

Non - Functional Testing

Website : [SportSphere](#)

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● Types of NF - Testing done

1. Performance Test
2. Load Test
3. Stress Test
4. Testing of Security

● Technology / Tools Used for NF - Testing

1. Apache - Jmeter

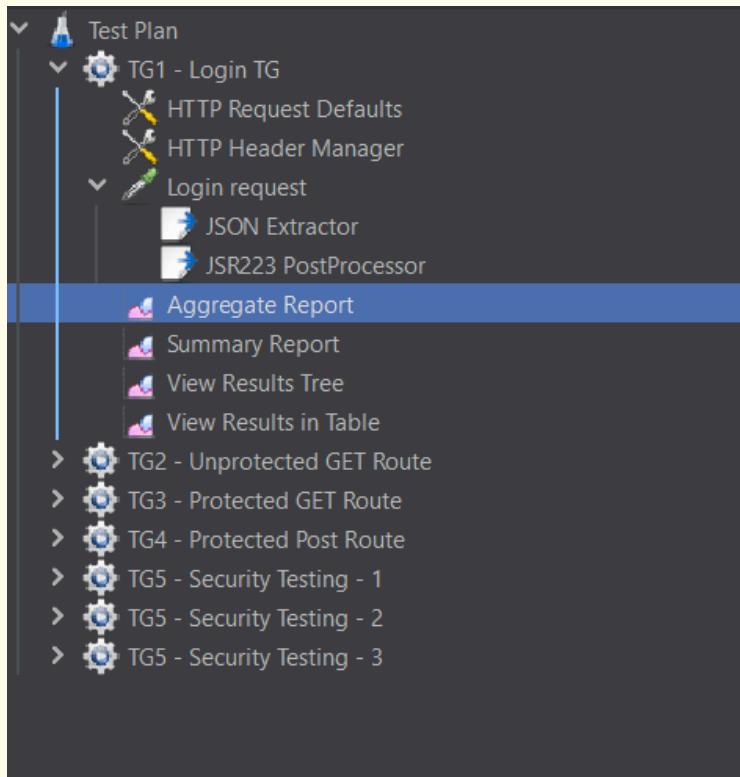
● Process of Testing

- The backend APIs deployed on Render were tested directly through JMeter by configuring Thread Groups, HTTP Requests, Header Managers, Timers, and Assertions.
- A dedicated **Login Thread Group** was created to authenticate the user and extract the JWT token for all protected API calls.
- Separate Thread Groups were built for each test type (Performance, Load, Stress, Security) to ensure clear isolation and accurate test results.
- The test results were analyzed using JMeter listeners such as **Aggregate Report**, **Summary Report**, and **View Results Tree**, enabling accurate identification of bottlenecks and system limits.

● TG1 - Login Test Group

- TG-1 was created to authenticate the user by sending a POST /api/auth/login request with valid credentials and to obtain the JWT T0ken.
- A **JSON Extractor** was used to capture the JWT token from the login response, and a **JSR223 PostProcessor** stored this token as a JMeter property for use in subsequent thread groups.
- This ensures all protected API routes receive a valid Authorization: Bearer <token> header automatically.

TG Structure :



Result Obtained :

The screenshot shows the JMeter interface with the 'Response data' tab selected. In the 'Response Body' section, the following JSON response is displayed:

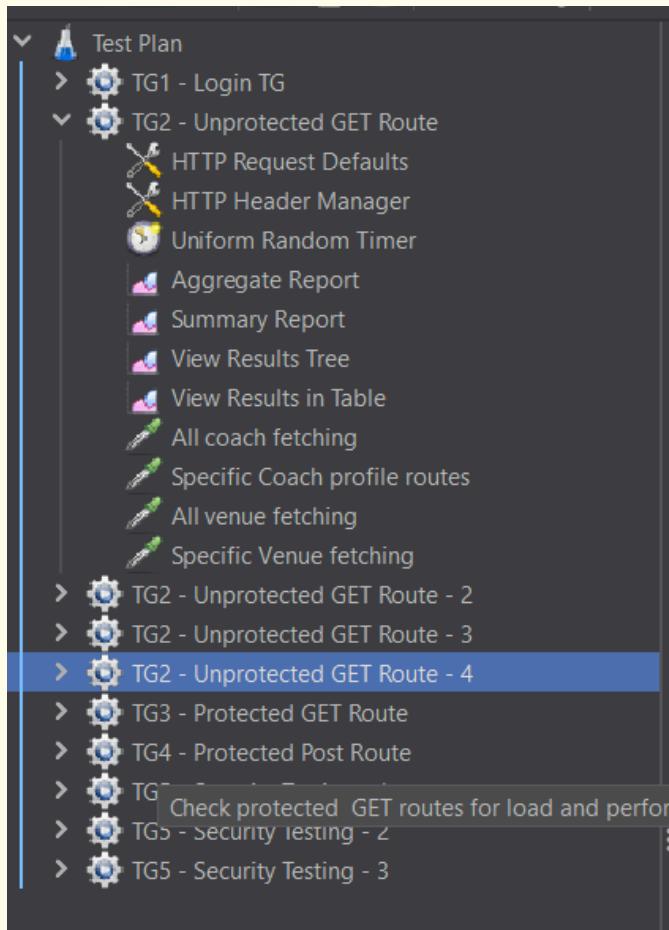
```
{"success":true,"message":"Login successful","token":"eyJhbGciOiJIUzI1NilsInR5cCI6IkpXCV0wiaWF0ljoxNzY0MzkzMzY0LCJleHAiOjE3NjQ0MDQxNjR9.L_r5BSgTJ9tcyYAveuGAm6bBI7Imaheriya","email":"202301470@dau.ac.in","role":"player","verified":true}
```

● TG2 - Unprotect GET Routes

- TG-2 was created to test the performance of protected GET endpoints such as venue , games ,
- It includes 3 test cases

No	No of Threads	Ramp Up Period	Loop Count
1	10	10	5
2	100	10	5

TG Structure :



For 10 Concurrent user :

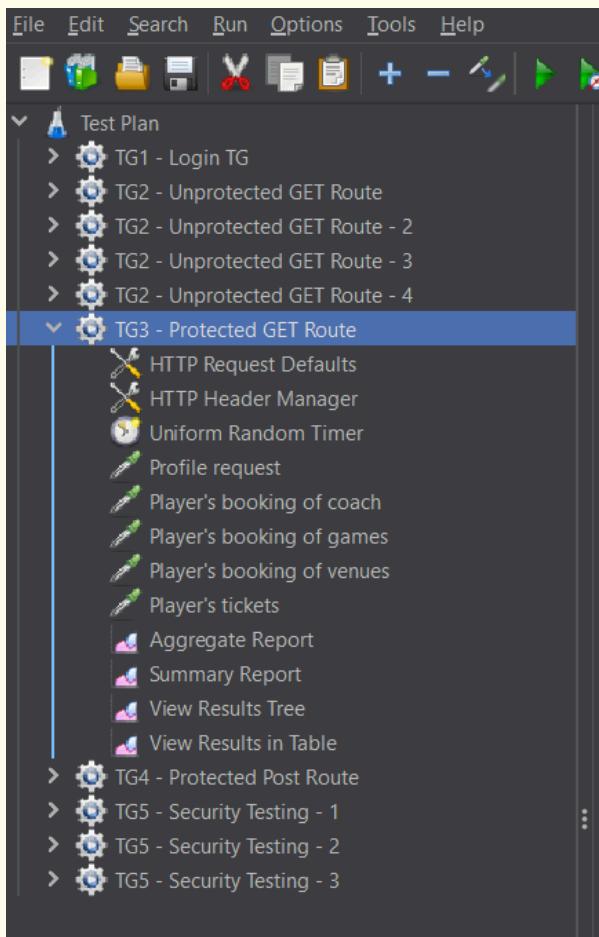
Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s..	Sent KB/sec
All coach fetc...	50	878	796	1177	1215	1361	752	1361	0.00%	1.5/sec	1.35	0.59
Specific Coac...	50	867	789	1035	1340	1635	753	1635	0.00%	1.5/sec	2.22	0.63
All venue fetc...	50	694	573	1071	1099	1417	532	1417	0.00%	1.5/sec	5.35	0.58
Specific Venu...	50	659	561	935	1002	1306	522	1306	0.00%	1.5/sec	1.50	0.61
TOTAL	200	775	773	1084	1228	1416	522	1635	0.00%	5.2/sec	9.05	2.10

