



IT-314 Software Engineering

Team 24

AlgrowBiz

Non-Functional Testing

Non-functional requirements ensure the app is secure, reliable, and scalable, providing a smooth user experience with minimal downtime. They support growth, maintainability, and trust by optimizing performance and safeguarding data.

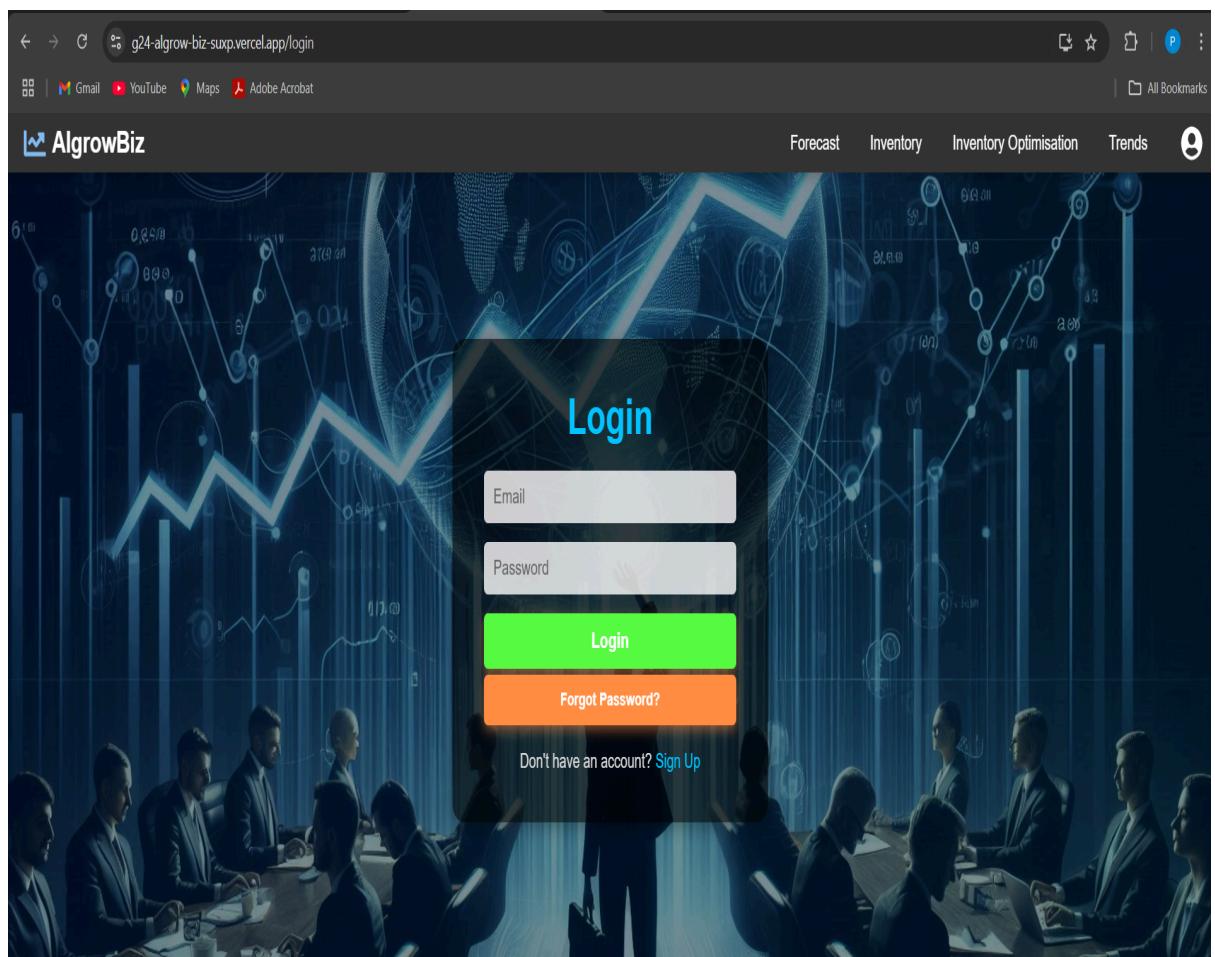
The following are the non-functional requirements of our project:

- **Reliability:** The app should provide accurate forecasts consistently, handle failures gracefully, and ensure data integrity even during disruptions, such as power outages or server crashes.
- **Performance:** The app must process and analyze large datasets quickly, delivering forecasts and insights within a reasonable timeframe, ensuring responsiveness for users.
- **Scalability:** The app should handle an increasing number of users or larger datasets without performance degradation, allowing it to grow with the business needs.
- **User-Friendly:** The app must have an intuitive interface, clear visualizations, and simple navigation to ensure users can easily generate, interpret, and act on sales forecasts without extensive training. (This has been covered under GUI section already.)

