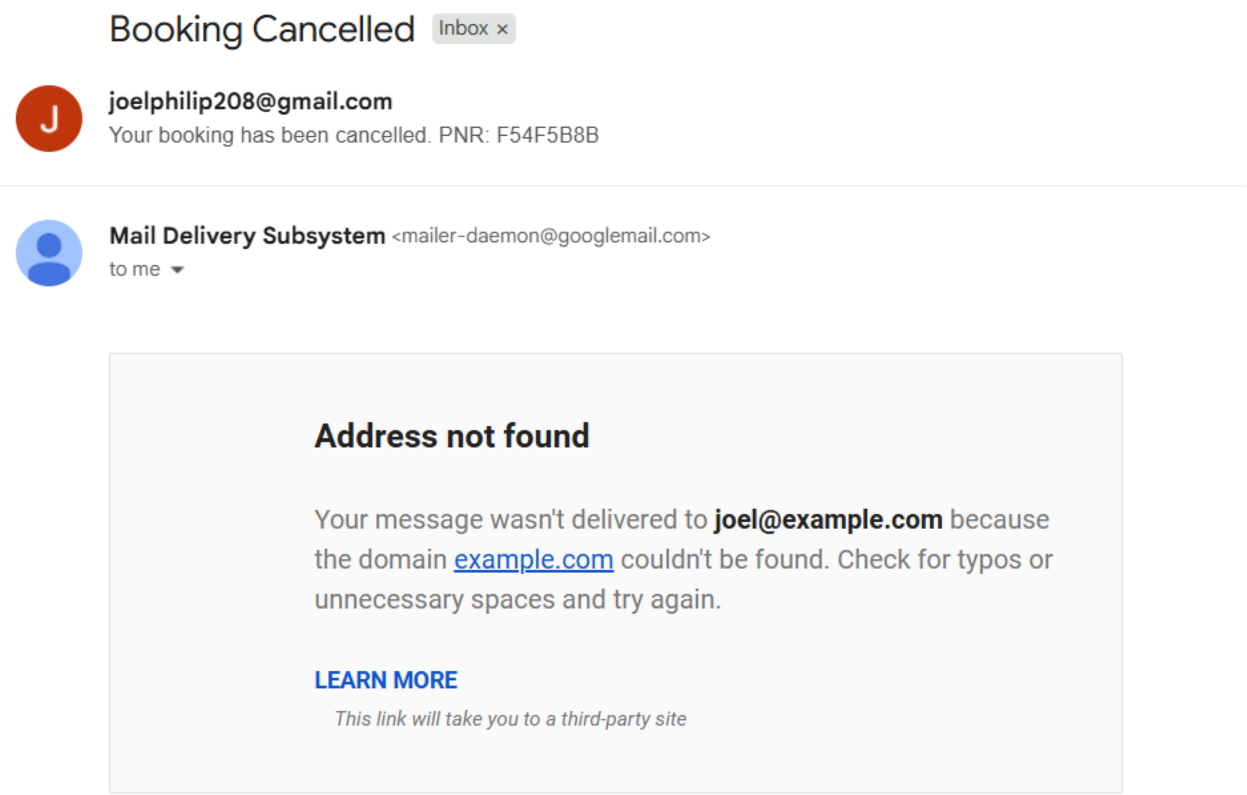
Your message wasn't delivered to **joel@example.com** because the domain example.com couldn't be found. Check for typos or unnecessary spaces and try again.

This link will take you to a third-party site



```
: EMAIL SERVICE → Using SMTP user: joelphilip208@gmail.com
: Attempting to send email to: joel@example.com
: Email sent successfully to joel@example.com
: Received EmailEvent from RabbitMQ: EmailEvent[to=joel@example.com, subject=Booking Confirmed, body=Your flight booking is confirmed.

: EMAIL SERVICE → Using SMTP user: joelphilip208@gmail.com
: Attempting to send email to: joel@example.com
: Email sent successfully to joel@example.com
: Received EmailEvent from RabbitMQ: EmailEvent[to=joel@example.com, subject=Booking Cancelled, body=Your booking has been cancelled.
```

I have used SMTP to do it and I put my credentials in my run configurations



Booking Cancelled

joelphilip208@gmail.com

Your booking has been cancelled. PNR: F54F5B8B

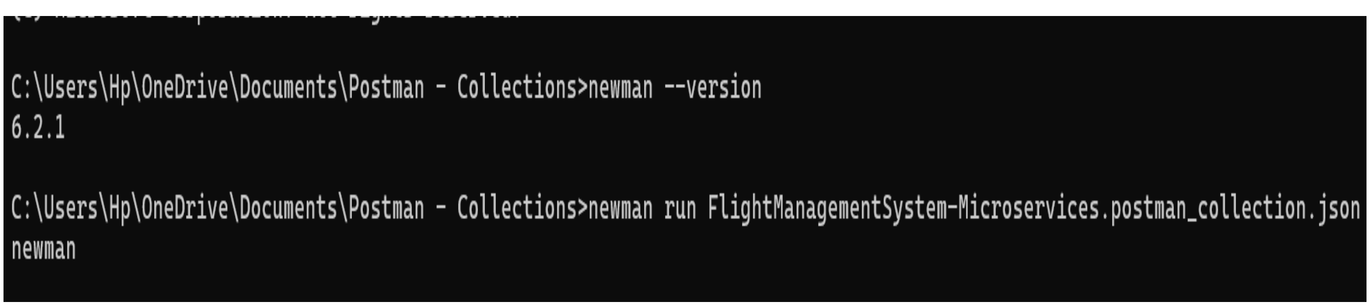
Mail Delivery Subsystem <mailer-daemon@googlemail.com>

Address not found

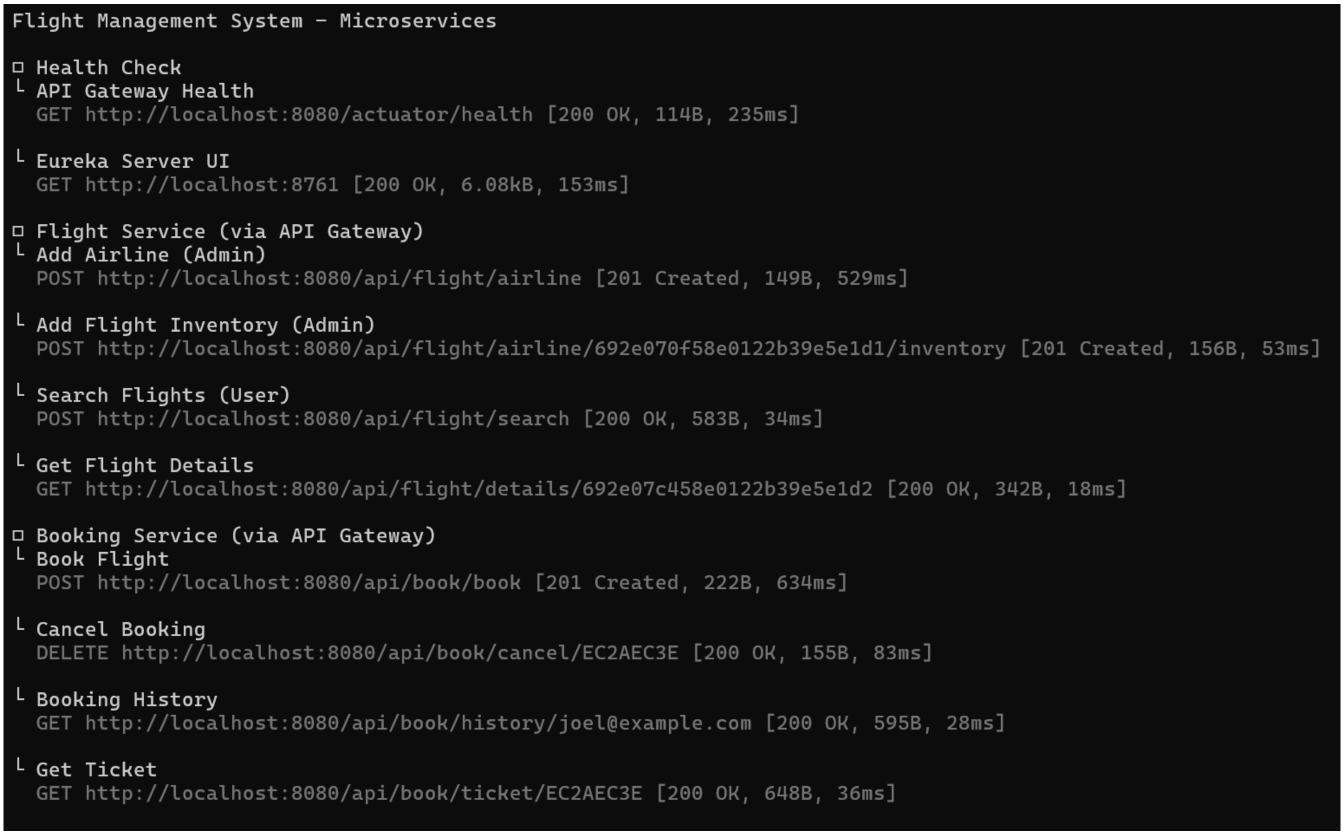
Your message wasn't delivered to **joel@example.com** because the domain example.com couldn't be found. Check for typos or unnecessary spaces and try again.

