



# IT314 - SOFTWARE ENGINEERING

## Non-Functional Testing

GroupID: 21

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### **Load Testing with JMeter**

#### **Overview**

Load testing in JMeter involves assessing the system's performance under different scenarios. To carry out this testing, a JMeter Test Plan requires a Listener component to record and display the outcomes of the performance test. Listeners offer response data in multiple formats, including trees, tables, graphs, and log files, with the option to save these results for later analysis.

#### **Types of JMeter Listeners**

JMeter provides various listener types, including:

- **Summary Report**
- **Aggregate Report**
- **Aggregate Graph**
- **View Results Tree**
- **View Results in Table**

## Parameters in a Summary Report

The Summary Report in JMeter offers key metrics and insights into the performance test. Here's an overview of its parameters, explained in a revised format:

### 1. **Samples**

- Reflects the number of virtual users or requests executed for a specific task or label.

### 2. **Label**

- Denotes the name or URL of the HTTP(s) request being tested.
- When the "Include group name in label" option is enabled, the Thread Group name appears as a prefix.

### 3. **Average Response Time**

- Displays the mean response time (in milliseconds) for all requests under a particular label.

### 4. **Minimum Response Time (Min)**

- Shows the shortest time taken by any request for a given label.

### 5. **Maximum Response Time (Max)**

- Indicates the longest response time recorded for a request under the label.

### 6. **Standard Deviation (Std. Dev.)**

- Measures the variation or inconsistency in response times.
- A lower standard deviation implies more stable performance.
- **Best Practice:** Aim for this value to be at most half of the average response time.

### 7. **Error Percentage (Error%)**

- Represents the proportion of requests that failed during the test, shown as a percentage.

### 8. **Throughput**

- Refers to the number of server requests handled per second.
- It is calculated based on the total time from the first to the last sample.
- Higher throughput indicates better server performance.

### 9. **Data Transfer Rate (KB/Sec)**

- Reflects the volume of data downloaded from the server in kilobytes per second during test execution.
- Essentially, this is the throughput expressed in terms of data size.

- **Test – HTTP GET Request of all the**

- **pages Web-Pages:**

1. Home Page
2. auth
3. dashboard
4. My-profile
5. AI Insight
6. Portfolio
7. Preferences
8. Help – Support

## Home page:

### a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
homepage	100	203	160	288	24.43	0.00%	46.2/sec	69.63	6.86	1543.0
TOTAL	100	203	160	288	24.43	0.00%	46.2/sec	69.63	6.86	1543.0

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
homepage	100	201	159	276	21.00	0.00%	46.1/sec	69.50	6.85	1543.0
TOTAL	100	201	159	276	21.00	0.00%	46.1/sec	69.50	6.85	1543.0

### b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
homepage	300	11626	168	37279	16788.86	0.00%	7.7/sec	11.54	1.14	1543.0
TOTAL	300	11626	168	37279	16788.86	0.00%	7.7/sec	11.54	1.14	1543.0

### c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
homepage	400	23751	183	42109	18654.99	21.75%	9.1/sec	16.50	1.05	1861.2
TOTAL	400	23751	183	42109	18654.99	21.75%	9.1/sec	16.50	1.05	1861.2

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	46.2
300	2	1	300	0	7.7
400	2	1	400	21.75	9.1

auth:

### a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
auth	100	192	156	230	15.33	0.00%	46.3/sec	70.87	7.06	1566.0
TOTAL	100	192	156	230	15.33	0.00%	46.3/sec	70.87	7.06	1566.0

### b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
auth	300	11507	176	36319	16734.74	0.00%	7.8/sec	11.96	1.19	1566.0
TOTAL	300	11507	176	36319	16734.74	0.00%	7.8/sec	11.96	1.19	1566.0

### c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
auth	400	23441	177	42100	18704.31	21.25%	9.1/sec	16.60	1.09	1872.4
TOTAL	400	23441	177	42100	18704.31	21.25%	9.1/sec	16.60	1.09	1872.4

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	46.3
300	2	1	300	0	7.8
400	2	1	400	21.25	9.1