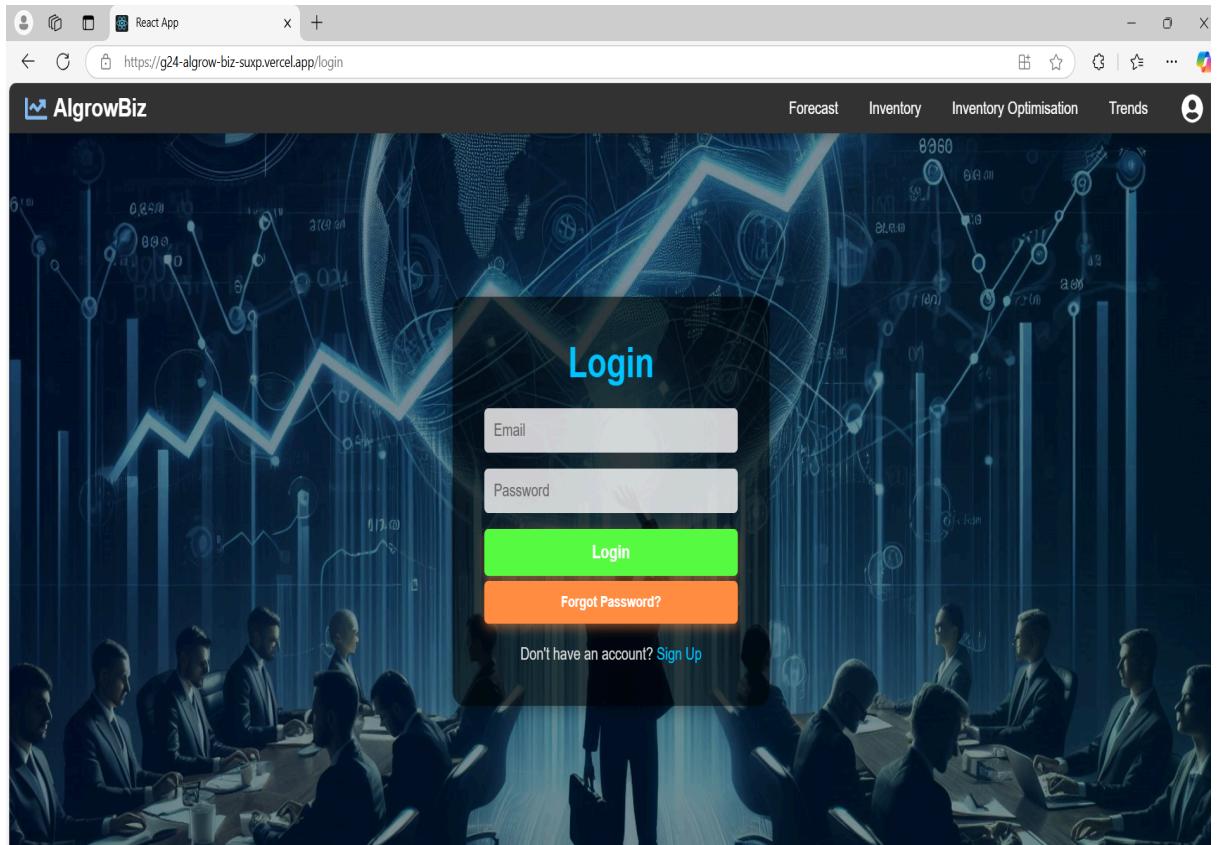
Compatibility Check:

Another important purpose of doing a non-functionality check is to test whether it fits with all the latest browsers, used in major proportions by the users in the present world. Here is our model's compatibility among different web browsers:

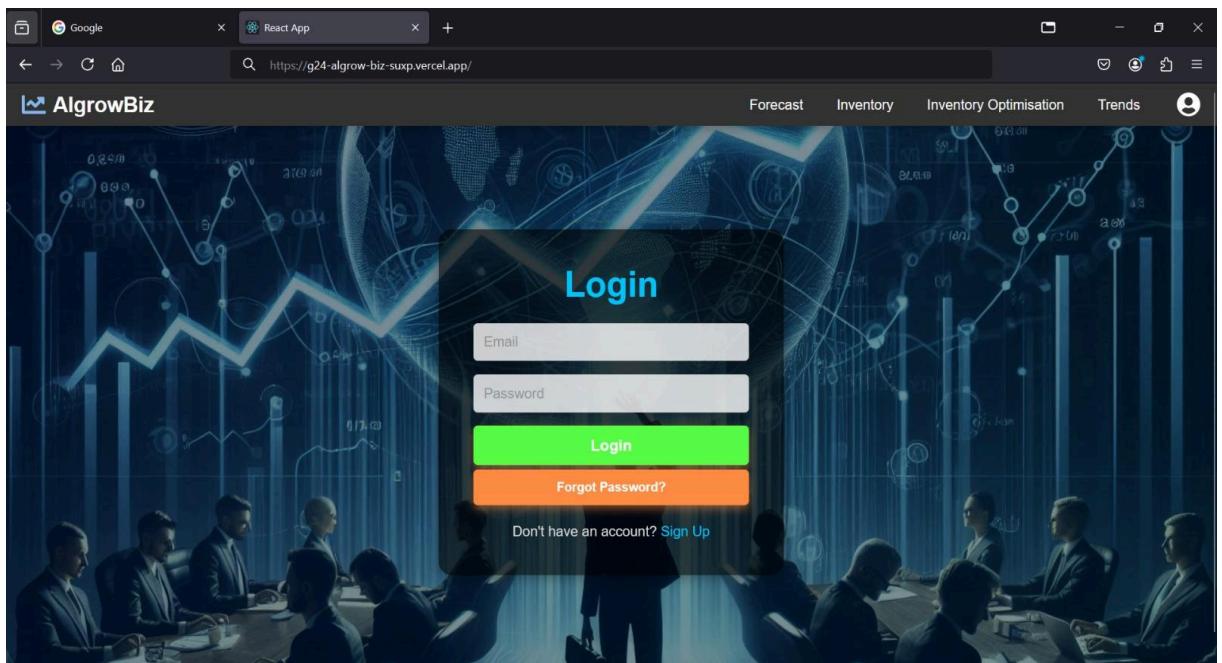
1) Google Chrome:



