Non - Functional testing using Jmeter

Load Testing:-

Load testing is a way to check how well a system works when many users or tasks are running at the same time. It looks at things like response time, speed, and stability to make sure the system can handle the expected workload without slowing down or breaking. Tools like JMeter are commonly used for this testing. Load testing helps find weak spots, improve resource usage, and ensure the system can scale up smoothly for a good user experience.

Parameters and tools used by Jmeter:-

1.Label

- Identifies the request name or URL for a specific HTTP(s) request.
- If the "Include group name in label?" option is selected, the Thread Group name is added as a prefix to the label.

2.Samples

- Shows the total number of virtual users or requests executed for a particular label.

3.Average

- Displays the mean response time (in milliseconds) for all samples under the specified label.

4.Min

- Reflects the shortest response time recorded for the label.

5.Max

- Shows the longest response time recorded for the label.

6.Standard Deviation (Std. Dev.)

- Indicates the variability or inconsistency in response times.
- A lower standard deviation suggests more stable performance.
- Best Practice: This value should ideally be ≤ 50% of the average response time.

7.Throughput

- Indicates the number of requests handled by the server per second.
- It is calculated from the time the first sample starts until the last one finishes.
- Higher throughput generally reflects better performance.

Tools in JMeter for Non-Functional Testing

1. **Summary Report**: Displays key metrics like response time and throughput in a concise table.
2. **Aggregate Report**: Shows detailed statistics like averages and percentiles for all requests.
3. **Aggregate Graph**: Visualizes aggregated metrics to analyze performance trends.
4. **View Results Tree**: Displays request and response details for debugging.
5. **View Results in Table**: Presents test results in a tabular format for easy review.

Home page:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Home	200	734	325	1667	323.78	0.00%	46.4/sec	79.78	11.96	1760.9
TOTAL	200	734	325	1667	323.78	0.00%	46.4/sec	79.78	11.96	1760.9

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Home	500	17722	320	73166	22323.17	9.00%	6.6/sec	11.80	1.54	1840.2
TOTAL	500	17722	320	73166	22323.17	9.00%	6.6/sec	11.80	1.54	1840.2

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
Home	1000	35470	330	70812	17013.09	63.30%	9.8/sec	23.46	1.05	2449.8
TOTAL	1000	35470	330	70812	17013.09	63.30%	9.8/sec	23.46	1.05	2449.8

Number of user	Ramp-up period	Loop count	Total samples	Average Error (%)	Throughput (per sec)
100	3	2	200	0	46.4
250	3	2	500	9	6.6
500	3	2	1000	63.30	9.8

Forgot password:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
forgotpass...	200	488	326	1464	191.96	0.00%	51.7/sec	89.08	13.53	1765.0
TOTAL	200	488	326	1464	191.96	0.00%	51.7/sec	89.08	13.53	1765.0

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
forgotpass...	500	17333	324	78798	22649.85	10.00%	6.1/sec	11.22	1.46	1870.3
TOTAL	500	17333	324	78798	22649.85	10.00%	6.1/sec	11.22	1.46	1870.3

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
forgotpass...	1000	35991	325	78841	18299.02	56.30%	9.5/sec	22.18	1.21	2389.2
TOTAL	1000	35991	325	78841	18299.02	56.30%	9.5/sec	22.18	1.21	2389.2

Number of user	Ramp-up period	Loop count	Total samples	Average Error (%)	Throughput (per sec)
100	3	2	200	0	51.7
250	3	2	500	10	6.1
500	3	2	1000	56.30	9.5

Login page:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
signup	200	597	331	3628	330.51	0.00%	44.8/sec	76.97	11.72	1760.9
TOTAL	200	597	331	3628	330.51	0.00%	44.8/sec	76.97	11.72	1760.9

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
login	500	15090	324	43954	18372.81	15.60%	11.0/sec	20.35	2.40	1901.9
TOTAL	500	15090	324	43954	18372.81	15.60%	11.0/sec	20.35	2.40	1901.9

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
login	1500	29283	320	78799	20882.56	43.33%	3.0/sec	6.63	0.47	2245.4
TOTAL	1500	29283	320	78799	20882.56	43.33%	3.0/sec	6.63	0.47	2245.4

Number of user	Ramp-up period	Loop count	Total samples	Average Error (%)	Throughput (per sec)
100	3	2	200	0	44.8
250	3	2	500	15.60	11
500	3	2	1000	43.33	3