This link will take you to a third-party site

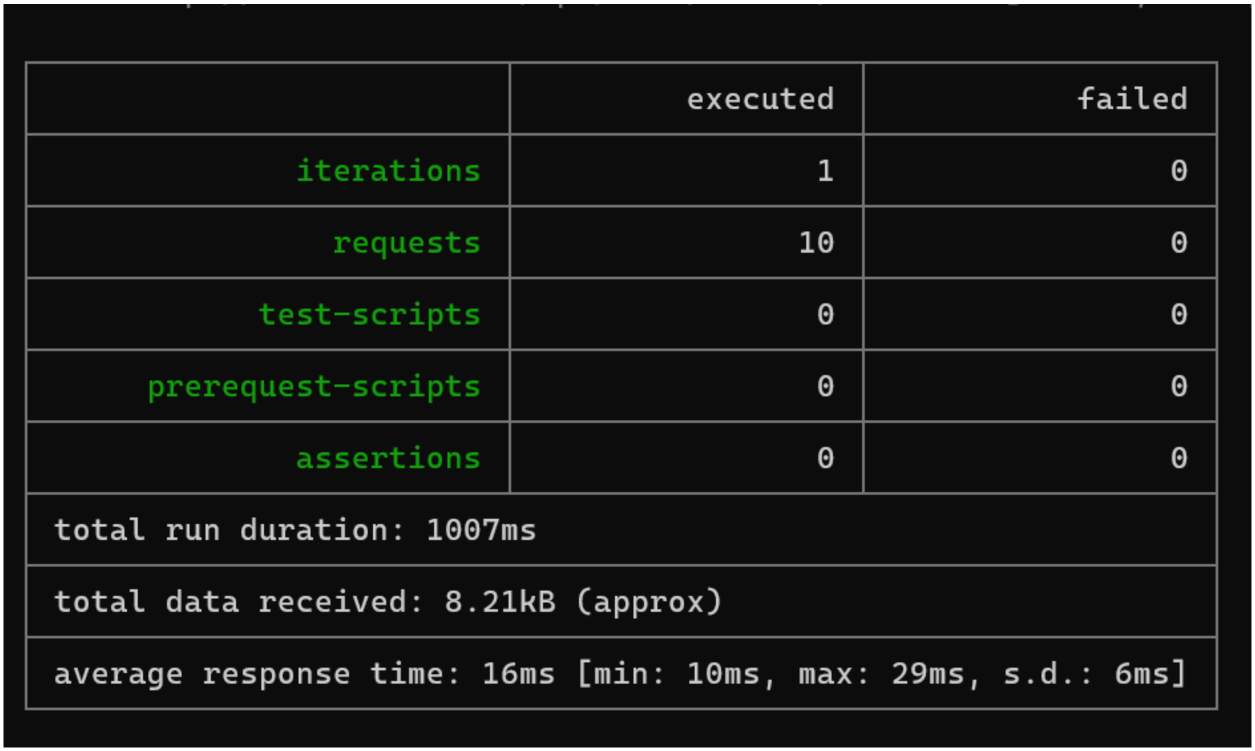
I have used newman tool to test my API end points and every request gave a valid response



```
C:\Users\Hp\OneDrive\Documents\Postman - Collections>newman --version
6.2.1

C:\Users\Hp\OneDrive\Documents\Postman - Collections>newman run FlightManagementSystem-Microservices.postman_collection.json
newman
```



```
Flight Management System - Microservices

□ Health Check
└ API Gateway Health
  GET http://localhost:8080/actuator/health [200 OK, 114B, 235ms]

└ Eureka Server UI
  GET http://localhost:8761 [200 OK, 6.08kB, 153ms]

□ Flight Service (via API Gateway)
└ Add Airline (Admin)
  POST http://localhost:8080/api/flight/airline [201 Created, 149B, 529ms]

└ Add Flight Inventory (Admin)
  POST http://localhost:8080/api/flight/airline/692e070f58e0122b39e5e1d1/inventory [201 Created, 156B, 53ms]

└ Search Flights (User)
  POST http://localhost:8080/api/flight/search [200 OK, 583B, 34ms]

└ Get Flight Details
  GET http://localhost:8080/api/flight/details/692e07c458e0122b39e5e1d2 [200 OK, 342B, 18ms]

□ Booking Service (via API Gateway)
└ Book Flight
  POST http://localhost:8080/api/book/book [201 Created, 222B, 634ms]

└ Cancel Booking
  DELETE http://localhost:8080/api/book/cancel/EC2AEC3E [200 OK, 155B, 83ms]

└ Booking History
  GET http://localhost:8080/api/book/history/joel@example.com [200 OK, 595B, 28ms]

└ Get Ticket
  GET http://localhost:8080/api/book/ticket/EC2AEC3E [200 OK, 648B, 36ms]
```

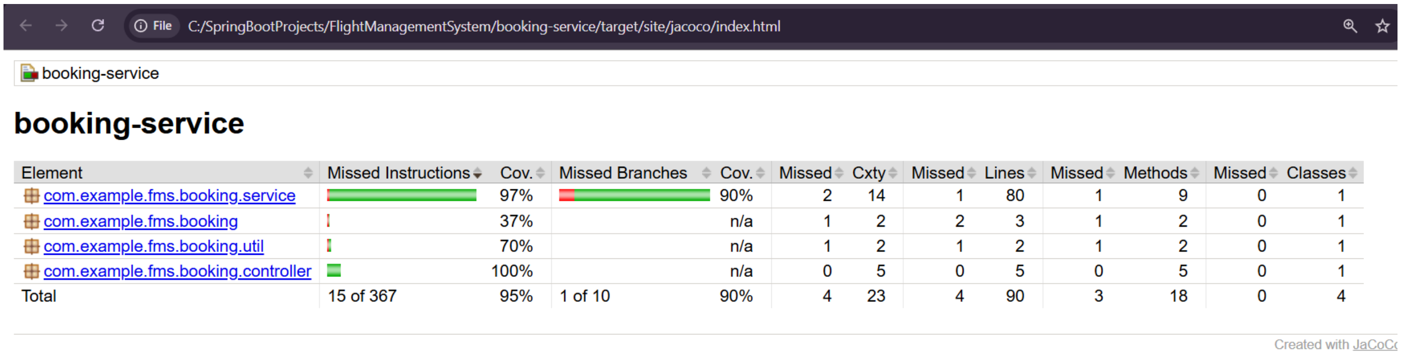


```
┌─────────────────────────┬───────────────────┬───────────────────┐
│                         │          executed │            failed │
├─────────────────────────┼───────────────────┼───────────────────┤
│              iterations │                 1 │                 0 │
├─────────────────────────┼───────────────────┼───────────────────┤
│                requests │                10 │                 0 │
├─────────────────────────┼───────────────────┼───────────────────┤
│            test-scripts │                 0 │                 0 │
├─────────────────────────┼───────────────────┼───────────────────┤
│      prerequest-scripts │                 0 │                 0 │
├─────────────────────────┼───────────────────┼───────────────────┤
│              assertions │                 0 │                 0 │
├─────────────────────────┴───────────────────┴───────────────────┤
│ total run duration: 1007ms                                      │
├─────────────────────────────────────────────────────────────────┤
│ total data received: 8.21kB (approx)                            │
├─────────────────────────────────────────────────────────────────┤
│ average response time: 16ms [min: 10ms, max: 29ms, s.d.: 6ms]   │
└─────────────────────────────────────────────────────────────────┘
```

JaCoCo Report

For Booking Service :-

Code coverage is 95 %



File C:/SpringBootProjects/FlightManagementSystem/booking-service/target/site/jacoco/index.html

booking-service

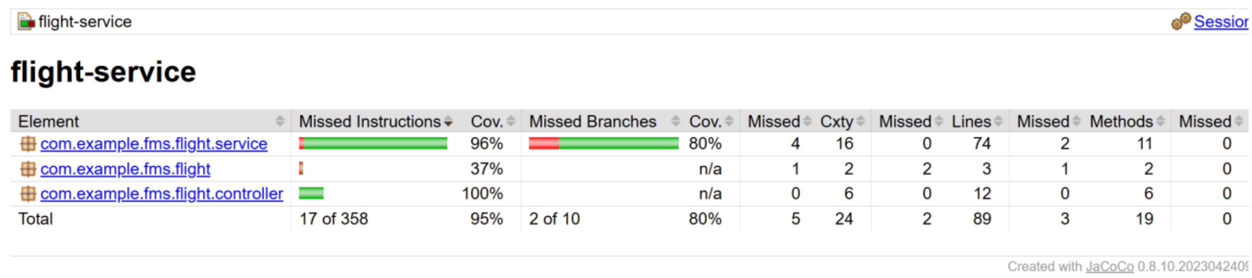
booking-service

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
com.example.fms.booking.service		97%		90%	2	14	1	80	1	9	0	1
com.example.fms.booking		37%		n/a	1	2	2	3	1	2	0	1
com.example.fms.booking.util		70%		n/a	1	2	1	2	1	2	0	1
com.example.fms.booking.controller		100%		n/a	0	5	0	5	0	5	0	1
Total	15 of 367	95%	1 of 10	90%	4	23	4	90	3	18	0	4

Created with JaCoC

For Flight Service:-

Code Coverage is 95%



flight-service

Sessio

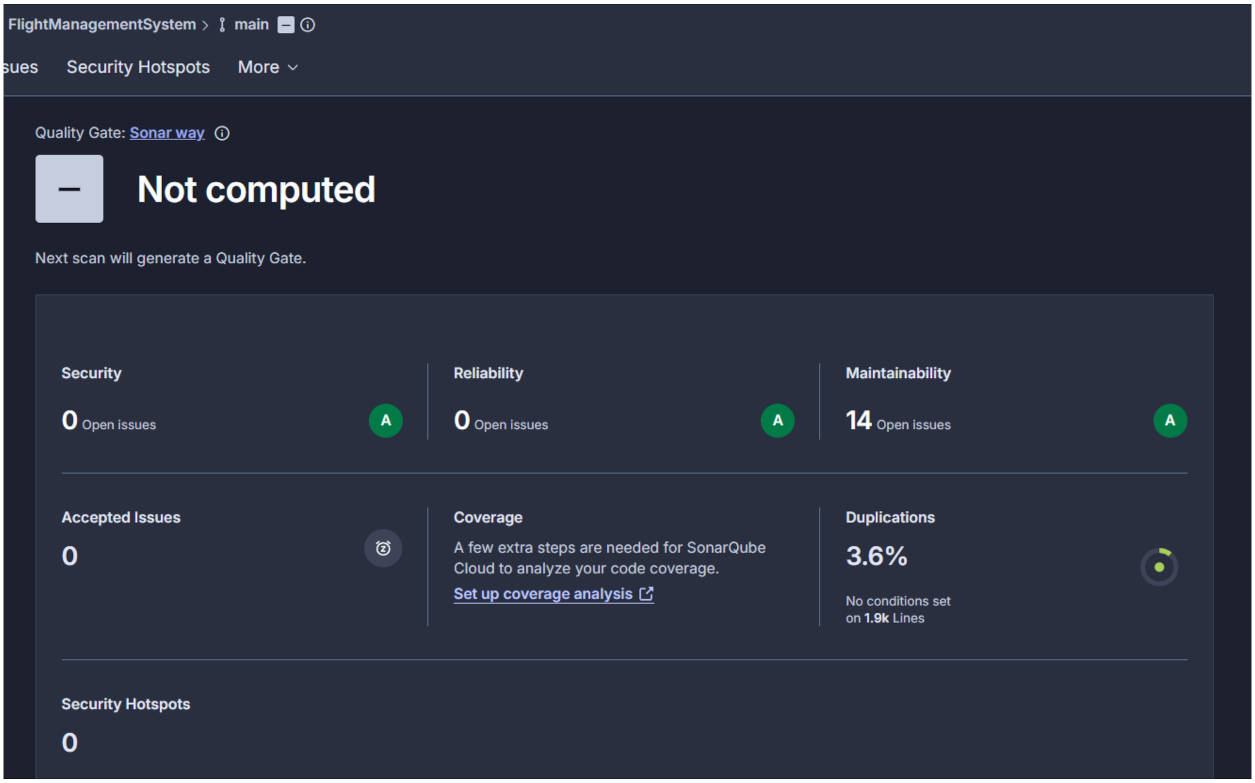
flight-service

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed
com.example.fms.flight.service		96%		80%	4	16	0	74	2	11	0
com.example.fms.flight		37%		n/a	1	2	2	3	1	2	0
com.example.fms.flight.controller		100%		n/a	0	6	0	12	0	6	0
Total	17 of 358	95%	2 of 10	80%	5	24	2	89	3	19	0

Created with JaCoCo 0.8.10.20230424

SonarQube Report

Before :-



FlightManagementSystem > main

sues Security Hotspots More

Quality Gate: Sonar way

Not computed

Next scan will generate a Quality Gate.