2) Microsoft Edge:



3) Mozilla Firefox:



Scalability(Load Testing):

In the load testing part, we notice the effects when multiple users visit/use our webpage and aim that our system shall be scalable.

Here are the different load testings for each of the pages:

Report :

The screenshot shows the JMeter interface with the 'Summary Report' selected in the left tree view. The main area displays a table of results with the following columns: Label, # Samples, Average, Min, Max, Std. Dev., Error %, Throughput, Received KB/sec, Sent KB/sec, and Avg. Bytes. The data includes results for LoginPage, HomePage, Forecast, Inventory, Iniform, InventoryOptimisation, Trends, and a total row for 21000 samples. The throughput is 45.5/sec, received KB/sec is 62.56, and sent KB/sec is 7.10.

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
LoginPage	3000	651	54	3852	523.26	1.10%	54.5/sec	62.56	7.10	
HomePage	3000	561	64	3853	395.88	0.13%	54.6/sec	61.81	7.13	
Forecast	3000	541	55	3652	348.15	0.00%	54.5/sec	61.63	7.35	
Inventory	3000	537	49	2877	342.38	0.00%	54.5/sec	61.58	7.39	
Iniform	3000	651	81	4314	601.70	1.10%	54.4/sec	62.36	7.52	
InventoryOptimisation	3000	550	63	4676	395.23	0.13%	54.7/sec	61.80	8.32	
Trends	3000	531	58	3864	352.05	0.00%	55.0/sec	62.06	7.58	
TOTAL	21000	575	49	4676	435.69	0.35%	376.1/sec	426.96	51.55	

Results in table:

The screenshot shows the JMeter interface with the 'View Results in Table' selected in the left tree view. The main area displays a table of results with the following columns: Sample #, Start Time, Thread Name, Label, Sample Time(ms), Status, Bytes, Sent Bytes, Latency, and Connect Time(ms). The data lists numerous transactions for various pages like Trends, Iniform, and InventoryOptimisation over a period from 19:49:37.278 to 19:49:37.648, with latencies ranging from 111 to 192 ms.