Reset password page:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
reset	200	456	304	1705	181.70	0.00%	53.0/sec	91.24	13.77	1763.0
TOTAL	200	456	304	1705	181.70	0.00%	53.0/sec	91.24	13.77	1763.0

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
reset	500	24585	320	80823	27694.40	7.20%	4.4/sec	7.98	1.08	1845.2
TOTAL	500	24585	320	80823	27694.40	7.20%	4.4/sec	7.98	1.08	1845.2

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
reset	1000	32810	27	78798	20657.36	49.10%	9.6/sec	21.91	1.33	2344.0
TOTAL	1000	32810	27	78798	20657.36	49.10%	9.6/sec	21.91	1.33	2344.0

Number of user	Ramp-up period	Loop count	Total samples (User*lopps)	Average Error (%)	Throughput (per sec)
100	3	2	200	0	53.0
250	3	2	500	7.20	4.4
500	3	2	1000	49.10	9.6

Sign up page:

a)100 user

Summary Report

Name: Summary Report

Comments:

Write results to file / Read from file

Filename: [Browse...] Log/Display Only: ☐ Errors ☐ Successes [Configure]

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
login	200	638	334	1783	337.68	0.00%	48.7/sec	83.74	12.64	1762.1
TOTAL	200	638	334	1783	337.68	0.00%	48.7/sec	83.74	12.64	1762.1

b)250 user

Summary Report

Name: Summary Report

Comments:

Write results to file / Read from file

Filename: [Browse...] Log/Display Only: ☐ Errors ☐ Successes [Configure]

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
signup	500	22793	336	57789	18766.24	32.40%	5.9/sec	12.25	1.09	2119.3
TOTAL	500	22793	336	57789	18766.24	32.40%	5.9/sec	12.25	1.09	2119.3

c)500 user

Summary Report

Name: Summary Report

Comments:

Write results to file / Read from file

Filename: [Browse...] Log/Display Only: ☐ Errors ☐ Successes [Configure]

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
signup	1000	42818	328	78851	14860.62	72.60%	9.6/sec	25.77	1.06	2753.0
TOTAL	1000	42818	328	78851	14860.62	72.60%	9.6/sec	25.77	1.06	2753.0

Number of user	Ramp-up period	Loop count	Total samples	Average Error (%)	Throughput (per sec)
100	3	2	200	0	48.7
250	3	2	500	32.40	5.9
500	3	2	1000	72.60	9.6

Verify email:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
verify	200	983	368	2797	621.49	0.00%	37.7/sec	65.14	9.86	1770.0
TOTAL	200	983	368	2797	621.49	0.00%	37.7/sec	65.14	9.86	1770.0

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
verify	500	20192	326	72919	21859.62	12.80%	6.6/sec	12.20	1.51	1884.3
TOTAL	500	20192	326	72919	21859.62	12.80%	6.6/sec	12.20	1.51	1884.3

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
verify	1000	34681	322	70804	16351.25	66.60%	9.9/sec	23.89	0.99	2482.1
TOTAL	1000	34681	322	70804	16351.25	66.60%	9.9/sec	23.89	0.99	2482.1

Number of user	Ramp-up period	Loop count	Total samples (User*lopps)	Average Error (%)	Throughput (per sec)
100	3	2	200	0	37.7
250	3	2	500	12.80	6.6
500	3	2	1000	66.60	9.9

Send email:

a)100 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
HTTP Reque...	200	469	317	980	147.33	0.00%	52.8/sec	91.83	14.64	1781.4
TOTAL	200	469	317	980	147.33	0.00%	52.8/sec	91.83	14.64	1781.4

b)250 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
HTTP Reque...	500	16917	304	72997	21671.13	8.60%	6.6/sec	11.96	1.68	1852.5
TOTAL	500	16917	304	72997	21671.13	8.60%	6.6/sec	11.96	1.68	1852.5

c)500 user

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
HTTP Reque...	1000	34025	327	78784	21089.63	49.00%	9.5/sec	21.30	1.43	2295.1
TOTAL	1000	34025	327	78784	21089.63	49.00%	9.5/sec	21.30	1.43	2295.1

Number of user	Ramp-up period	Loop count	Total samples (User*lopps)	Average Error (%)	Throughput (per sec)
100	3	2	200	0	52.8
250	3	2	500	8.6	6.6
500	3	2	1000	49.0	9.5