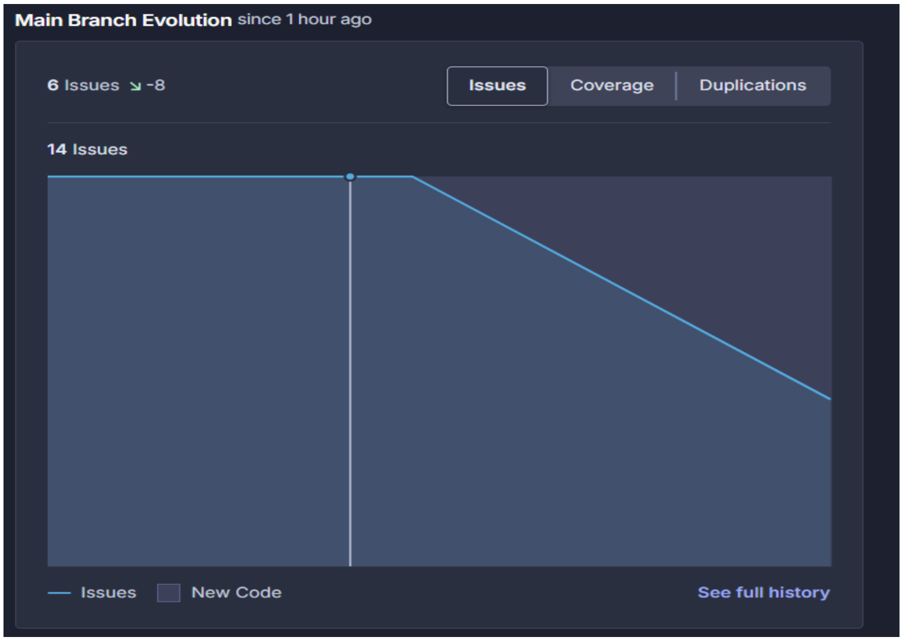
Security	Reliability	Maintainability
0 Open issues A	0 Open issues A	14 Open issues A

Accepted Issues	Coverage	Duplications
0	A few extra steps are needed for SonarQube Cloud to analyze your code coverage. Set up coverage analysis	3.6% No conditions set on 1.9k Lines

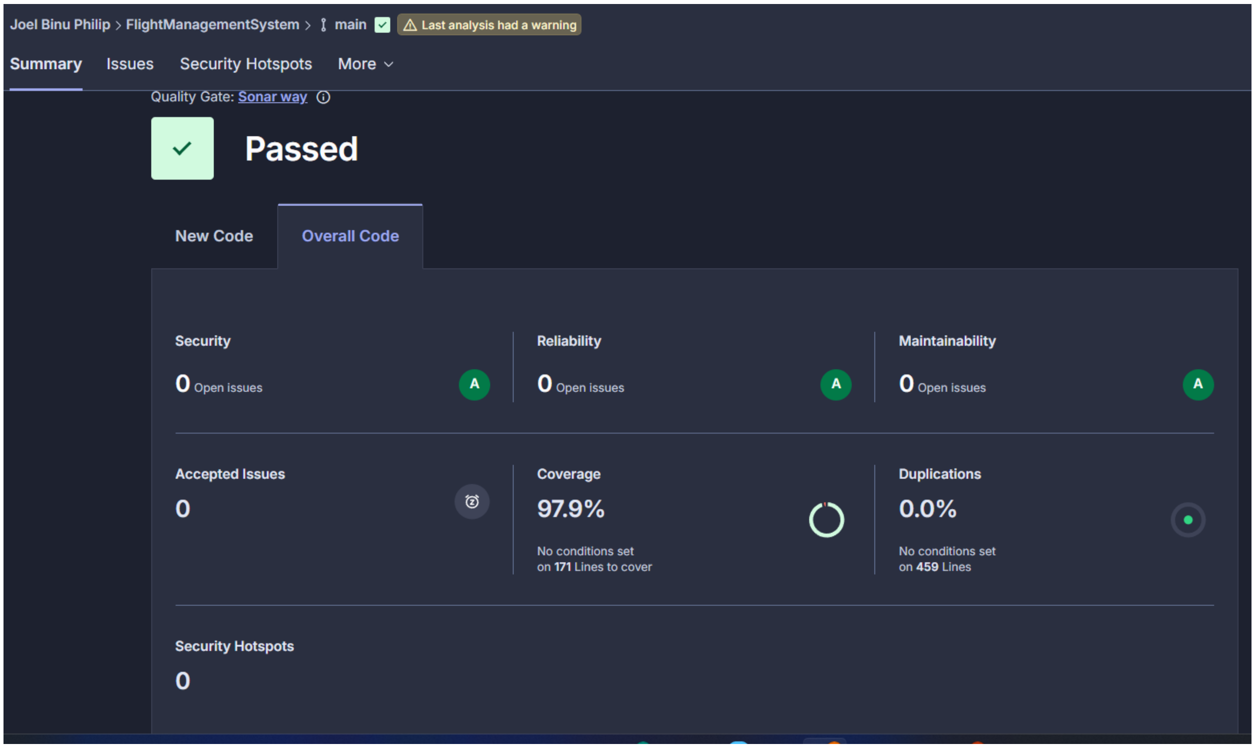
Security Hotspots

0

Issue fixing history graph



After :-


Joel Binu Philip > FlightManagementSystem > main ✓ ⚠ Last analysis had a warning
Summary
Issues
Security Hotspots
More ⌄
New Code
Overall Code

Quality Gate: Sonar way ⓘ

✓ Passed

Security
0 Open issues A

Reliability
0 Open issues A

Maintainability
0 Open issues A

Accepted Issues
0

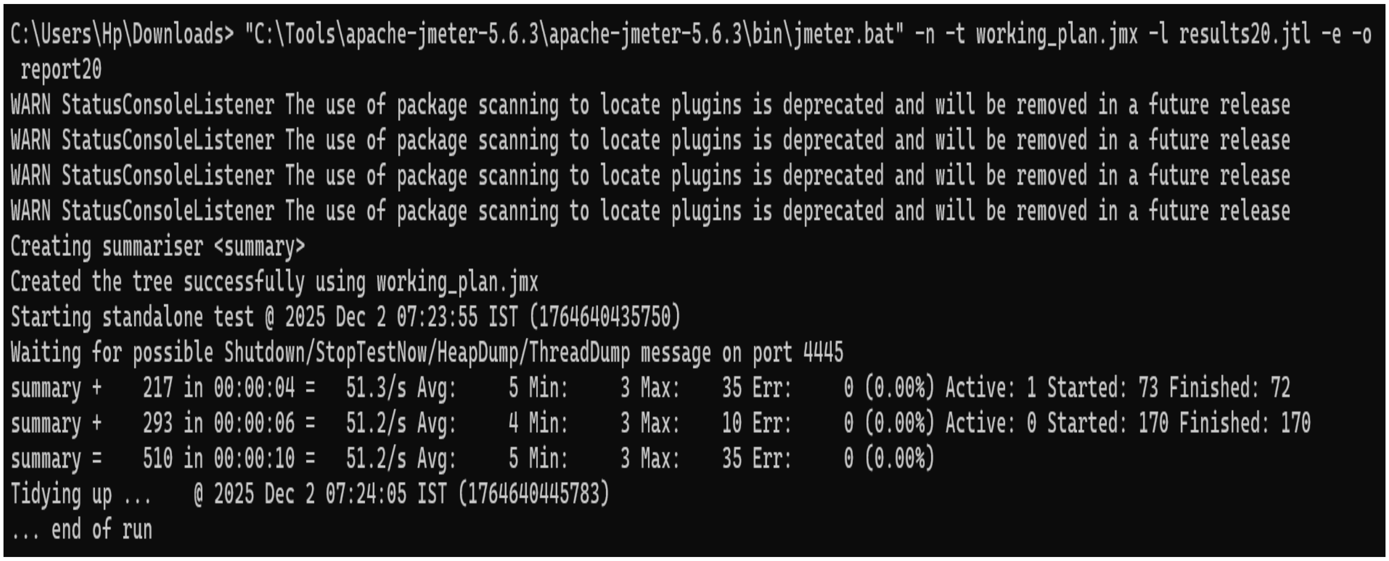
Coverage
97.9%
No conditions set
on 171 Lines to cover