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
2067	19:49:37.278	Thread Group 1-290	Trends	165	✓	1155	141	165	0
2068	19:49:37.287	Thread Group 1-283	Trends	160	✓	1155	141	160	0
2069	19:49:37.284	Thread Group 1-289	Trends	166	✓	1155	141	166	0
2070	19:49:37.291	Thread Group 1-288	Inventory	159	✓	1158	139	159	0
2071	19:49:37.283	Thread Group 1-292	Iniform	167	✓	1155	143	167	0
2072	19:49:37.305	Thread Group 1-263	Trends	181	✓	1155	141	181	0
2073	19:49:37.303	Thread Group 1-297	Iniform	176	✓	1155	143	176	0
2074	19:49:37.310	Thread Group 1-293	Trends	179	✓	1155	141	179	0
2075	19:49:37.310	Thread Group 1-293	Trends	182	✓	1155	141	182	0
2076	19:49:37.313	Thread Group 1-299	Iniform	182	✓	1155	143	182	0
2077	19:49:37.375	Thread Group 1-296	Trends	147	✓	1155	141	147	0
2078	19:49:37.330	Thread Group 1-293	InventoryOptimisation	192	✓	1155	156	192	0
2079	19:49:37.375	Thread Group 1-287	Trends	147	✓	1155	141	147	0
2080	19:49:37.369	Thread Group 1-277	Trends	147	✓	1155	141	147	0
2081	19:49:37.360	Thread Group 1-294	Trends	151	✓	1155	141	151	0
2082	19:49:37.403	Thread Group 1-298	InventoryOptimisation	146	✓	1155	146	146	0
2083	19:49:37.373	Thread Group 1-292	Trends	148	✓	1155	141	148	0
2084	19:49:37.403	Thread Group 1-276	Trends	149	✓	1155	141	149	0
2085	19:49:37.410	Thread Group 1-300	Iniform	125	✓	1159	143	125	0
2086	19:49:37.432	Thread Group 1-291	InventoryOptimisation	135	✓	1155	156	135	0
2087	19:49:37.450	Thread Group 1-288	Iniform	134	✓	1155	143	134	0
2088	19:49:37.450	Thread Group 1-292	InventoryOptimisation	137	✓	1155	156	137	0
2089	19:49:37.486	Thread Group 1-297	InventoryOptimisation	111	✓	1155	156	111	0
2090	19:49:37.495	Thread Group 1-299	InventoryOptimisation	128	✓	1155	156	128	0
2091	19:49:37.538	Thread Group 1-293	Trends	86	✓	1155	141	86	0
2092	19:49:37.543	Thread Group 1-289	InventoryOptimisation	63	✓	1155	156	63	0
2093	19:49:37.553	Thread Group 1-290	InventoryOptimisation	93	✓	1155	156	93	0
2094	19:49:37.551	Thread Group 1-290	Trends	97	✓	1155	141	97	0
2095	19:49:37.567	Thread Group 1-291	Trends	98	✓	1155	141	98	0
2096	19:49:37.587	Thread Group 1-292	Trends	66	✓	1155	141	66	0
2097	19:49:37.597	Thread Group 1-297	Trends	60	✓	1155	141	60	0
2098	19:49:37.623	Thread Group 1-298	Trends	69	✓	1155	141	69	0
2099	19:49:37.647	Thread Group 1-288	Trends	65	✓	1155	141	65	0
2100	19:49:37.648	Thread Group 1-300	Trends	64	✓	1155	141	64	0

Test Plan

- Thread Group
 - LoginPage
 - HomePage
 - Forecast
 - Inventory
 - Inform
 - InventoryOptimisation
 - Trends
- View Results Tree
- Summary Report
- View Results in Table**

View Results in Table

Name: View Results in Table

Comments:

Write results to file / Read from file

Filename:

Sample # Start Time Thread Name Label Sample Time(ms) Status Bytes Sent Bytes Latency Connect Time(ms)

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
10391	19:49:19.429	Inread Group 1-19	Inform	291	✓	1125	143	291	0
10392	19:49:19.431	Thread Group 1-204	Ininform	587	✓	1155	143	587	0
10393	19:49:19.433	Thread Group 1-139	Inventory	589	✓	1158	139	589	0
10394	19:49:19.444	Thread Group 1-284	Forecast	578	✓	1158	138	578	0
10395	19:49:19.450	Thread Group 1-249	InventoryOptimisation	589	✓	1155	130	589	0
10396	19:49:19.454	Thread Group 1-157	LoginPage	590	✓	1158	135	590	0
10397	19:49:19.454	Thread Group 1-115	InventoryOptimisation	598	✓	1155	156	598	0
10398	19:49:19.459	Thread Group 1-22	InventoryOptimisation	586	✓	1155	156	586	0
10399	19:49:19.450	Thread Group 1-58	LoginPage	585	✓	1158	135	585	0
10400	19:49:19.450	Thread Group 1-32	InventoryOptimisation	591	✓	1155	156	591	0
10401	19:49:19.450	Thread Group 1-205	Ininform	597	✓	1155	143	597	0
10402	19:49:19.452	Thread Group 1-271	Inventory	595	✓	1158	139	595	0
10403	19:49:19.461	Thread Group 1-250	InventoryOptimisation	586	✓	1155	156	586	0
10404	19:49:19.462	Thread Group 1-102	Inventory	585	✓	1158	139	585	0
10405	19:49:19.463	Thread Group 1-53	InventoryOptimisation	595	✓	1155	135	595	0
10406	19:49:19.452	Thread Group 1-219	LoginPage	599	✓	1158	134	599	0
10407	19:49:19.467	Thread Group 1-34	Trends	587	✓	1155	141	587	0
10408	19:49:19.466	Thread Group 1-73	HomePage	588	✓	1159	134	588	0
10409	19:49:19.467	Thread Group 1-114	LoginPage	592	✓	1158	135	592	0
10410	19:49:19.467	Thread Group 1-254	Ininform	595	✓	1155	143	595	0
10411	19:49:19.474	Thread Group 1-174	LoginPage	596	✓	1158	135	596	0
10412	19:49:19.473	Thread Group 1-234	LoginPage	597	✓	1158	135	597	0
10413	19:49:19.487	Thread Group 1-123	InventoryOptimisation	583	✓	1155	135	583	0
10414	19:49:19.488	Thread Group 1-48	InventoryOptimisation	880	✓	1155	135	880	0
10415	19:49:19.489	Thread Group 1-59	InventoryOptimisation	601	✓	1155	136	601	0
10416	19:49:19.487	Thread Group 1-130	Ininform	583	✓	1155	143	583	0
10417	19:49:19.506	Thread Group 1-38	Forecast	567	✓	1158	138	567	0
10418	19:49:19.509	Thread Group 1-211	Inventory	564	✓	1158	139	564	0
10419	19:49:19.509	Thread Group 1-57	Trends	564	✓	1155	141	564	0
10420	19:49:19.506	Thread Group 1-78	Forecast	567	✓	1158	138	567	0
10421	19:49:19.509	Thread Group 1-227	LoginPage	566	✓	1158	135	566	0
10422	19:49:19.473	Thread Group 1-282	HomePage	602	✓	1158	134	602	0
10423	19:49:19.536	Thread Group 1-60	LoginPage	543	✓	1158	135	543	0
10424	19:49:19.510	Thread Group 1-116	Trends	571	✓	1155	141	571	0
10425	19:49:19.509	Thread Group 1-242	InventoryOptimisation	579	✓	1156	156	579	0

