



**Dhirubhai Ambani
University**
Technology

Formerly DA-IICT

IT314 - Software Engineering

Non-Functional Testing

Topic: Fluentify – Language Learning App

Group-ID: 3

Performance and Scalability:

Overview:

Load testing in JMeter focuses on evaluating how a system behaves under varying user loads and traffic conditions. To effectively conduct load or performance testing, a JMeter Test Plan typically includes Listener components. Listeners capture, record and visualize the results of each request executed during the test. It gives response data in multiple formats such as trees, tables, graphs, and log files making it easier to analyse system behaviour.

Different types of JMeter Listeners: -

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

Parameters in Summary Report: -

The Summary Report in JMeter offers key metrics and insights into the performance test.

1. Samples

Shows number of virtual users executed the specified task.

2. Average Response time (Avg)

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

3. Minimum Response time (Min)

Shows shortest response time taken by any sample for some given label

4. Maximum Response time (Max)

Displays the longest response time taken by any sample for some given label

5. Standard Deviation (Std. Dev)

Measures the inconsistency in response time
Lower standard deviation means more stable performance.

6. Error Percentage (Error %)

Represents the proportion of requests that failed during test (shown in percentage)

7. Throughput

It indicates the number of server requests handled per second

Higher throughput indicates better performance

8. Data transfer rate

It is the throughput expressed in terms of data size

It is the volume of data downloaded from the server per second.

Web Pages: -

- Login Page
- Dash Board
- Module Page and respective contents
- Contest Page and respective contents
- Progress
- Profile
- Admin Dash Board

Test results:

1. Login Page:

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------|-----------|---------|------|------|-----------|---------|------------|-----------------|-------------|------------|
| Login | 100 | 2158 | 1000 | 3872 | 929.79 | 0.00% | 17.4/sec | 16.89 | 2.23 | 994.0 |
| TOTAL | 100 | 2158 | 1000 | 3872 | 929.79 | 0.00% | 17.4/sec | 16.89 | 2.23 | 994.0 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Login | 1000 | 9700 | 1242 | 16679 | 3326.41 | 0.00% | 57.2/sec | 55.55 | 7.32 | 994.1 |
| TOTAL | 1000 | 9700 | 1242 | 16679 | 3326.41 | 0.00% | 57.2/sec | 55.55 | 7.32 | 994.1 |

2500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Login | 2500 | 15781 | 2652 | 30855 | 8176.87 | 6.00% | 80.6/sec | 88.81 | 9.69 | 1128.1 |
| TOTAL | 2500 | 15781 | 2652 | 30855 | 8176.87 | 6.00% | 80.6/sec | 88.81 | 9.69 | 1128.1 |

| Label | Samples (no.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|-------|---------------|--------------------|-----------|---------------------|
| Login | 100 | 2158 | 0.00 | 17.4 |
| | 1000 | 9700 | 0.00 | 57.2 |
| | 2500 | 15781 | 6.00 | 80.6 |

2. Dash Board:

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Dash Board | 100 | 1287 | 312 | 3524 | 672.14 | 0.00% | 23.1/sec | 22.44 | 3.05 | 994.1 |
| TOTAL | 100 | 1287 | 312 | 3524 | 672.14 | 0.00% | 23.1/sec | 22.44 | 3.05 | 994.1 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Dash Board | 500 | 2086 | 742 | 2915 | 699.05 | 0.00% | 101.6/sec | 98.62 | 13.39 | 994.1 |
| TOTAL | 500 | 2086 | 742 | 2915 | 699.05 | 0.00% | 101.6/sec | 98.62 | 13.39 | 994.1 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Dash Board | 1000 | 55018 | 3324 | 67447 | 12781.81 | 30.00% | 14.4/sec | 24.79 | 1.33 | 1762.4 |
| TOTAL | 1000 | 55018 | 3324 | 67447 | 12781.81 | 30.00% | 14.4/sec | 24.79 | 1.33 | 1762.4 |

| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|------------|---------------|--------------------|-----------|---------------------|
| Dash Board | 100 | 1287 | 0.00 | 23.1 |
| | 500 | 2086 | 0.00 | 101.6 |
| | 1000 | 55018 | 30.00 | 14.4 |

3. Profile:

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Profile | 100 | 434 | 178 | 768 | 147.06 | 0.00% | 44.5/sec | 43.24 | 5.79 | 994.1 |
| TOTAL | 100 | 434 | 178 | 768 | 147.06 | 0.00% | 44.5/sec | 43.24 | 5.79 | 994.1 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Profile | 500 | 4806 | 519 | 6680 | 1595.27 | 0.00% | 58.2/sec | 56.47 | 7.55 | 994.1 |
| TOTAL | 500 | 4806 | 519 | 6680 | 1595.27 | 0.00% | 58.2/sec | 56.47 | 7.55 | 994.1 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Profile | 1000 | 17768 | 6406 | 28531 | 4871.62 | 0.00% | 32.9/sec | 31.89 | 4.27 | 994.1 |
| TOTAL | 1000 | 17768 | 6406 | 28531 | 4871.62 | 0.00% | 32.9/sec | 31.89 | 4.27 | 994.1 |

| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|---------|---------------|--------------------|-----------|---------------------|
| Profile | 100 | 434 | 0.00 | 44.5 |
| | 500 | 4806 | 0.00 | 58.2 |
| | 1000 | 17768 | 0.00 | 32.9 |