Duplications
0.0%
No conditions set
on 459 Lines

Security Hotspots
0

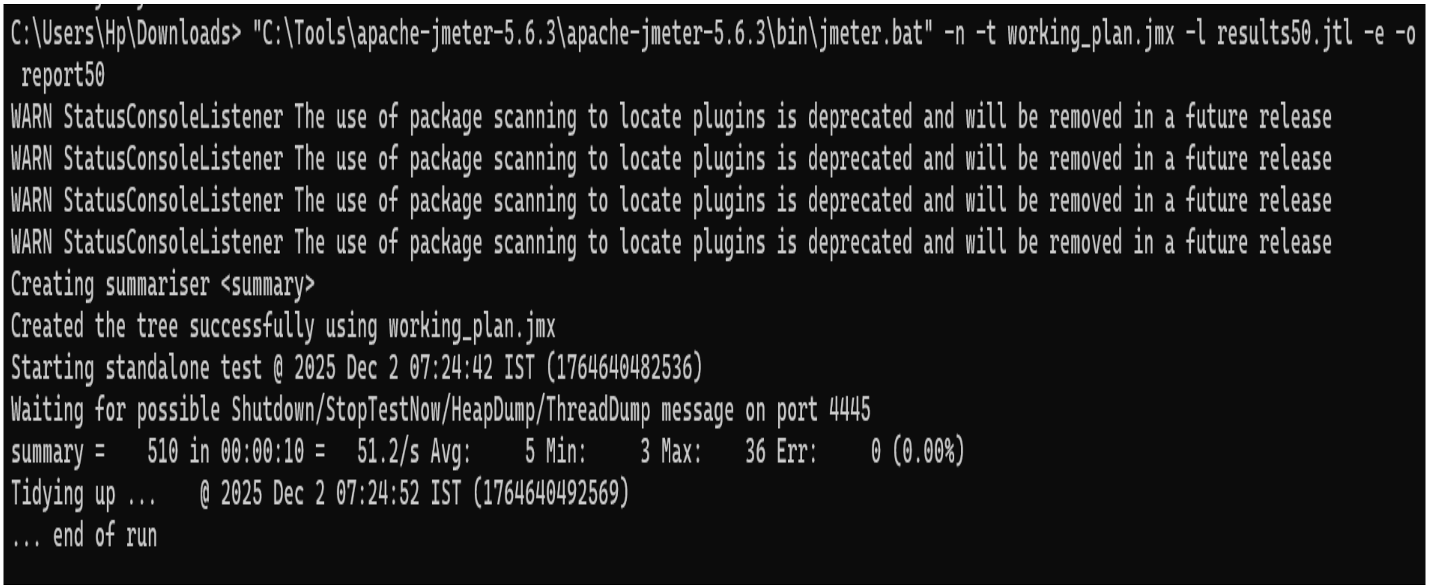
JMeter Load Testing Using CLI

20 threads



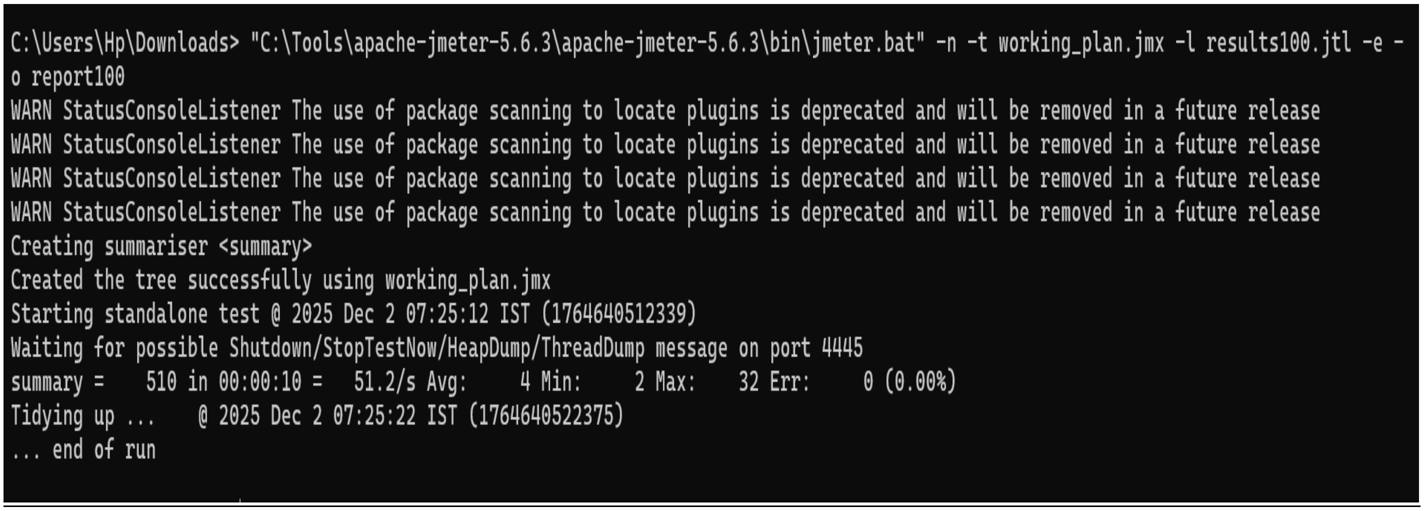
```
C:\Users\Hp\Downloads> "C:\Tools\apache-jmeter-5.6.3\apache-jmeter-5.6.3\bin\jmeter.bat" -n -t working_plan.jmx -l results20.jtl -e -o
 report20
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener 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 working_plan.jmx
Starting standalone test @ 2025 Dec 2 07:23:55 IST (1764640435750)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
summary +    217 in 00:00:04 =   51.3/s Avg:     5 Min:     3 Max:    35 Err:     0 (0.00%) Active: 1 Started: 73 Finished: 72
summary +    293 in 00:00:06 =   51.2/s Avg:     4 Min:     3 Max:    10 Err:     0 (0.00%) Active: 0 Started: 170 Finished: 170
summary =    510 in 00:00:10 =   51.2/s Avg:     5 Min:     3 Max:    35 Err:     0 (0.00%)
Tidying up ...    @ 2025 Dec 2 07:24:05 IST (1764640445783)
... end of run
```

50 threads



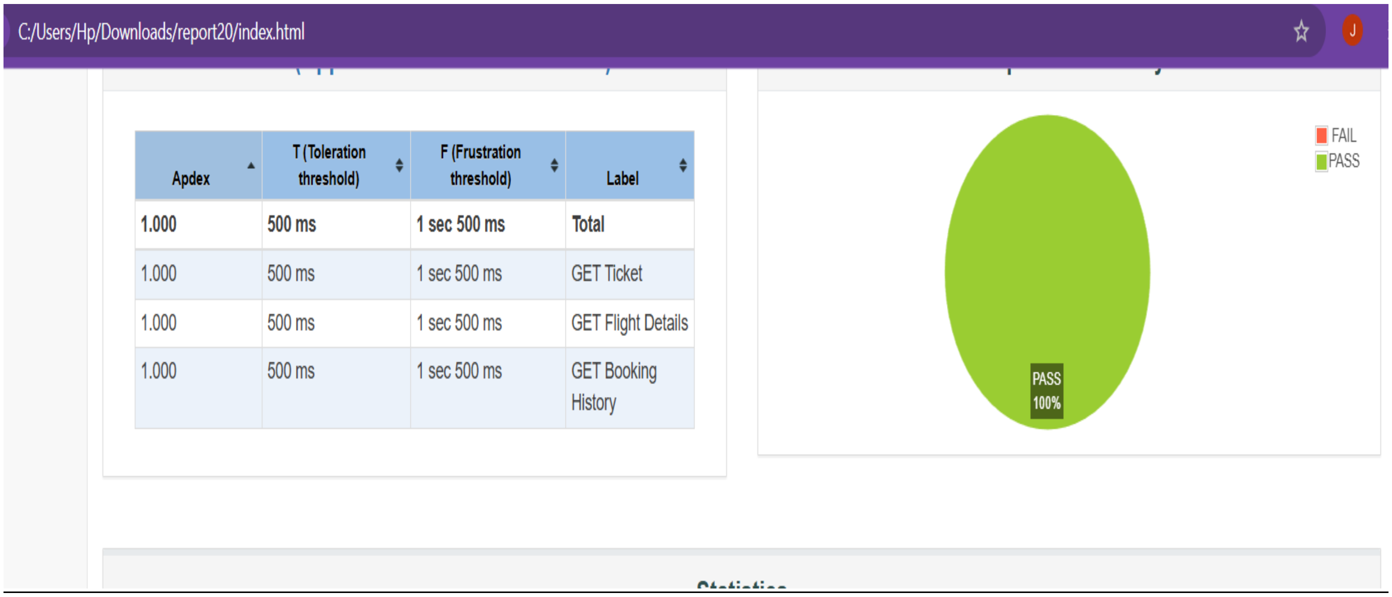
```
C:\Users\Hp\Downloads> "C:\Tools\apache-jmeter-5.6.3\apache-jmeter-5.6.3\bin\jmeter.bat" -n -t working_plan.jmx -l results50.jtl -e -o
 report50
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener 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 working_plan.jmx
Starting standalone test @ 2025 Dec 2 07:24:42 IST (1764640482536)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
summary =    510 in 00:00:10 =   51.2/s Avg:     5 Min:     3 Max:    36 Err:     0 (0.00%)
Tidying up ...    @ 2025 Dec 2 07:24:52 IST (1764640492569)
... end of run
```

100 Threads



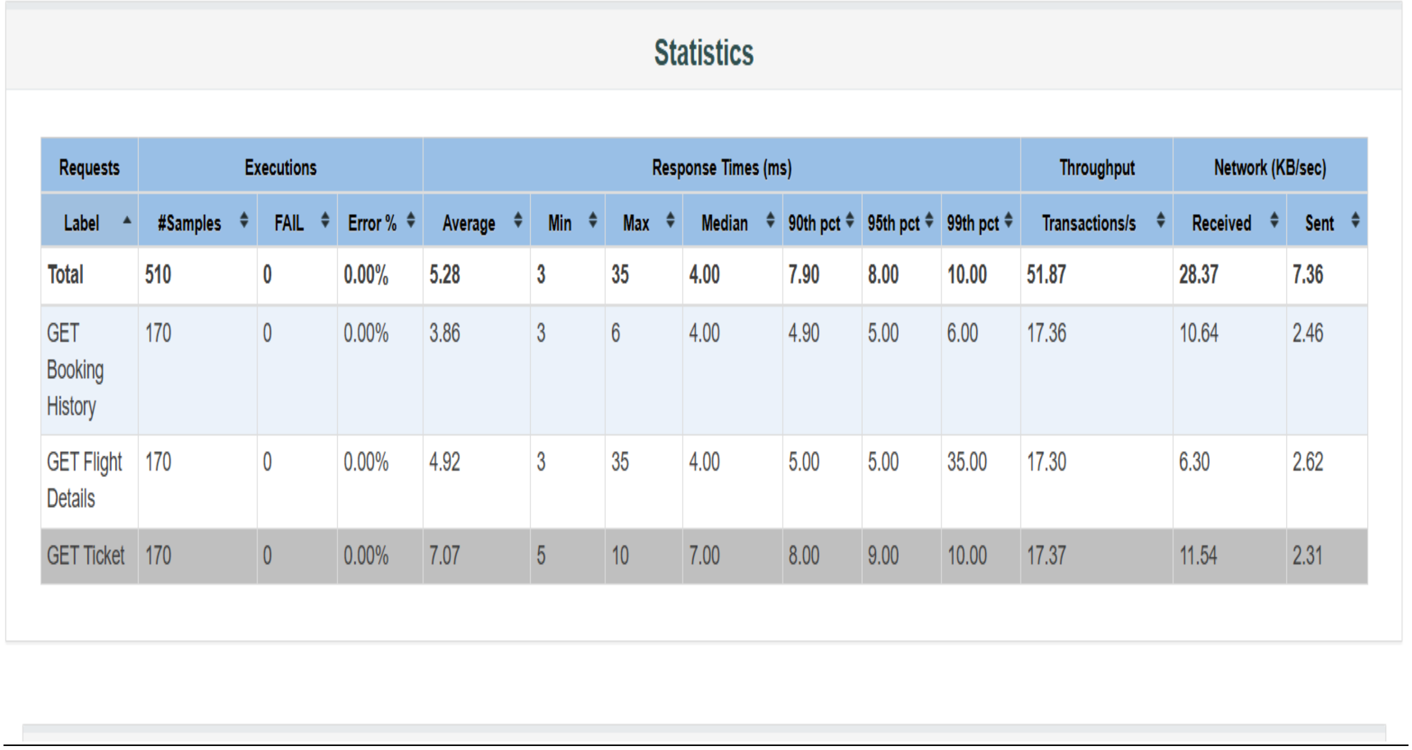
```
C:\Users\Hp\Downloads> "C:\Tools\apache-jmeter-5.6.3\apache-jmeter-5.6.3\bin\jmeter.bat" -n -t working_plan.jmx -l results100.jtl -e -
o report100
WARN StatusConsoleListener The use of package scanning to locate plugins is deprecated and will be removed in a future release
WARN StatusConsoleListener 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 working_plan.jmx
Starting standalone test @ 2025 Dec 2 07:25:12 IST (1764640512339)
Waiting for possible Shutdown/StopTestNow/HeapDump/ThreadDump message on port 4445
summary =    510 in 00:00:10 =   51.2/s Avg:     4 Min:     2 Max:    32 Err:     0 (0.00%)
Tidying up ...    @ 2025 Dec 2 07:25:22 IST (1764640522375)
... end of run
```

20 threads report



C:/Users/Hp/Downloads/report20/index.html

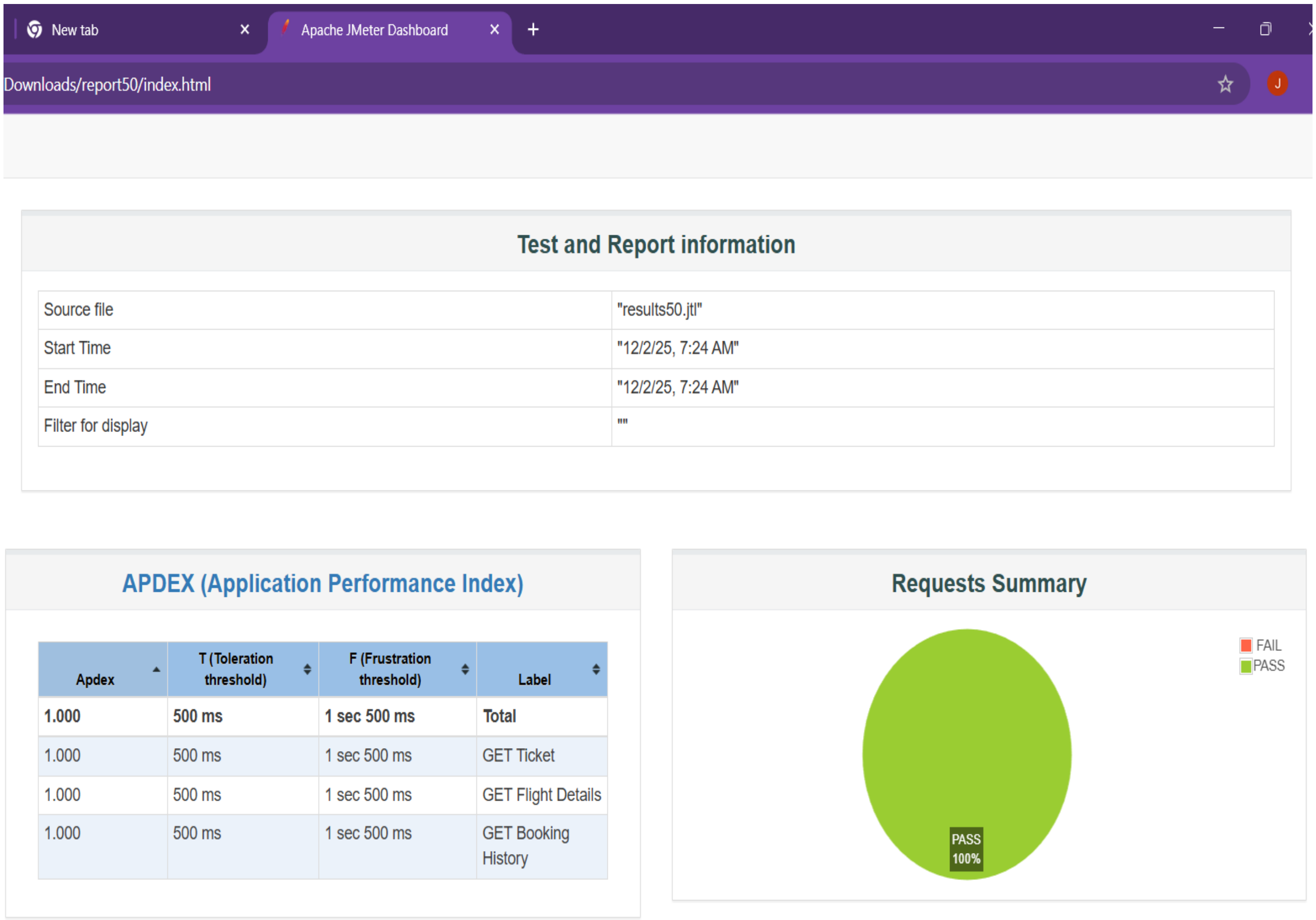
Apdex	T (Toleration threshold)	F (Frustration threshold)	Label
1.000	**500 ms**	**1 sec 500 ms**	**Total**
1.000	500 ms	1 sec 500 ms	GET Ticket
1.000	500 ms	1 sec 500 ms	GET Flight Details
1.000	500 ms	1 sec 500 ms	GET Booking History