Scroll automatically? Child samples? No of Samples: 21000 Latest Sample: 64 Average: 475 Deviation: 405

Test Plan

- Thread Group
 - LoginPage
 - HomePage
 - Forecast
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- View Results Tree
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View Results in Table

Name: View Results in Table

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Sample # Start Time Thread Name Label Sample Time(ms) Status Bytes Sent Bytes Latency Connect Time(ms)

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10391	19:49:19.429	Inread Group 1-19	Inform	291	✓	1125	143	291	0
10392	19:49:19.431	Thread Group 1-204	Ininform	587	✓	1155	143	587	0
10393	19:49:19.433	Thread Group 1-139	Inventory	589	✓	1158	139	589	0
10394	19:49:19.444	Thread Group 1-284	Forecast	578	✓	1158	138	578	0
10395	19:49:19.450	Thread Group 1-250	InventoryOptimisation	589	✓	1155	135	589	0
10396	19:49:19.454	Thread Group 1-157	LoginPage	590	✓	1158	135	590	0
10397	19:49:19.454	Thread Group 1-115	InventoryOptimisation	598	✓	1155	156	598	0
10398	19:49:19.459	Thread Group 1-22	InventoryOptimisation	586	✓	1155	156	586	0
10399	19:49:19.450	Thread Group 1-58	LoginPage	585	✓	1158	135	585	0
10400	19:49:19.450	Thread Group 1-32	InventoryOptimisation	591	✓	1155	156	591	0
10401	19:49:19.450	Thread Group 1-205	Ininform	597	✓	1155	143	597	0
10402	19:49:19.452	Thread Group 1-271	Inventory	595	✓	1158	139	595	0
10403	19:49:19.453	Thread Group 1-250	InventoryOptimisation	585	✓	1155	156	585	0
10404	19:49:19.455	Thread Group 1-102	Inventory	585	✓	1158	139	585	0
10405	19:49:19.465	Thread Group 1-35	InventoryOptimisation	586	✓	1155	156	586	0
10406	19:49:19.452	Thread Group 1-219	HomePage	599	✓	1158	134	599	0
10407	19:49:19.467	Thread Group 1-34	Trends	587	✓	1155	141	587	0
10408	19:49:19.466	Thread Group 1-73	HomePage	588	✓	1158	134	588	0
10409	19:49:19.467	Thread Group 1-114	LoginPage	592	✓	1158	135	592	0
10410	19:49:19.467	Thread Group 1-254	Ininform	595	✓	1155	143	595	0
10411	19:49:19.474	Thread Group 1-174	LoginPage	596	✓	1158	135	596	0
10412	19:49:19.473	Thread Group 1-234	LoginPage	597	✓	1158	135	597	0
10413	19:49:19.473	Thread Group 1-123	InventoryOptimisation	583	✓	1155	136	583	0
10414	19:49:19.470	Thread Group 1-48	InventoryOptimisation	600	✓	1155	156	600	0
10415	19:49:19.469	Thread Group 1-69	InventoryOptimisation	601	✓	1155	156	601	0
10416	19:49:19.467	Thread Group 1-130	Ininform	583	✓	1155	143	583	0
10417	19:49:19.506	Thread Group 1-38	Forecast	567	✓	1158	138	567	0
10418	19:49:19.509	Thread Group 1-211	Inventory	564	✓	1158	139	564	0
10419	19:49:19.509	Thread Group 1-57	Trends	564	✓	1155	141	564	0
10420	19:49:19.506	Thread Group 1-78	Forecast	567	✓	1158	138	567	0
10421	19:49:19.509	Thread Group 1-227	LoginPage	566	✓	1158	135	566	0
10422	19:49:19.473	Thread Group 1-282	HomePage	602	✓	1158	134	602	0
10423	19:49:19.536	Thread Group 1-60	LoginPage	543	✓	1158	135	543	0
10424	19:49:19.510	Thread Group 1-116	Trends	571	✓	1155	141	571	0
10425	19:49:19.509	Thread Group 1-242	InventoryOptimisation	579	✓	1156	156	579	0