Overall Analysis

No of users-500
Ramp-up period-3
Loop count-2

Summary Report

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received K...	Sent KB/sec	Avg. Bytes
signup	1000	21046	318	78913	23782.15	32.60%	7.5/sec	15.65	1.39	2139.9
login	1000	14141	328	79780	21252.63	11.00%	7.5/sec	13.66	1.74	1867.6
forget	1000	3982	325	49848	7373.94	0.00%	7.5/sec	12.86	1.96	1761.0
home	1000	1647	316	9785	1736.03	0.00%	7.5/sec	12.84	1.93	1758.3
verifyotp	1000	1278	306	7759	1356.02	0.00%	7.5/sec	12.85	1.96	1760.2
sendemail	1000	1206	325	5416	1094.28	0.00%	7.5/sec	12.96	2.07	1777.4
reset	1000	957	326	11706	845.92	0.00%	7.5/sec	12.82	1.94	1757.9
TOTAL	7000	6323	306	79780	14462.19	6.23%	51.3/sec	91.73	12.72	1831.8
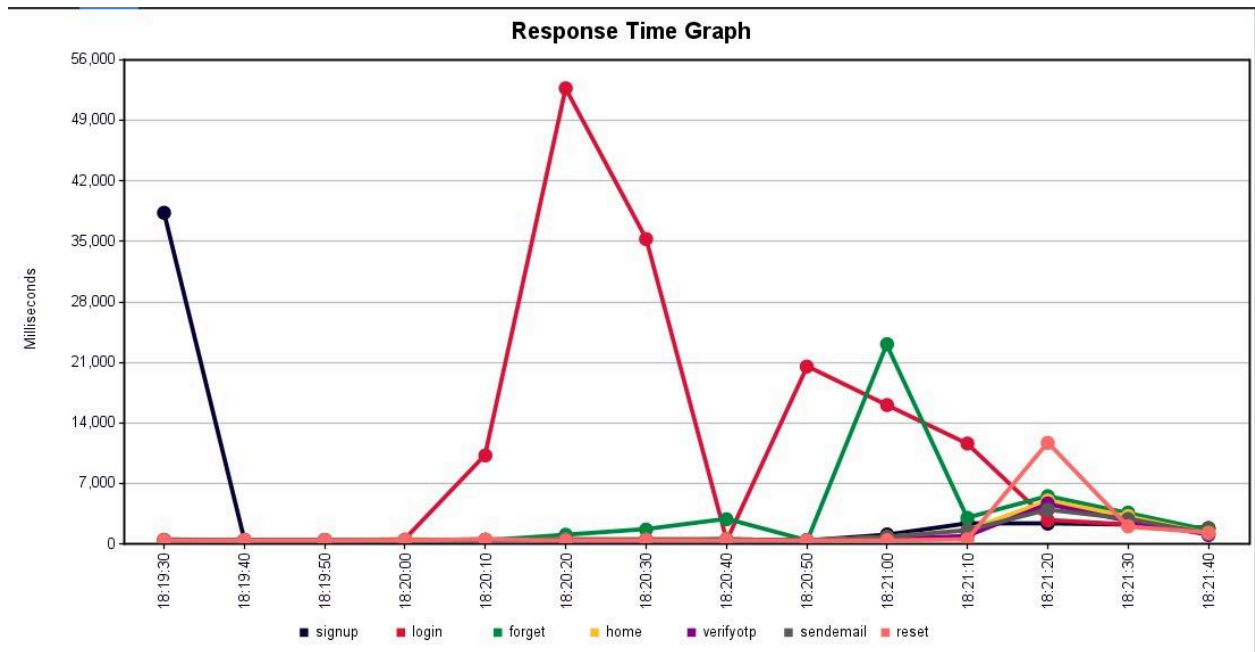
Observations:

1. **High response times:**
   - The "login" page (red line) shows a significant spike around **18:20:30**, peaking at nearly 50,000 ms. This indicates a performance bottleneck or heavy load during this time for the login functionality.

- ○ The "signup" page (blue line) also shows a high initial response time (~35,000 ms) at **18:19:30** but quickly drops off.

2. **Moderate and stable pages:**
   - ○ Pages like "home," "verify otp," "reset," and "sendmail" show much more stable and lower response times, mostly below 7,000 ms. These pages seem to be performing better under the test conditions.

3. **Trend analysis:**
   - ○ After the spikes in "login" and "signup," response times for most pages stabilize toward the end of the test, around **18:21:40**.