Statistics

Requests	Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total	**510**	**0**	**0.00%**	**5.28**	**3**	**35**	**4.00**	**7.90**	**8.00**	**10.00**	**51.87**	**28.37**	**7.36**
GET Booking History	170	0	0.00%	3.86	3	6	4.00	4.90	5.00	6.00	17.36	10.64	2.46
GET Flight Details	170	0	0.00%	4.92	3	35	4.00	5.00	5.00	35.00	17.30	6.30	2.62
GET Ticket	170	0	0.00%	7.07	5	10	7.00	8.00	9.00	10.00	17.37	11.54	2.31

50 Threads Report



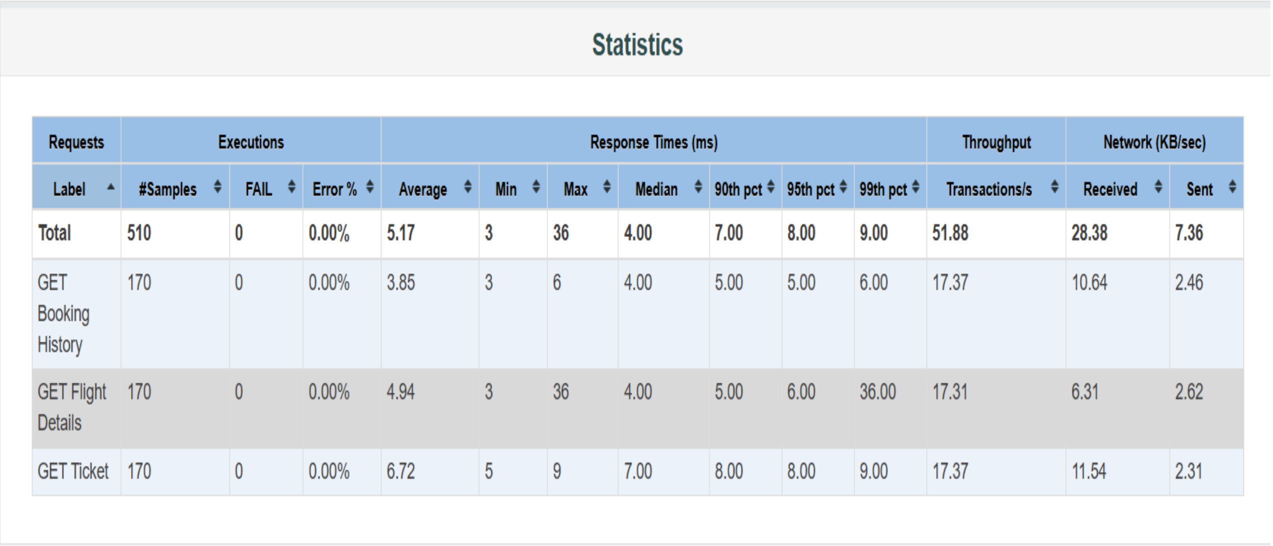
Test and Report information

Source file	"results50.jtl"
Start Time	"12/2/25, 7:24 AM"
End Time	"12/2/25, 7:24 AM"
Filter for display	""

APDEX (Application Performance Index)

Apdex	T (Toleration threshold)	F (Frustration threshold)	Label
1.000	**500 ms**	**1 sec 500 ms**	**Total**
1.000	500 ms	1 sec 500 ms	GET Ticket
1.000	500 ms	1 sec 500 ms	GET Flight Details
1.000	500 ms	1 sec 500 ms	GET Booking History

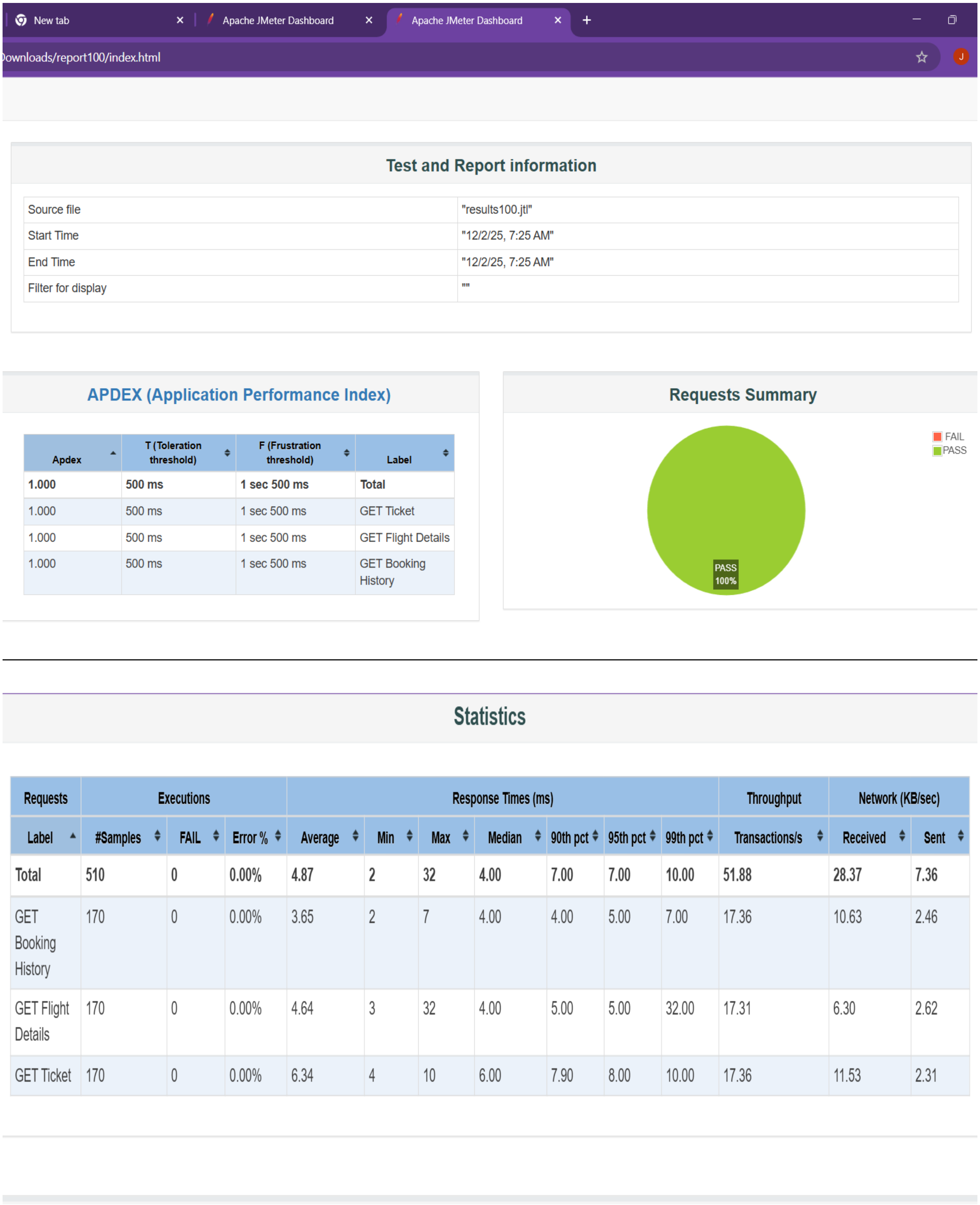
Requests Summary



Statistics

Requests	Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total	**510**	**0**	**0.00%**	**5.17**	**3**	**36**	**4.00**	**7.00**	**8.00**	**9.00**	**51.88**	**28.38**	**7.36**
GET Booking History	170	0	0.00%	3.85	3	6	4.00	5.00	5.00	6.00	17.37	10.64	2.46
GET Flight Details	170	0	0.00%	4.94	3	36	4.00	5.00	6.00	36.00	17.31	6.31	2.62
GET Ticket	170	0	0.00%	6.72	5	9	7.00	8.00	8.00	9.00	17.37	11.54	2.31

100 Threads



Test and Report information

Source file	"results100.jtl"
Start Time	"12/2/25, 7:25 AM"
End Time	"12/2/25, 7:25 AM"
Filter for display	""

APDEX (Application Performance Index)

Apdex	T (Toleration threshold)	F (Frustration threshold)	Label
1.000	**500 ms**	**1 sec 500 ms**	**Total**
1.000	500 ms	1 sec 500 ms	GET Ticket
1.000	500 ms	1 sec 500 ms	GET Flight Details
1.000	500 ms	1 sec 500 ms	GET Booking History