For 100 Concurrent Users :

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s..	Sent KB/sec
All coach fetc...	497	7775	4014	10369	33141	96507	598	125192	3.42%	2.1/sec	1.90	0.83
Specific Coac...	494	9410	4063	11894	40712	125329	722	168633	4.86%	2.1/sec	3.03	0.88
All venue fetc...	492	8643	2284	17774	54022	115048	465	168751	6.50%	2.1/sec	6.99	0.80
Specific Venu...	490	10067	2245	21457	63642	126673	338	168665	11.02%	2.1/sec	2.08	0.83
TOTAL	1973	8970	3672	13848	49874	115048	338	168751	6.44%	8.2/sec	13.87	3.31

● TG3 - Protected Get Routes

- Test Group 3 contains TC to send GET Request Route of Player's side coach , venue and game bookings.
- These Routes are protected and require a JWT Session Token.
- It took around ~1 sec for 90% of Users and ~1.5 to ~1.7 second for 99% Users.



For 10 Concurrent user :

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s...	Sent KB/sec
Profile request	200	866	818	968	1027	1540	742	1691	0.50%	17.3/min	0.54	0.11
Player's booki...	200	1100	1050	1244	1364	1618	965	1731	0.50%	17.3/min	0.60	0.12
Player's booki...	200	936	857	1091	1301	2171	761	3490	0.00%	17.3/min	0.17	0.11
Player's booki...	200	847	810	981	1039	1350	721	1478	0.50%	17.3/min	0.46	0.12
Player's tickets	200	867	810	1001	1083	1499	737	3302	0.00%	17.3/min	0.23	0.11
TOTAL	1000	923	844	1115	1238	1548	721	3490	0.30%	1.4/sec	1.98	0.57

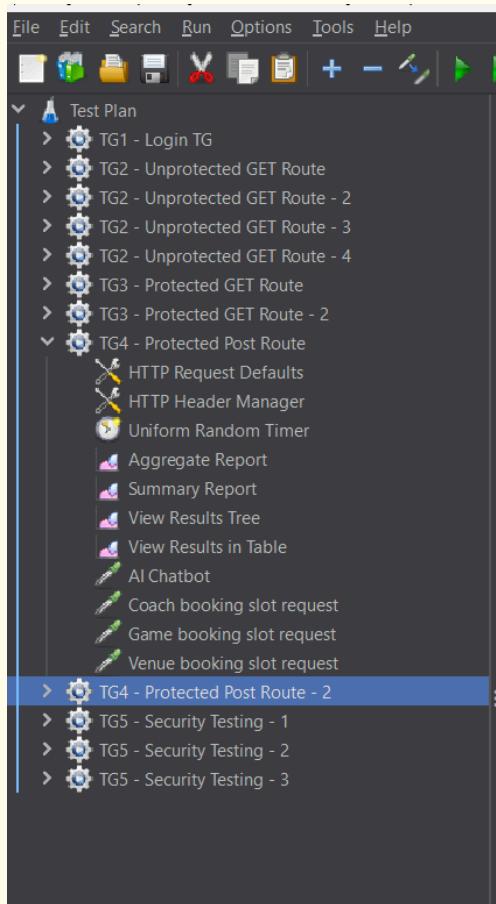
For 100 Concurrent Users :

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s...	Sent KB/sec
Profile request	1000	6087	6064	8638	9275	9832	885	11599	2.50%	2.6/sec	15.55	1.01
Player's booki...	1000	9244	9147	11621	12169	12809	1380	14585	3.50%	2.5/sec	21.88	1.02
Player's booki...	1000	7361	7574	9208	9586	10063	1159	13588	1.30%	2.5/sec	10.17	1.00
Player's booki...	1000	7105	7243	9061	9386	9702	782	10847	0.60%	2.5/sec	4.57	1.01
Player's tickets	1000	6261	6181	8598	9079	9790	747	11452	1.00%	2.6/sec	7.60	1.00
TOTAL	5000	7212	7305	9519	10634	12174	747	14585	1.78%	12.4/sec	58.08	4.91

- For 100 users it took ~8 sec for 90% Users and ~12 sec for 99%Users.