Dashboard:

a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
dashboard	100	209	164	1177	99.45	0.00%	34.7/sec	52.99	5.45	1566.0
TOTAL	100	209	164	1177	99.45	0.00%	34.7/sec	52.99	5.45	1566.0

b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
dashboard	300	11510	168	37299	16738.74	0.00%	7.6/sec	11.69	1.20	1566.0
TOTAL	300	11510	168	37299	16738.74	0.00%	7.6/sec	11.69	1.20	1566.0

c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
dashboard	400	23166	175	42144	18779.09	21.00%	9.1/sec	16.56	1.13	1868.4
TOTAL	400	23166	175	42144	18779.09	21.00%	9.1/sec	16.56	1.13	1868.4

Number of Users	Ramp-up Period	Loop Count	Total Samples(Users*Loops)	Average Error(%)	Throughput
100	2	1	100	0	34.7
300	2	1	300	0	7.6
400	2	1	400	21	9.1

My Profile:

a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
myProfile	100	228	157	1207	142.46	0.00%	41.6/sec	63.64	6.58	1566.0
TOTAL	100	228	157	1207	142.46	0.00%	41.6/sec	63.64	6.58	1566.0

b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
myProfile	300	11581	180	36966	16749.22	0.00%	7.7/sec	11.84	1.22	1566.0
TOTAL	300	11581	180	36966	16749.22	0.00%	7.7/sec	11.84	1.22	1566.0

c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
myProfile	400	23480	174	42130	18730.46	21.75%	9.1/sec	16.65	1.12	1879.2
TOTAL	400	23480	174	42130	18730.46	21.75%	9.1/sec	16.65	1.12	1879.2

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	41.6
300	2	1	300	0	7.7
400	2	1	400	21.75	9.1

AI insight:

a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Ai-Insight	100	263	176	463	64.89	0.00%	42.8/sec	64.67	6.98	1547
TOTAL	100	263	176	463	64.89	0.00%	42.8/sec	64.67	6.98	1547

b) 300 users

Summary Report

Name:Summary Report

Comments:

Write results to file / Read from file

FilenameBrowse...Log/Display Only:☐ Errors☐ SuccessesConfigure

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Ai-Insight	300	23678	6313	37336	13636.49	0.00%	7.6/sec	11.55	1.25	1547
TOTAL	300	23678	6313	37336	13636.49	0.00%	7.6/sec	11.55	1.25	1547

c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Ai-Insight	400	21899	372	42109	14360.81	3.75%	9.1/sec	14.19	1.42	1601.8
TOTAL	400	21899	372	42109	14360.81	3.75%	9.1/sec	14.19	1.42	1601.8

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	42.8
300	2	1	300	0	7.6
400	2	1	400	3.75	9.1



## Portfolio:

### a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Portfolio	100	192	157	263	20.27	0.00%	46.3/sec	69.97	7.51	1547.0
TOTAL	100	192	157	263	20.27	0.00%	46.3/sec	69.97	7.51	1547.0

### b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Portfolio	300	10973	232	38127	16514.42	0.00%	7.5/sec	11.29	1.21	1547.0
TOTAL	300	10973	232	38127	16514.42	0.00%	7.5/sec	11.29	1.21	1547.0

### c) 400users

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 KB/sec	Sent KB/sec	Avg. Bytes
Portfolio	400	22794	198	42101	18645.20	19.00%	9.1/sec	16.17	1.19	1824.6
TOTAL	400	22794	198	42101	18645.20	19.00%	9.1/sec	16.17	1.19	1824.6

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	46.3
300	2	1	300	0	7.5
400	2	1	400	19	9.1

## Preferences:

### a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Preferences	100	195	159	497	36.35	0.00%	46.5/sec	71.06	7.40	1566.0
TOTAL	100	195	159	497	36.35	0.00%	46.5/sec	71.06	7.40	1566.0

### b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Preferences	300	11548	180	42073	16808.27	0.33%	6.8/sec	10.43	1.08	1570.8
TOTAL	300	11548	180	42073	16808.27	0.33%	6.8/sec	10.43	1.08	1570.8