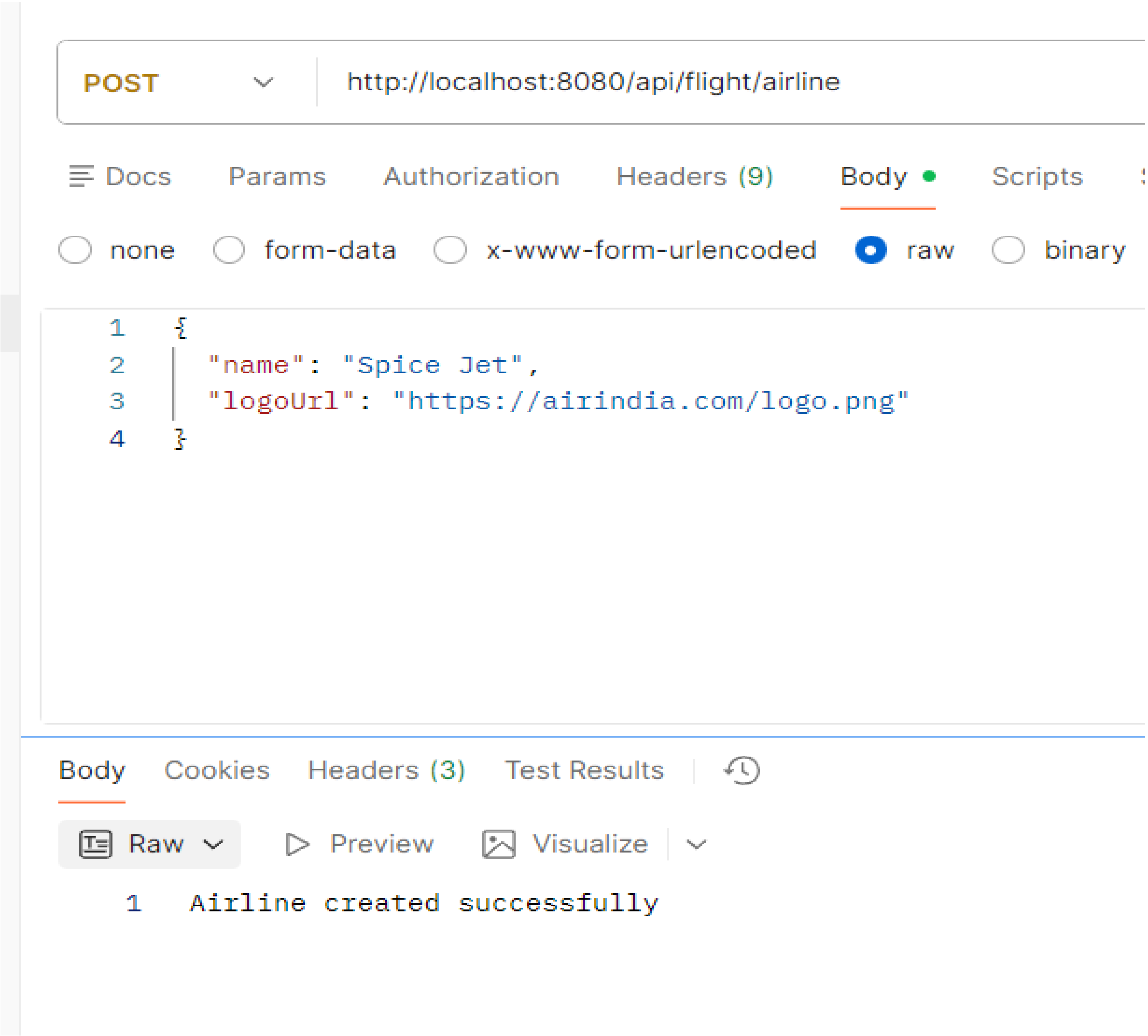
Requests Summary

Statistics

Requests	Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total	510	0	0.00%	4.87	2	32	4.00	7.00	7.00	10.00	51.88	28.37	7.36
GET Booking History	170	0	0.00%	3.65	2	7	4.00	4.00	5.00	7.00	17.36	10.63	2.46
GET Flight Details	170	0	0.00%	4.64	3	32	4.00	5.00	5.00	32.00	17.31	6.30	2.62
GET Ticket	170	0	0.00%	6.34	4	10	6.00	7.90	8.00	10.00	17.36	11.53	2.31

API Endpoints

POST Add Airline :-



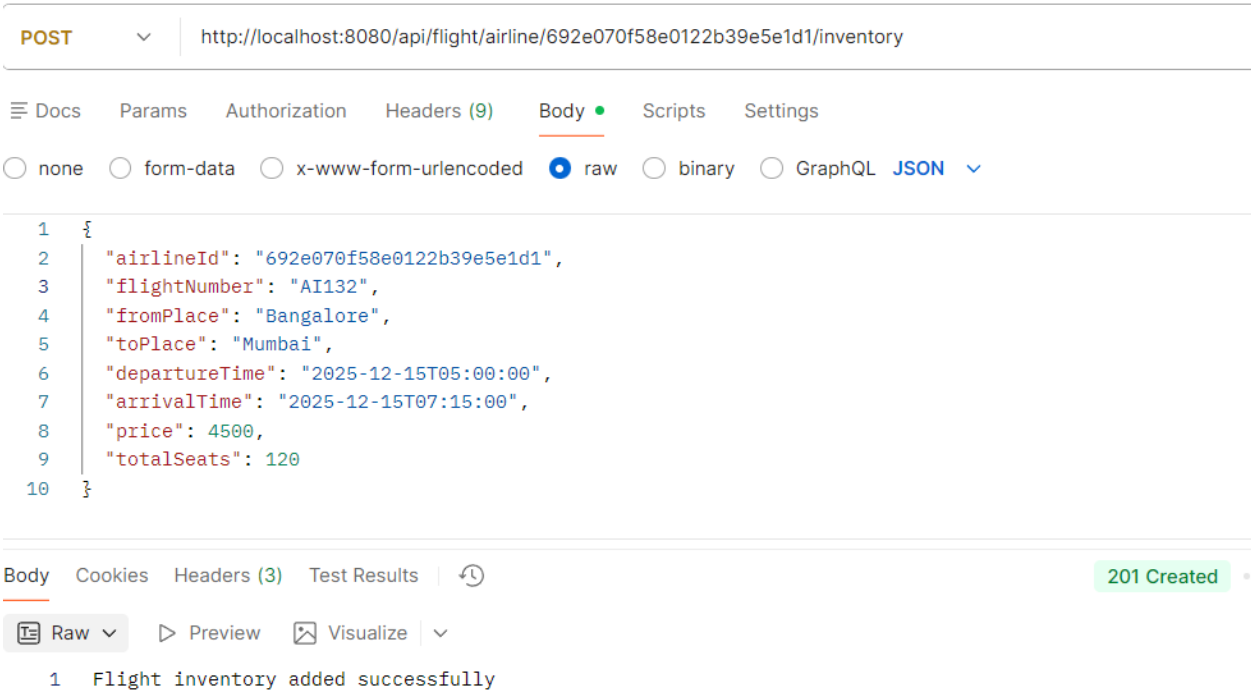
POST http://localhost:8080/api/flight/airline

○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary

```
{
  "name": "Spice Jet",
  "logoUrl": "https://airindia.com/logo.png"
}
```

```
Airline created successfully
```

POST Add Flight Inventory



POST http://localhost:8080/api/flight/airline/692e070f58e0122b39e5e1d1/inventory

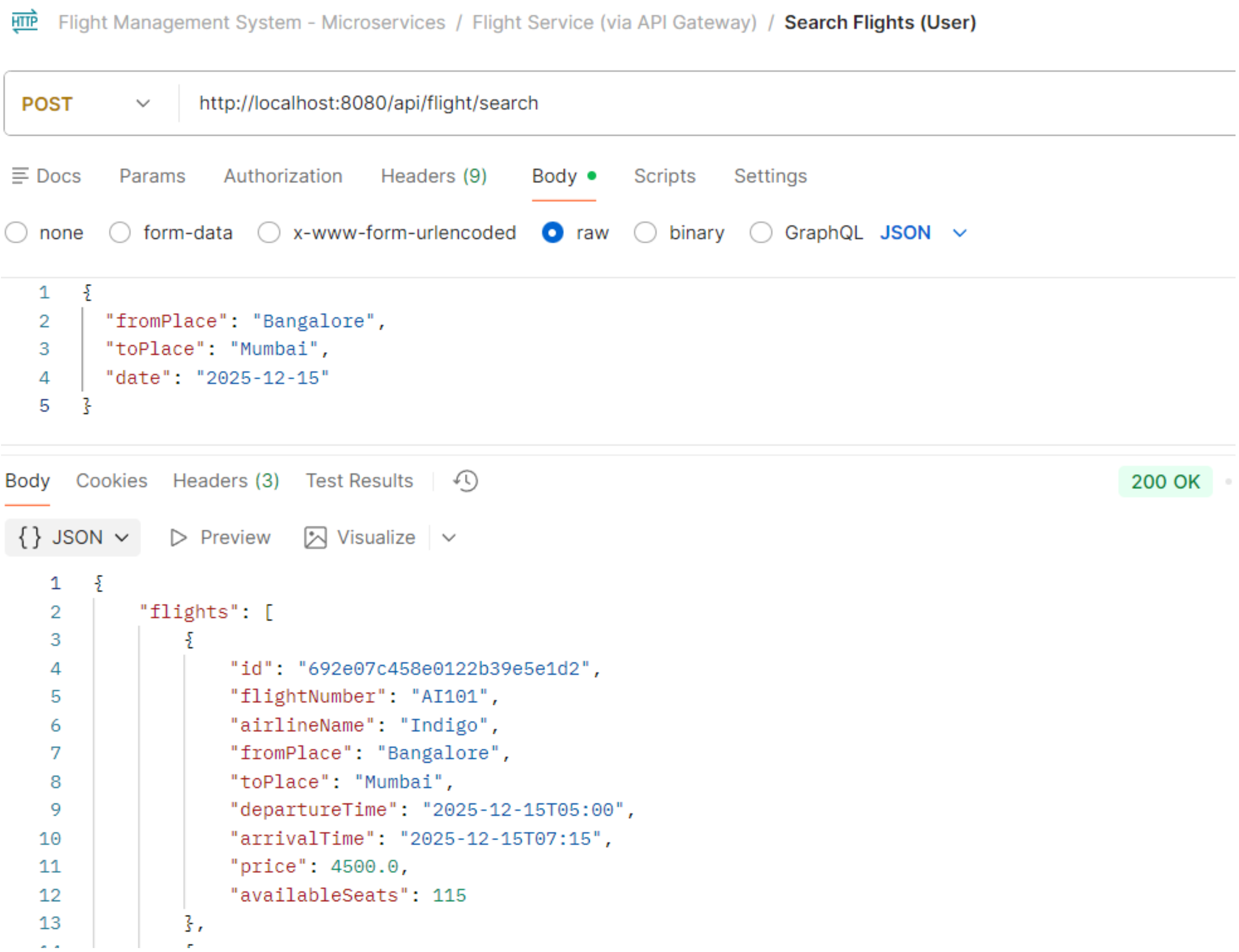
Body: ● raw JSON

```
{
  "airlineId": "692e070f58e0122b39e5e1d1",
  "flightNumber": "AI132",
  "fromPlace": "Bangalore",
  "toPlace": "Mumbai",
  "departureTime": "2025-12-15T05:00:00",
  "arrivalTime": "2025-12-15T07:15:00",
  "price": 4500,
  "totalSeats": 120
}
```

201 Created

```
Flight inventory added successfully
```

POST Search flights



Flight Management System - Microservices / Flight Service (via API Gateway) / **Search Flights (User)**