4. Modules:

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Modules | 100 | 412 | 182 | 1365 | 248.77 | 0.00% | 43.3/sec | 42.11 | 6.00 | 996.0 |
| Hindi Module | 100 | 117 | 49 | 548 | 79.24 | 0.00% | 47.6/sec | 46.25 | 6.87 | 996.0 |
| Course Content | 100 | 133 | 52 | 545 | 93.72 | 0.00% | 46.3/sec | 45.05 | 6.42 | 996.0 |
| TOTAL | 300 | 221 | 49 | 1365 | 209.74 | 0.00% | 120.5/sec | 117.23 | 16.95 | 996.0 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------------|-----------|---------|------|------|-----------|---------|------------|-----------------|-------------|------------|
| Modules | 500 | 4996 | 685 | 9200 | 2803.95 | 0.00% | 44.7/sec | 43.45 | 6.20 | 996.0 |
| Hindi Module | 500 | 4893 | 415 | 6270 | 1478.24 | 0.00% | 31.4/sec | 30.55 | 4.54 | 996.0 |
| Course Content | 500 | 4743 | 1210 | 6263 | 1020.16 | 0.00% | 25.7/sec | 25.04 | 3.57 | 996.0 |
| TOTAL | 1500 | 4877 | 415 | 9200 | 1925.31 | 0.00% | 72.8/sec | 70.83 | 10.24 | 996.0 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------------|-----------|---------|-----|-------|-----------|---------|------------|-----------------|-------------|------------|
| Modules | 1000 | 11016 | 265 | 18785 | 6396.26 | 0.00% | 48.1/sec | 46.83 | 6.68 | 996.0 |
| Hindi Module | 1000 | 9804 | 287 | 13491 | 3198.65 | 0.00% | 32.4/sec | 31.50 | 4.68 | 996.0 |
| Course Content | 1000 | 7372 | 725 | 13498 | 3026.23 | 0.00% | 28.5/sec | 27.68 | 3.95 | 996.0 |
| TOTAL | 3000 | 9397 | 265 | 18785 | 4732.52 | 0.00% | 84.0/sec | 81.72 | 11.81 | 996.0 |

| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|---------|---------------|--------------------|-----------|---------------------|
| Modules | 100 | 221 | 0.00 | 120.5 |
| | 500 | 4877 | 0.00 | 72.8 |
| | 1000 | 9937 | 0.00 | 84.0 |

5. Contests:

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Contests | 100 | 460 | 203 | 759 | 187.80 | 0.00% | 37.0/sec | 35.96 | 4.84 | 996.0 |
| Hindi Contest | 100 | 169 | 47 | 356 | 83.56 | 0.00% | 39.5/sec | 38.41 | 5.28 | 996.0 |
| TOTAL | 200 | 315 | 47 | 759 | 205.39 | 0.00% | 70.6/sec | 68.67 | 9.34 | 996.0 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------------|-----------|---------|-----|-------|-----------|---------|------------|-----------------|-------------|------------|
| Contests | 500 | 2929 | 575 | 10186 | 1818.62 | 0.00% | 48.9/sec | 47.56 | 6.40 | 996.0 |
| Hindi Contest | 500 | 1363 | 44 | 7592 | 1021.09 | 0.00% | 51.3/sec | 49.94 | 6.87 | 996.0 |
| TOTAL | 1000 | 2146 | 44 | 10186 | 1669.74 | 0.00% | 96.7/sec | 94.04 | 12.79 | 996.0 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|---------------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Contests | 1000 | 6955 | 1067 | 23406 | 3685.99 | 0.40% | 41.5/sec | 40.78 | 5.41 | 1006.5 |
| Hindi Contest | 1000 | 1209 | 46 | 10458 | 1152.47 | 0.00% | 43.3/sec | 42.09 | 5.79 | 996.0 |
| TOTAL | 2000 | 4082 | 46 | 23406 | 3963.83 | 0.20% | 82.7/sec | 80.87 | 10.92 | 1001.3 |

| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|----------|---------------|--------------------|-----------|---------------------|
| Contests | 100 | 315 | 0.00 | 70.6 |
| | 500 | 2146 | 0.00 | 96.7 |
| | 1000 | 4082 | 0.20 | 82.7 |