### c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
Preferences	400	23618	272	42118	18570.12	22.00%	9.1/sec	16.68	1.13	1883.2
TOTAL	400	23618	272	42118	18570.12	22.00%	9.1/sec	16.68	1.13	1883.2

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	46.5
300	2	1	300	0.33	6.8
400	2	1	400	22	9.1

## Help-Support:

### a) 100 users

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 KB/sec	Sent KB/sec	Avg. Bytes
HepI-Support	100	199	161	303	25.02	0.00%	46.0/sec	69.49	7.59	1547.0
TOTAL	100	199	161	303	25.02	0.00%	46.0/sec	69.49	7.59	1547.0

### b) 300 users

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 KB/sec	Sent KB/sec	Avg. Bytes
HepI-Support	300	9340	214	36492	15312.65	0.00%	7.8/sec	11.78	1.29	1547.0
TOTAL	300	9340	214	36492	15312.65	0.00%	7.8/sec	11.78	1.29	1547.0

### c) 400 users

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 KB/sec	Sent KB/sec	Avg. Bytes
HepI-Support	400	23415	193	42119	18779.16	21.25%	9.1/sec	16.46	1.18	1857.9
TOTAL	400	23415	193	42119	18779.16	21.25%	9.1/sec	16.46	1.18	1857.9

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loops)	Average Error (%)	Throughput
100	2	1	100	0	46
300	2	1	300	0	7.8
400	2	1	400	21.25	9.1

**a) 100 users**

The chart displays the response time in milliseconds for eight different web pages over a period of approximately two minutes. The Y-axis ranges from 0 to 48,000 milliseconds, and the X-axis shows time in HH:MM:SS format. The data series are: homepage (dark blue), auth (red), dashboard (green), myProfile (yellow), Ai-Insight (purple), Portfolio (grey), Preferences (orange), and Hept-Support (brown). The response times for most pages fluctuate significantly, with Hept-Support showing the highest peak at 42,000 ms around 23:20:00. The response times for all pages drop to near zero at 23:21:00.

Time	homepage	auth	dashboard	myProfile	Ai-Insight	Portfolio	Preferences	Hept-Support
23:19:50	0	1,000	500	15,500	23,500	3,200	1,000	28,000
23:20:00	6,500	13,500	13,500	23,500	35,500	0	13,500	42,000
23:20:10	0	11,000	15,000	23,500	32,500	0	0	40,000
23:20:20	0	9,000	16,500	23,500	30,500	0	0	39,000
23:20:30	0	3,500	19,500	22,500	25,500	0	0	36,000
23:20:40	0	0	24,000	24,000	24,000	24,000	0	27,500
23:20:50	0	0	18,000	18,000	16,000	16,000	0	18,000
23:21:00	0	0	12,000	0	0	0	0	0
23:21:10	0	0	0	0	9,500	0	0	21,000

## b) 200 users

### 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 KB/sec	Sent KB/sec	Avg. Bytes
homepage	200	23890	178	42103	18797.74	18.50%	4.5/sec	8.04	0.55	1814.4
auth	200	27310	199	42110	16601.76	28.50%	2.5/sec	4.75	0.27	1977.5
dashboard	200	21463	200	53043	18403.29	3.00%	1.6/sec	2.47	0.24	1609.3
myProfile	200	16195	206	52193	17738.51	6.00%	1.5/sec	2.48	0.23	1652.6
Ai-Insight	200	13300	219	52341	16444.31	4.50%	1.5/sec	2.42	0.24	1612.8
Portfolio	200	1875	56	44861	6095.38	0.00%	2.1/sec	3.24	0.35	1547.0
Preferences	200	735	57	7163	1583.03	0.00%	2.2/sec	3.29	0.34	1566.0
Hepl-Support	200	14099	211	52305	20170.06	6.00%	2.1/sec	3.43	0.33	1634.8
TOTAL	1600	14858	56	53043	18208.07	8.31%	12.1/sec	19.87	1.76	1676.8

### Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename

Browse...