POST http://localhost:8080/api/flight/search

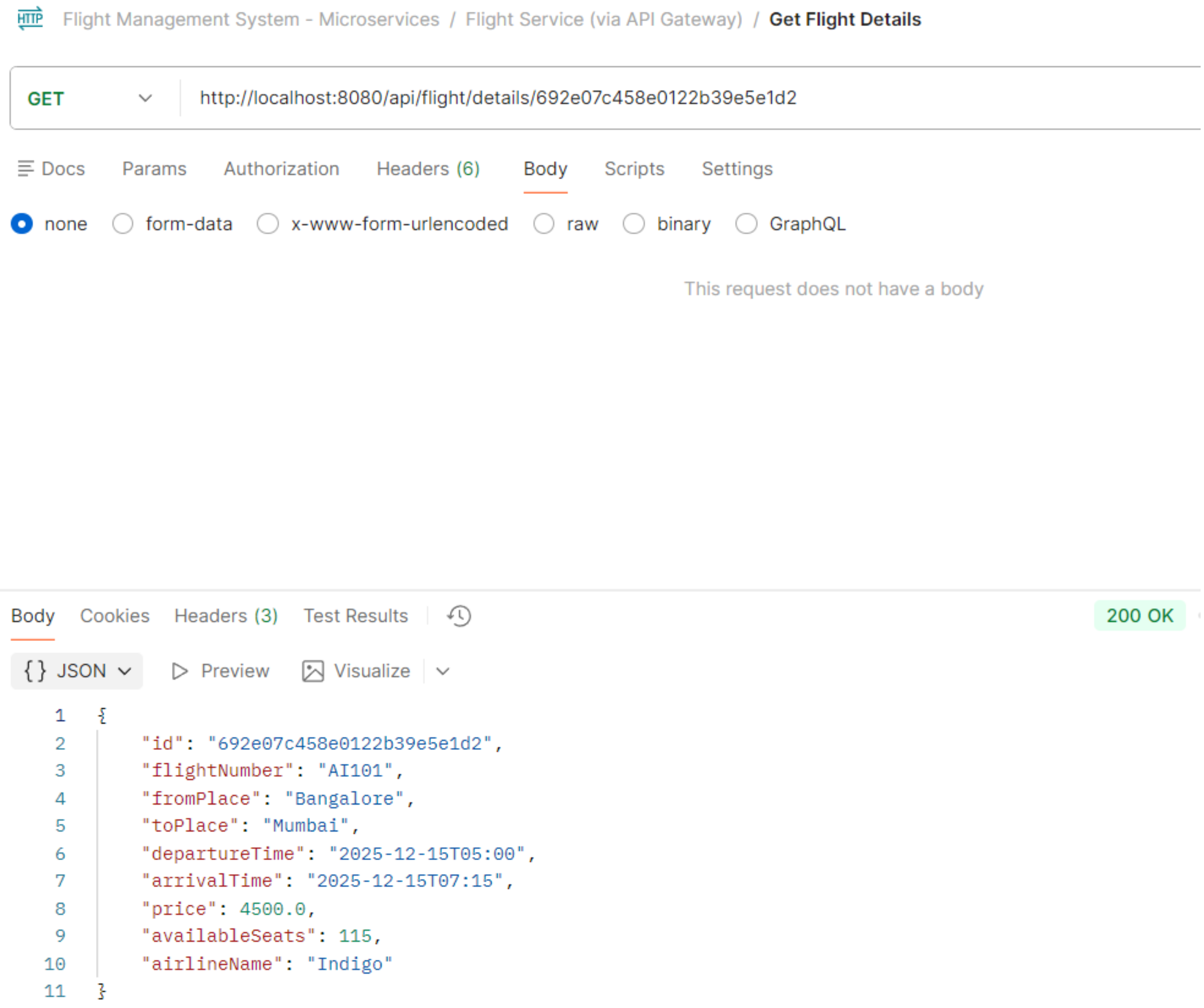
○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary ○ GraphQL JSON

```
{
  "fromPlace": "Bangalore",
  "toPlace": "Mumbai",
  "date": "2025-12-15"
}
```

200 OK

```
{
    "flights": [
        {
            "id": "692e07c458e0122b39e5e1d2",
            "flightNumber": "AI101",
            "airlineName": "Indigo",
            "fromPlace": "Bangalore",
            "toPlace": "Mumbai",
            "departureTime": "2025-12-15T05:00",
            "arrivalTime": "2025-12-15T07:15",
            "price": 4500.0,
            "availableSeats": 115
        },
```

GET Get Flight Details



Flight Management System - Microservices / Flight Service (via API Gateway) / **Get Flight Details**

GET http://localhost:8080/api/flight/details/692e07c458e0122b39e5e1d2

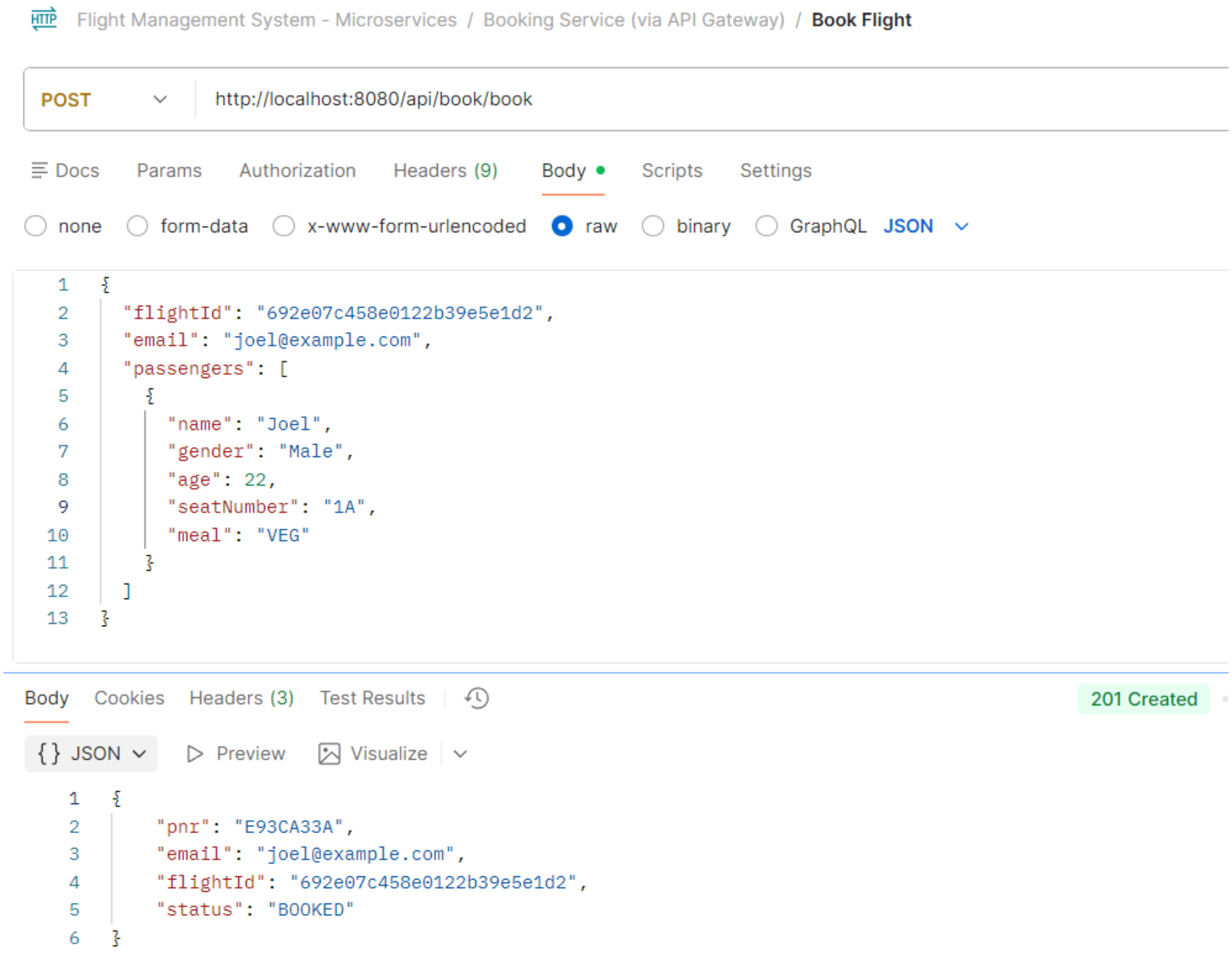
● none ○ form-data ○ x-www-form-urlencoded ○ raw ○ binary ○ GraphQL

This request does not have a body

200 OK

```
{
    "id": "692e07c458e0122b39e5e1d2",
    "flightNumber": "AI101",
    "fromPlace": "Bangalore",
    "toPlace": "Mumbai",
    "departureTime": "2025-12-15T05:00",
    "arrivalTime": "2025-12-15T07:15",
    "price": 4500.0,
    "availableSeats": 115,
    "airlineName": "Indigo"
}
```

POST Book Seat in Flight



Flight Management System - Microservices / Booking Service (via API Gateway) / Book Flight

POST http://localhost:8080/api/book/book

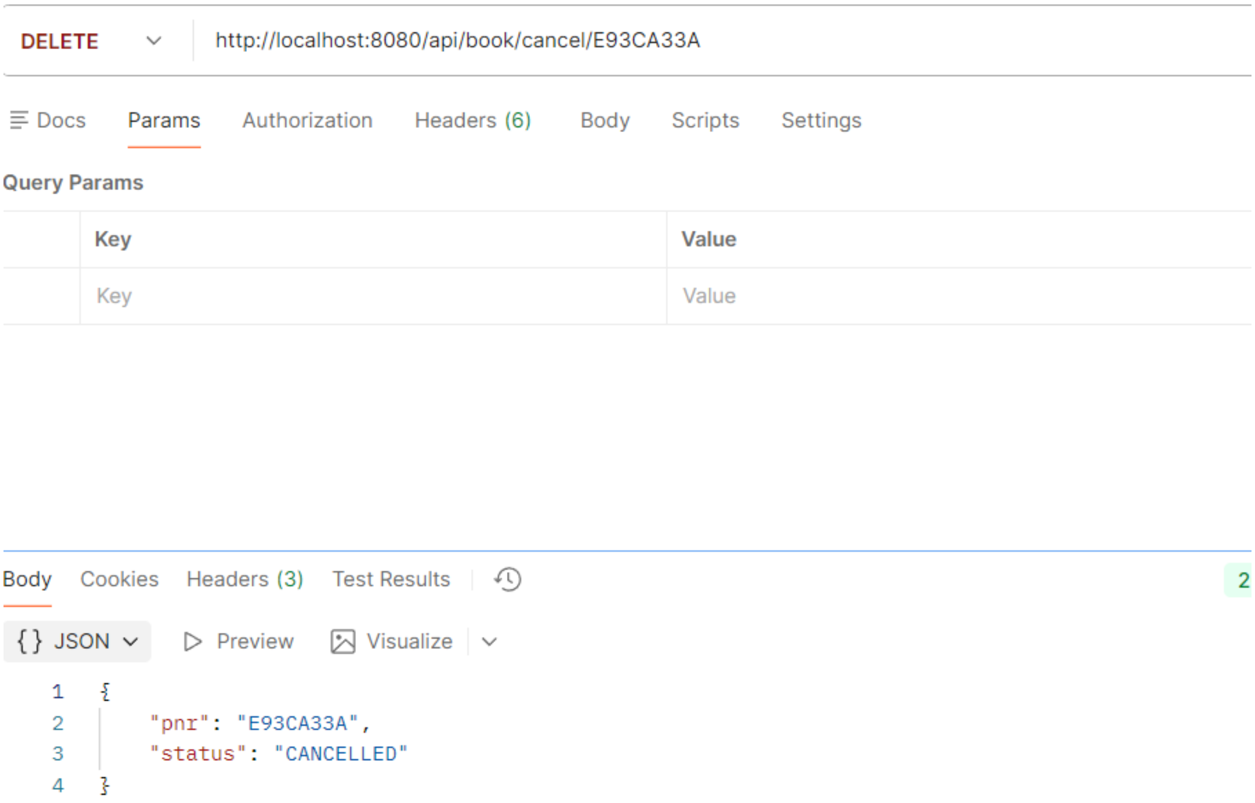
○ none ○ form-data ○ x-www-form-urlencoded ● raw ○ binary ○ GraphQL JSON

```
{
  "flightId": "692e07c458e0122b39e5e1d2",
  "email": "joel@example.com",
  "passengers": [
    {
      "name": "Joel",
      "gender": "Male",
      "age": 22,
      "seatNumber": "1A",
      "meal": "VEG"
    }
  ]
}
```