● TG4 - Protected Post Routes

- Test Group 4 contains TC to send POST Request to Route of Sloat Request for coach , venue and games.



For 10 Users :

- It took on average ~1sec for 90% Users and ~1.5 - 2 sec for 99% Users.

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s...	Sent KB/sec
AI Chatbot	100	1255	960	1963	2503	2973	868	3142	0.00%	1.5/sec	0.76	0.63
Coach bookin...	100	903	785	1031	1320	2333	735	5706	0.00%	1.5/sec	0.80	0.71
Game bookin...	100	814	782	888	1038	1267	731	1558	0.00%	1.5/sec	0.75	0.61
Venue bookin...	100	841	789	1010	1135	1439	725	1440	0.00%	1.5/sec	1.21	0.60
TOTAL	400	953	795	1270	1793	2535	725	5706	0.00%	5.6/sec	3.23	2.34

For 100 Users :

- It took on average ~1sec for 90% Users and ~1.5 - 2 sec for 99% Users.

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/s...	Sent KB/sec
AI Chatbot	1000	3457	3009	5293	7072	8295	1097	9110	0.10%	5.5/sec	2.67	2.34
Coach bookin...	1000	3948	4122	4698	4967	5311	802	5709	0.00%	5.5/sec	2.86	2.53
Game bookin...	1000	3984	4142	4731	5015	5378	761	5776	0.10%	5.5/sec	2.72	2.19
Venue bookin...	1000	3961	4142	4716	4984	5328	738	5708	0.00%	5.5/sec	4.32	2.15
TOTAL	4000	3837	4019	4746	5162	7318	738	9110	0.05%	21.3/sec	12.17	8.91

● TG5 - Security Testing

- There are several TC Under this Testing.
- First TC Include Login attempt without JWT Token and with wrong JWT Token.
- So we got errors for both cases.

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
1	13:34:44.372	TG5 - Security Testi...	Missing Token	1247	✗	560	179	1247	384
2	13:34:46.173	TG5 - Security Testi...	Invalid Token	359	✗	560	179	359	0

- When One type of User want to access another type of User's functionality then we will get message containing these is not allowed

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
1	13:35:47.487	TG5 - Security Testi...	Wrong Role Test	932	✓	533	408	932	358
2	13:35:48.903	TG5 - Security Testi...	Wrong Role Test	1363	✓	523	404	1363	0

The screenshot shows the JMeter interface with the 'Response data' tab selected. On the left, a dropdown menu labeled 'Text' is open, showing two entries: 'Wrong Role Test' and 'Wrong Role Test'. The main panel displays the response data as a JSON object: {"success":false,"message":"Only coaches can access this"}

- When User send too many wrong credentials for login attempt in short time we should show error message but we are not getting it.
- It should also show error message when User Send too many OTP Request.
- It should also SQL Injection login.

Screenshot of a NetworkMiner or similar packet capture tool showing a successful SQL injection attempt. The interface includes a sidebar with a shield icon labeled "SQL Injection for login". The main pane shows the "Response data" tab selected, displaying the JSON response {"success":false,"message":"Invalid credentials"}.

#	Date	User	Action	Details	Time	Source IP	Destination IP	Protocol	Length	Checksum	Flags	Sequence	Acknowledgment	Timestamp	Offset
8		TG5 - Security Testi...	Brute Force Login ...		15:45:29.058	192.168.1.100	192.168.1.101	HTTP	1586	555	15:45:29.058	1222	494	1222	0
9	13:45:27.714	TG5 - Security Testi...	Brute Force Login ...						1222	533					
10	13:45:29.914	TG5 - Security Testi...	Brute Force Login ...						1277	533					
11	13:45:31.730	TG5 - Security Testi...	Brute Force Login ...						1274	533					
12	13:45:33.464	TG5 - Security Testi...	Valid Email						654	522					
13	13:45:34.915	TG5 - Security Testi...	Invalid Email						2116	592					
14	13:45:37.235	TG5 - Security Testi...	Valid Email						407	522					
15	13:45:38.607	TG5 - Security Testi...	Invalid Email						1697	592					