Log/Display Only:

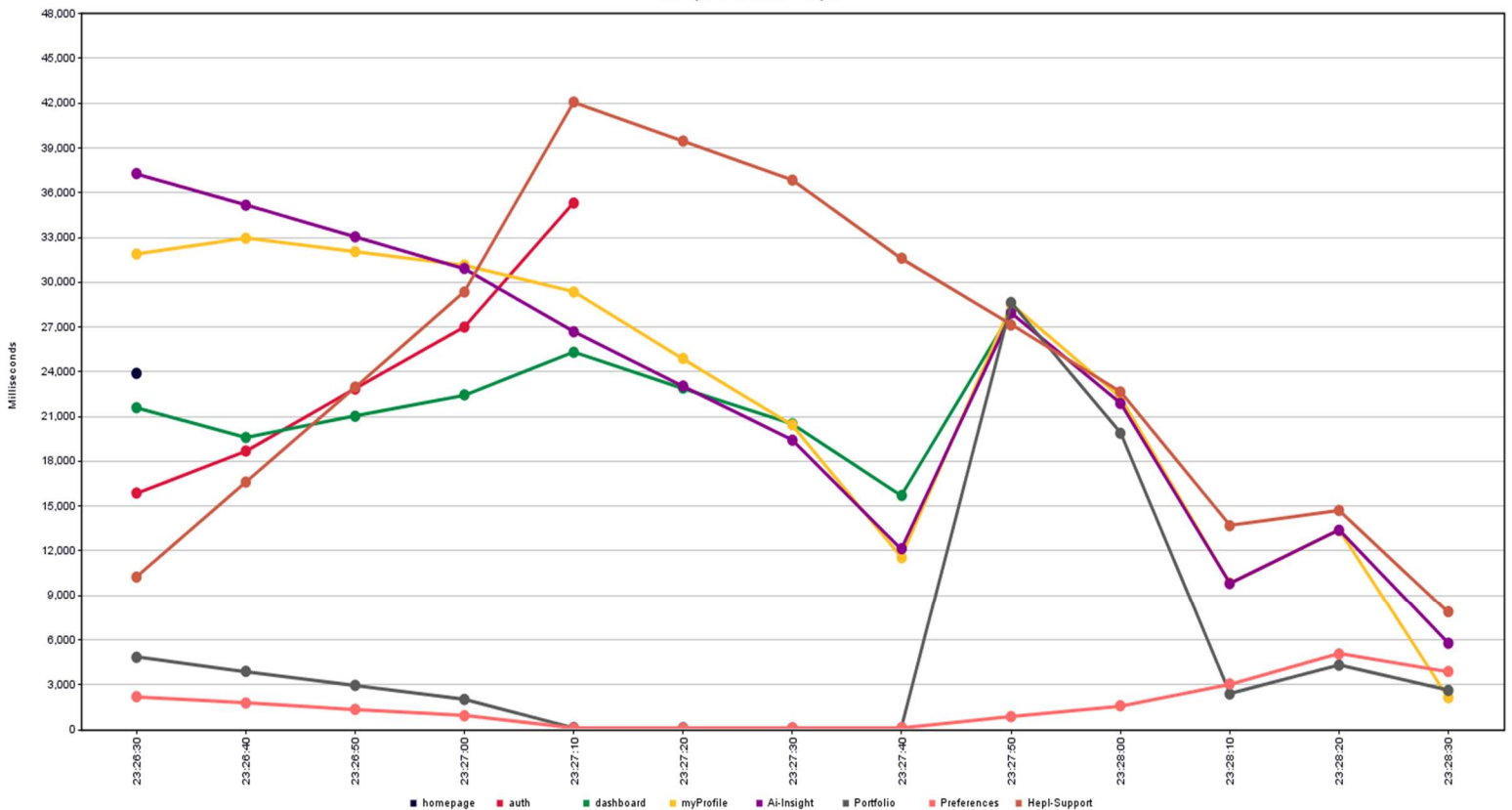
☐ Errors

☐ Successes

Configure

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/sec	Sent KB/sec
homepage	200	23890	37190	42090	42095	42103	178	42103	18.50%	4.5/sec	8.04	0.55
auth	200	27310	36352	42093	42098	42107	199	42110	28.50%	2.5/sec	4.75	0.27
dashboard	200	21463	25179	44882	51638	52085	200	53043	3.00%	1.6/sec	2.47	0.24
myProfile	200	16195	8254	42086	51523	51798	206	52193	6.00%	1.5/sec	2.48	0.23
Ai-Insight	200	13300	3772	42080	51788	52277	219	52341	4.50%	1.5/sec	2.42	0.24