Scroll automatically? Child samples? No of Samples: 21000 Latest Sample: 64 Average: 475 Deviation: 405

Screenshot of JMeter Test Plan - View Results in Table

Test Plan

- Thread Group
 - LoginPage
 - HomePage
 - Forecast
 - Inventory
 - Initform
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- View Results Tree
- Summary Report
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View Results in Table

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Sent Bytes	Latency	Connect Time(ms)
15417	19:49:27.506	Thread Group 1-283	LoginPage	460	✓	1158	135	460	0
15418	19:49:27.518	Thread Group 1-174	InventoryOptimisation	449	✓	1159	156	449	0
15419	19:49:27.516	Thread Group 1-162	Initform	451	✓	1155	143	451	0
15420	19:49:27.536	Thread Group 1-124	Inventory	432	✓	1158	139	432	0
15421	19:49:27.535	Thread Group 1-84	Trends	433	✓	1155	141	433	0
15422	19:49:27.508	Thread Group 1-291	InventoryOptimisation	463	✓	1155	156	463	0
15423	19:49:27.468	Thread Group 1-247	HomePage	525	✓	1158	134	525	0
15424	19:49:27.469	Thread Group 1-109	HomePage	455	✓	1159	134	455	0
15425	19:49:27.538	Thread Group 1-72	HomePage	455	✓	1159	124	455	0
15426	19:49:27.538	Thread Group 1-285	Inventory	459	✓	1159	139	459	0
15427	19:49:27.540	Thread Group 1-265	LoginPage	457	✓	1159	135	457	0
15428	19:49:27.538	Thread Group 1-117	Inventory	460	✓	1157	139	460	0
15429	19:49:27.540	Thread Group 1-239	Initform	462	✓	1155	143	462	0
15430	19:49:27.539	Thread Group 1-268	HomePage	463	✓	1158	134	463	0
15431	19:49:27.540	Thread Group 1-214	LoginPage	467	✓	1158	135	467	0
15432	19:49:27.541	Thread Group 1-192	Initform	466	✓	1155	143	466	0
15433	19:49:27.543	Thread Group 1-293	InventoryOptimisation	461	✓	1155	156	461	0
15434	19:49:27.543	Thread Group 1-120	Inventory	465	✓	1159	139	465	0
15435	19:49:27.543	Thread Group 1-202	HomePage	470	✓	1157	134	470	0
15436	19:49:27.541	Thread Group 1-131	Forecast	472	✓	1159	138	472	0
15437	19:49:27.546	Thread Group 1-284	LoginPage	469	✓	1159	135	469	0
15438	19:49:27.545	Thread Group 1-270	HomePage	472	✓	1158	134	472	0
15439	19:49:27.545	Thread Group 1-160	Trends	475	✓	1155	141	475	0
15440	19:49:27.554	Thread Group 1-202	Forecast	470	✓	1158	138	470	0
15441	19:49:27.546	Thread Group 1-248	Inventory	479	✓	1158	139	479	0
15442	19:49:27.558	Thread Group 1-60	InventoryOptimisation	470	✓	1155	156	470	0
15443	19:49:27.558	Thread Group 1-101	HomePage	467	✓	1158	134	467	0
15444	19:49:27.558	Thread Group 1-180	Inventory	485	✓	1159	133	485	0
15445	19:49:27.560	Thread Group 1-271	HomePage	486	✓	1159	134	486	0
15446	19:49:27.560	Thread Group 1-264	LoginPage	486	✓	1159	135	486	0
15447	19:49:27.561	Thread Group 1-290	Trends	487	✓	1155	141	487	0
15448	19:49:27.560	Thread Group 1-230	Initform	488	✓	1155	143	488	0
15449	19:49:27.546	Thread Group 1-219	Trends	502	✓	1155	141	502	0
15450	19:49:27.567	Thread Group 1-281	Trends	482	✓	1155	141	482	0

No of Samples: 21000 Latest Sample: 64 Average: 375 Deviation: 405

Child samples: Scroll automatically:

Results Tree:

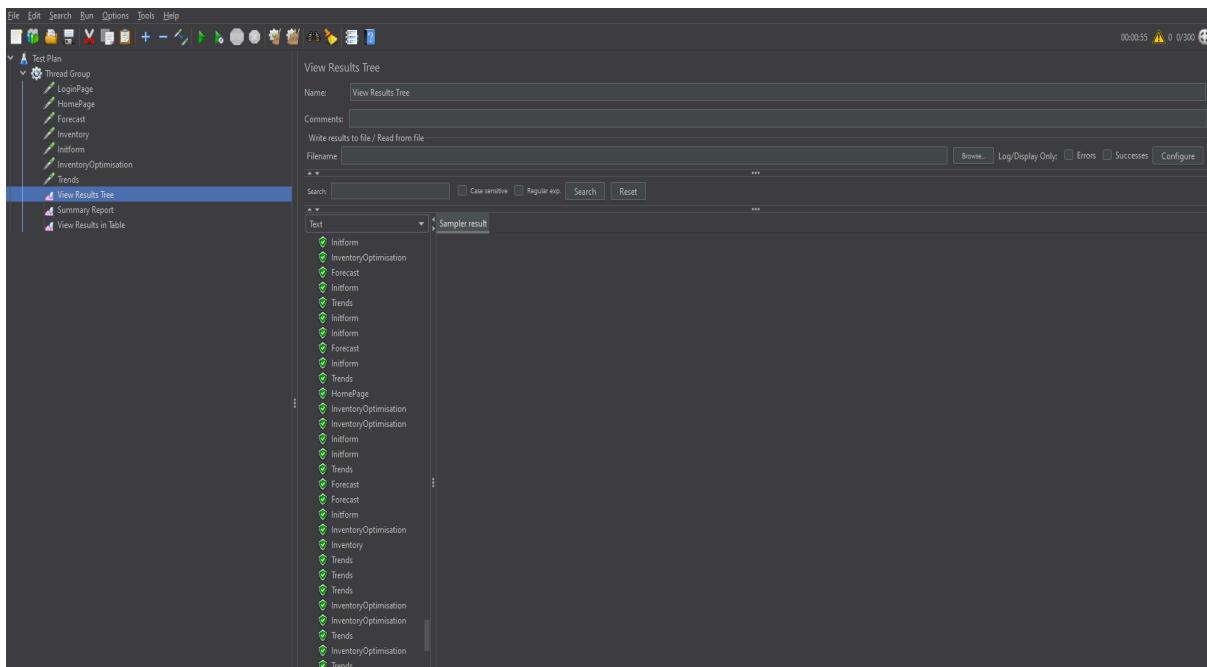
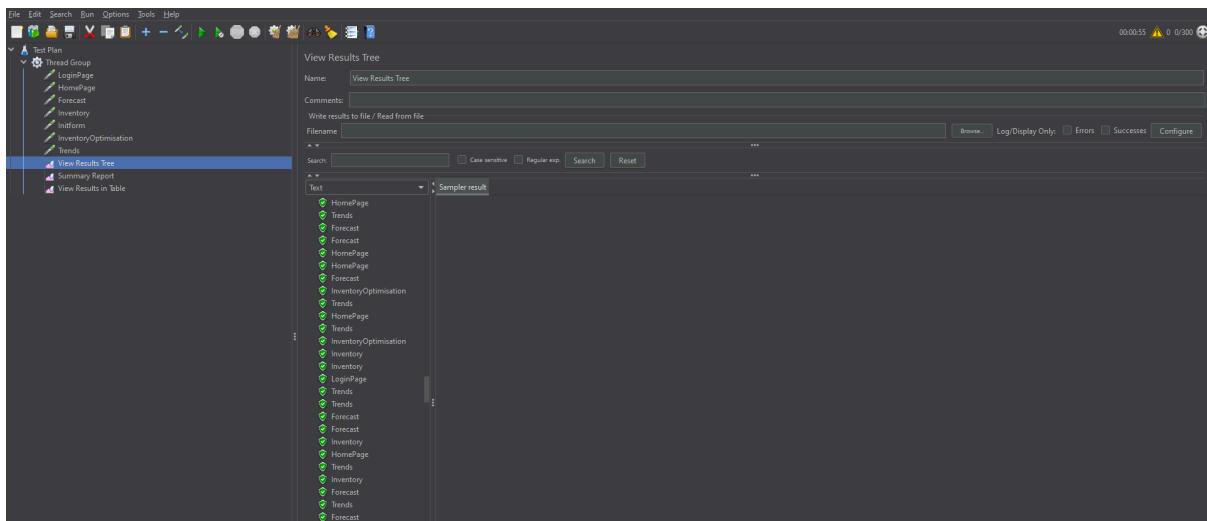
Screenshot of JMeter Test Plan - View Results Tree

Test Plan

- Thread Group
 - LoginPage
 - HomePage
 - Forecast
 - Inventory
 - Initform
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- View Results Tree
- Summary Report
- View Results in Table

View Results Tree

Text	Sampler result
Inventory	
LoginPage	
Trends	
Inventory	
InventoryOptimisation	
Trends	
LoginPage	
InventoryOptimisation	
Initform	
LoginPage	
Inventory	
Initform	
Trends	
Trends	
Inventory	
Initform	
Forecast	
LoginPage	
Initform	
HomePage	
HomePage	
Inventory	



[Note: We have tried for 300 users, wherein the overall error was ~0.5%, and this is when the ramp-up period is set to 20 seconds, and the loop count is set to 10. It may vary depending on the data changes.]