201 Created

```
{
    "pnr": "E93CA33A",
    "email": "joel@example.com",
    "flightId": "692e07c458e0122b39e5e1d2",
    "status": "BOOKED"
}
```

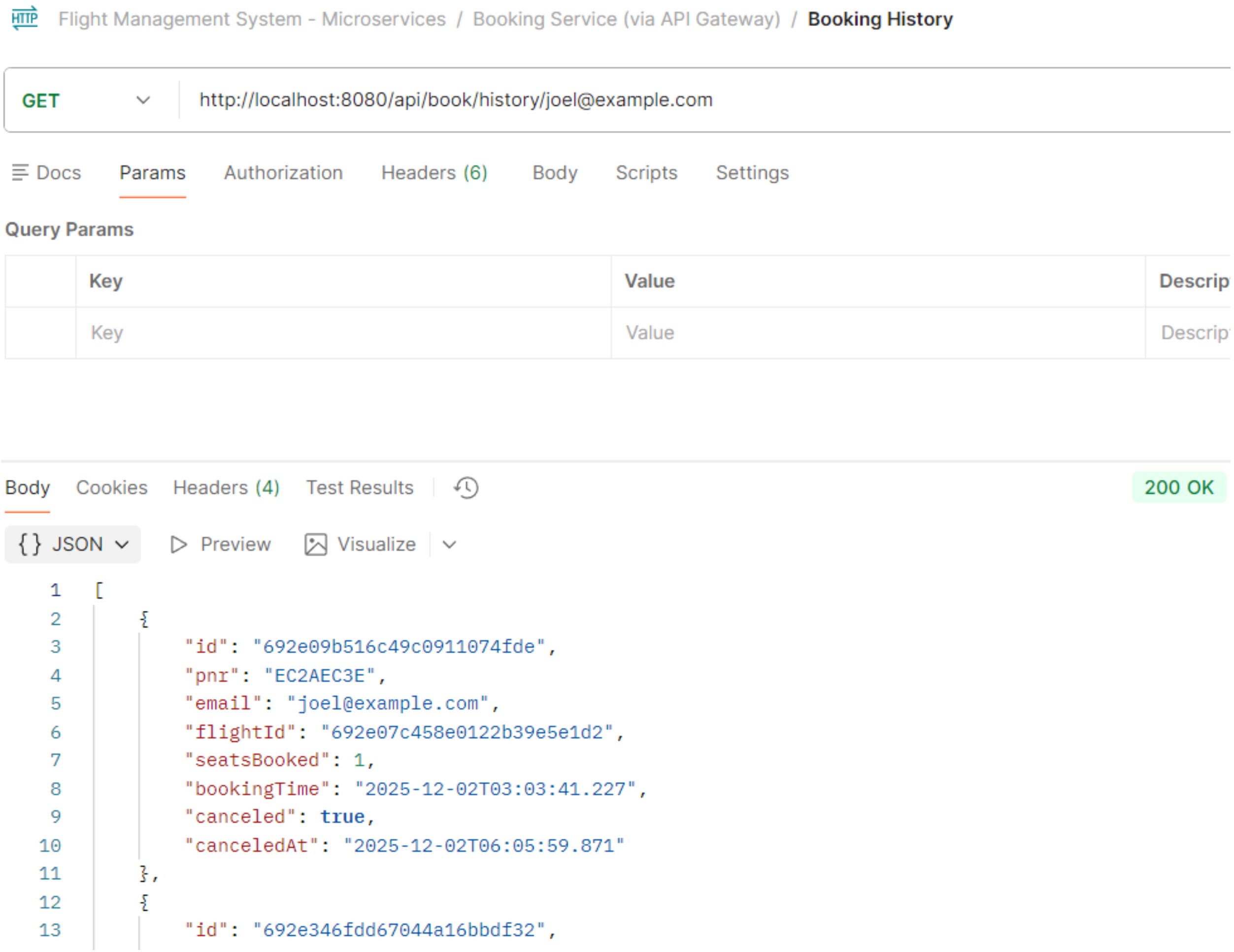
DELETE Cancel Booking



DELETE http://localhost:8080/api/book/cancel/E93CA33A

```
{
    "pnr": "E93CA33A",
    "status": "CANCELLED"
}
```

GET Get Booking History



Flight Management System - Microservices / Booking Service (via API Gateway) / **Booking History**

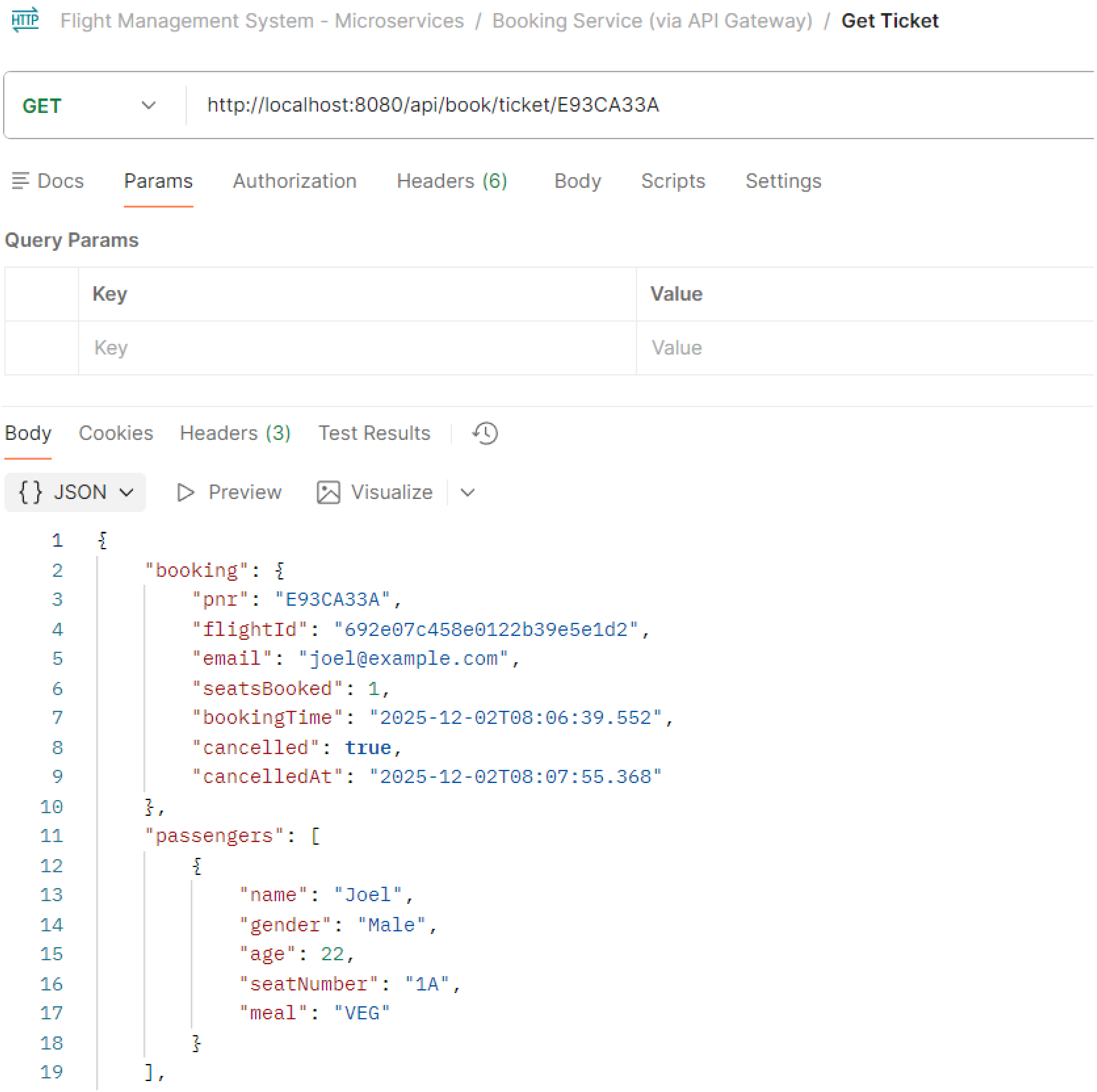
GET http://localhost:8080/api/book/history/joel@example.com

Query Params

	Key	Value	Descrip
	Key	Value	Descrip

```
[
    {
        "id": "692e09b516c49c0911074fde",
        "pnr": "EC2AEC3E",
        "email": "joel@example.com",
        "flightId": "692e07c458e0122b39e5e1d2",
        "seatsBooked": 1,
        "bookingTime": "2025-12-02T03:03:41.227",
        "canceled": true,
        "canceledAt": "2025-12-02T06:05:59.871"
    },
    {
        "id": "692e346fdd67044a16bbdf32",
```

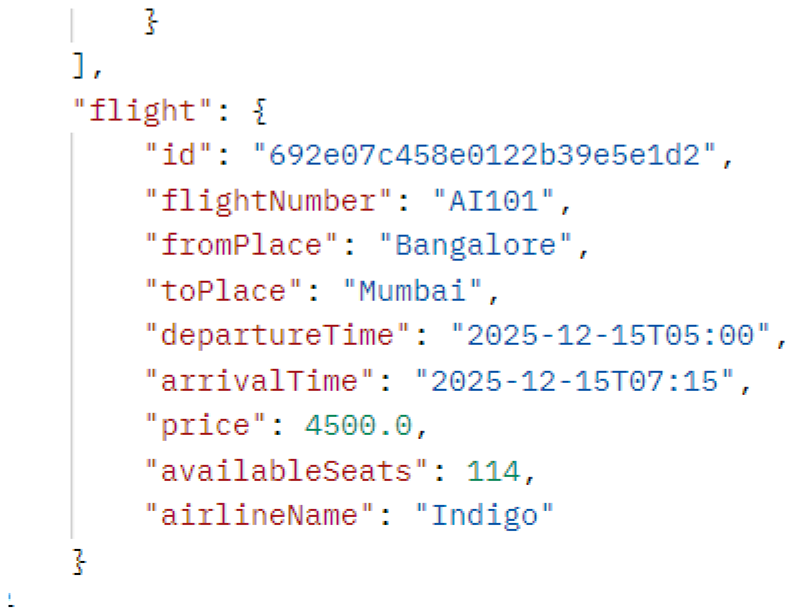
GET Ticket Details



Flight Management System - Microservices / Booking Service (via API Gateway) / **Get Ticket**

GET http://localhost:8080/api/book/ticket/E93CA33A

```
{
    "booking": {
        "pnr": "E93CA33A",
        "flightId": "692e07c458e0122b39e5e1d2",
        "email": "joel@example.com",
        "seatsBooked": 1,
        "bookingTime": "2025-12-02T08:06:39.552",
        "cancelled": true,
        "cancelledAt": "2025-12-02T08:07:55.368"
    },
    "passengers": [
        {
            "name": "Joel",
            "gender": "Male",
            "age": 22,
            "seatNumber": "1A",
            "meal": "VEG"
        }
    ],
```



```
        }
    ],
    "flight": {
        "id": "692e07c458e0122b39e5e1d2",
        "flightNumber": "AI101",
        "fromPlace": "Bangalore",
        "toPlace": "Mumbai",
        "departureTime": "2025-12-15T05:00",
        "arrivalTime": "2025-12-15T07:15",
        "price": 4500.0,
        "availableSeats": 114,
        "airlineName": "Indigo"
    }
}
```