Portfolio	200	1875	165	2042	7082	30690	56	44861	0.00%	2.1/sec	3.24	0.35
Preferences	200	735	166	2527	4594	6962	57	7163	0.00%	2.2/sec	3.29	0.34
Hepl-Support	200	14099	3071	51590	51697	52072	211	52305	6.00%	2.1/sec	3.43	0.33
TOTAL	1600	14858	1993	42088	50987	51802	56	53043	8.31%	12.1/sec	19.87	1.76

Response Time Graph



**c) 300 users**

[illegible]

Aggregate Report

Name:

Aggregate Report

Comments:

Write results to file / Read from file

Filename

Browse...

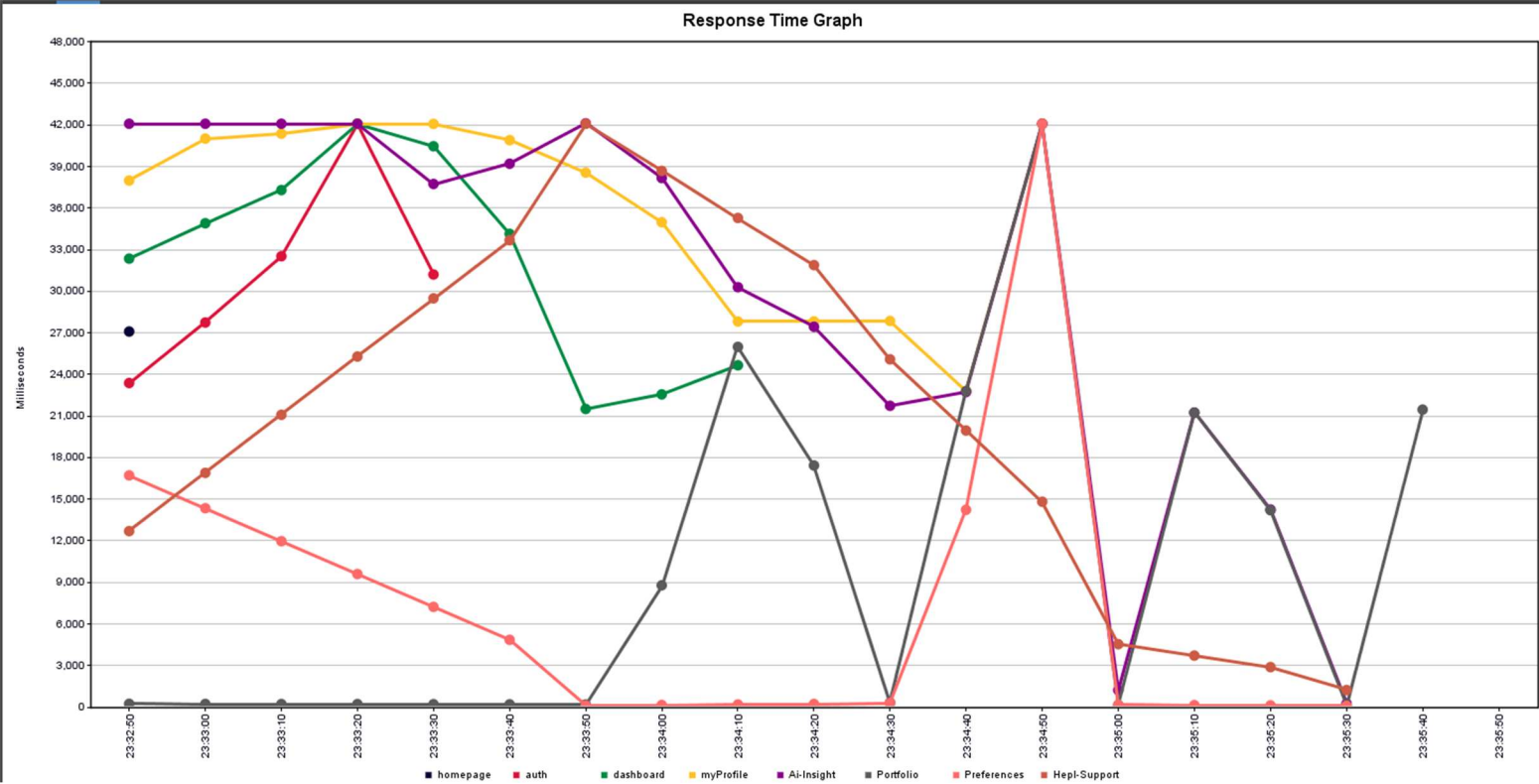
Log/Display Only:

☐ Errors

☐ Successes

Configure

Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Maximum	Error %	Throughput	Received KB/sec	Sent KB/sec
homepage	300	27093	42062	42101	42106	42113	181	42119	50.33%	6.8/sec	15.12	0.50
auth	300	30045	37709	42094	42097	42107	250	42112	38.33%	3.5/sec	7.22	0.33
dashboard	300	28265	37772	42105	42110	42124	249	42133	45.67%	2.5/sec	5.32	0.21
myProfile	300	32072	42079	42111	42126	42134	270	42134	59.67%	1.8/sec	4.33	0.12
AI-Insight	300	19307	21253	42093	42099	42120	182	42130	24.67%	2.2/sec	4.05	0.27
Portfolio	300	5115	155	21255	42059	42091	57	42097	5.33%	2.3/sec	3.66	0.35
Preferences	300	436	99	301	490	1146	56	42086	0.67%	2.3/sec	3.54	0.36
Hepl-Support	300	6989	922	28771	42081	42094	167	42102	6.67%	2.2/sec	3.57	0.34
TOTAL	2400	18665	21221	42096	42105	42115	56	42134	28.92%	11.8/sec	22.75	1.33



Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
homepage	600	30313	171	42141	14696.11	54.33%	1.8/sec	4.00	0.12	2338.4
auth	600	30287	166	42167	16457.60	60.17%	1.7/sec	3.95	0.10	2432.8
dashboard	600	23439	162	42126	17313.36	37.33%	1.5/sec	3.11	0.15	2104.2
myProfile	600	23728	164	42135	18365.99	39.00%	1.5/sec	3.14	0.15	2128.2
Ai-Insight	600	20884	167	42135	16467.00	23.33%	1.5/sec	2.79	0.19	1888.2
Portfolio	600	6002	54	42101	11518.27	4.50%	1.6/sec	2.58	0.25	1613.6
Preferences	600	372	54	42100	2567.36	0.33%	1.6/sec	2.52	0.26	1571.8
Hepl-Support	600	26237	164	42136	19617.70	50.50%	1.6/sec	3.65	0.13	2284.4
TOTAL	4800	20158	54	42167	18633.94	33.69%	12.1/sec	24.07	1.27	2045.2

No. of User	Ramp-up Period	Loop count	Total sample	Average error (%)	Throughput
100	2	1	800	2.25	7.1
200	2	1	1600	8.31	12.1
300	2	1	2400	28.92	11.8
300	3	2	4800	33.69	12.1

→ At 100 user threads, the system shows a manageable error rate of 2.25%, but at 200 user threads, the error rate rises significantly to 8.31%, indicating the system's stress limit is near 200 users and as it reached to 300 user Threads error reached significantly large 28.92 and for 600 user Threads average reached very high 33.69. This suggests the system begins to struggle under increasing load beyond this point of 200 user threads, compromising its performance.

## **Conclusion:**

Non-functional testing, such as load and stress testing, was conducted to evaluate the performance of web services using Apache JMeter with HTTP requests (e.g., HTTP GET). The primary objective was to assess the system's efficiency, its ability to handle varying levels of load, and its responsiveness under diverse conditions.