Security(Website Vulnerability) Test:

This testing plays a crucial role in the overall testing of the website due because it involves ensuring that the system is safeguarded from threats and vulnerability. Here, we have focused on our website's vulnerability, for other parameters, like session management, and data protection, are beyond our scope.

Analysing Website Vulnerability:

- In general, the risk level is low, however, it is not completely prone because the disclosure of software stack(for instance, vercel) may give attackers useful information, which can be considered as a potential threat.
- Also, there were no other critical vulnerabilities such as SQL injection, or XSS, detected in the scan.
- Following are some test results(**Source: Pentest Tools**)

Summary

Overall risk level:	Risk ratings:	Scan information:
Low		
	High: 0	Start time: Dec 02, 2024 / 00:49:23
	Medium: 0	UTC+0530
	Low: 5	Finish time: Dec 02, 2024 / 00:49:47
	Info: 14	UTC+0530
		Scan duration: 24 sec
		Tests performed: 19/19
		Scan status: Finished

🤖 Robots.txt file found

CONFIRMED

URL

<https://g24-algrow-biz.vercel.app/robots.txt>

▼ Details

Risk description:

There is no particular security risk in having a robots.txt file. However, it's important to note that adding endpoints in it should not be considered a security measure, as this file can be directly accessed and read by anyone.

Recommendation:

We recommend you to manually review the entries from robots.txt and remove the ones which lead to sensitive locations in the website (ex. administration panels, configuration files, etc).

References:

<https://www.theregister.co.uk/2015/05/19/robotstxt/>

Classification:

OWASP Top 10 - 2017 : A6 - Security Misconfiguration
OWASP Top 10 - 2021 : A5 - Security Misconfiguration

Scan coverage information

List of tests performed (19/19)

- ✓ Starting the scan...
- ✓ Checking for missing HTTP header - Content Security Policy...
- ✓ Checking for missing HTTP header - Referrer...
- ✓ Checking for missing HTTP header - X-Content-Type-Options...
- ✓ Checking for website technologies...
- ✓ Checking for vulnerabilities of server-side software...
- ✓ Checking for client access policies...
- ✓ Checking for robots.txt file...
- ✓ Checking for absence of the security.txt file...
- ✓ Checking for use of untrusted certificates...
- ✓ Checking for enabled HTTP debug methods...
- ✓ Checking for enabled HTTP OPTIONS method...
- ✓ Checking for secure communication...
- ✓ Checking for directory listing...
- ✓ Checking for missing HTTP header - Strict-Transport-Security...
- ✓ Checking for domain too loose set for cookies...
- ✓ Checking for HttpOnly flag of cookie...
- ✓ Checking for Secure flag of cookie...
- ✓ Checking for unsafe HTTP header Content Security Policy...

Scan parameters

target: <https://g24-algrow-biz.vercel.app/home>
scan_type: Light
authentication: False

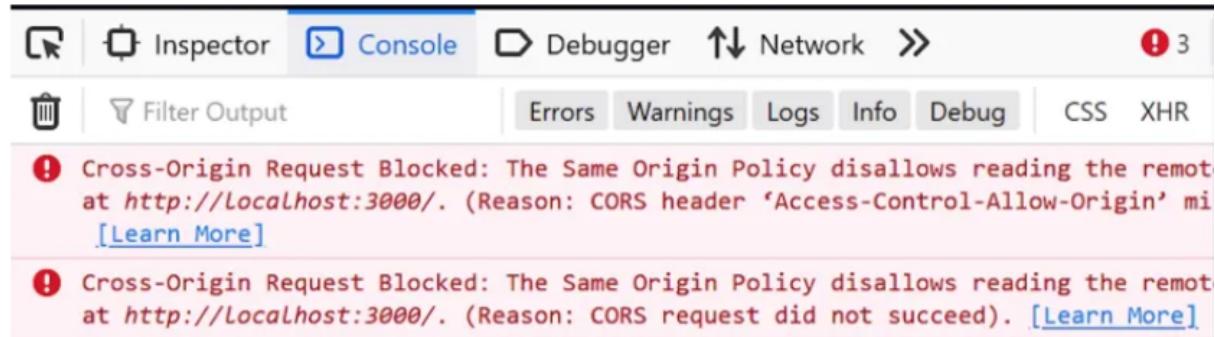
Scan stats

Unique Injection Points Detected:	1
URLs spidered:	1
Total number of HTTP requests:	10
Average time until a response was received:	73ms

```
25
26     # CORS(app) to ensure requests are only accepted from vercel front end
27     CORS(app, origins=["https://g24-algrow-biz-suxp.vercel.app/"])
28
29
```

This Feature in the backend make sure that the app is not vulnerable to other api calls that can alter the state of the program and could potentially mutate the database violating the ACID property of the database.

Testing by accessing the flask app by other website (local host):



This we see in the google inspect element that the request was blocked which was requested on localhost:3000 this helps to block unnecessary api calls.