6. Progress

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Progress | 100 | 226 | 95 | 1280 | 190.37 | 0.00% | 29.3/sec | 28.50 | 3.83 | 996.0 |
| TOTAL | 100 | 226 | 95 | 1280 | 190.37 | 0.00% | 29.3/sec | 28.50 | 3.83 | 996.0 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------|-----------|---------|-----|------|-----------|---------|------------|-----------------|-------------|------------|
| Progress | 500 | 1010 | 317 | 2312 | 426.42 | 0.00% | 148.1/sec | 144.05 | 19.38 | 996.0 |
| TOTAL | 500 | 1010 | 317 | 2312 | 426.42 | 0.00% | 148.1/sec | 144.05 | 19.38 | 996.0 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|----------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Progress | 1000 | 396 | 238 | 668 | 86.13 | 0.00% | 284.9/sec | 277.11 | 37.28 | 996.0 |
| TOTAL | 1000 | 396 | 238 | 668 | 86.13 | 0.00% | 284.9/sec | 277.11 | 37.28 | 996.0 |

| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|----------|---------------|--------------------|-----------|---------------------|
| Progress | 100 | 226 | 0.00 | 29.3 |
| | 500 | 1010 | 0.00 | 148.1 |
| | 1000 | 396 | 0.00 | 284.9 |

7. Admin Dash Board

100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Admin Dashboa... | 100 | 316 | 153 | 892 | 185.65 | 0.00% | 32.3/sec | 31.41 | 4.45 | 996.0 |
| TOTAL | 100 | 316 | 153 | 892 | 185.65 | 0.00% | 32.3/sec | 31.41 | 4.45 | 996.0 |

500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Admin Dashboa... | 500 | 236 | 147 | 465 | 50.69 | 0.00% | 154.4/sec | 150.19 | 21.26 | 996.0 |
| TOTAL | 500 | 236 | 147 | 465 | 50.69 | 0.00% | 154.4/sec | 150.19 | 21.26 | 996.0 |

1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------------|-----------|---------|-----|-----|-----------|---------|------------|-----------------|-------------|------------|
| Admin Dashboa... | 1000 | 570 | 337 | 816 | 93.68 | 0.00% | 297.4/sec | 289.31 | 40.96 | 996.0 |
| TOTAL | 1000 | 570 | 337 | 816 | 93.68 | 0.00% | 297.4/sec | 289.31 | 40.96 | 996.0 |

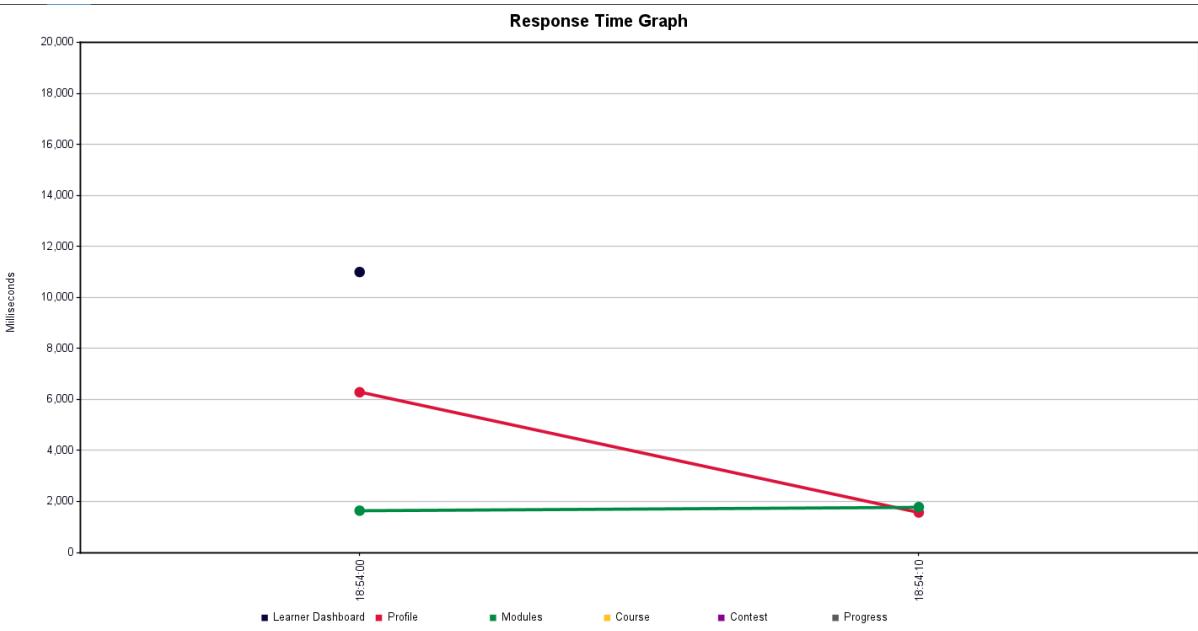
| Label | Samples (No.) | Average (millisec) | Error (%) | Throughput (Kb/sec) |
|------------------|---------------|--------------------|-----------|---------------------|
| Admin Dash Board | 100 | 316 | 0.00 | 32.3 |
| | 500 | 236 | 0.00 | 154.4 |
| | 1000 | 570 | 0.00 | 297.4 |

- All the above results mentioned displays the breakdown point of individual pages beyond which the error increases significantly crossing the average range of 10% making the conditions vulnerable.

8. Performance testing: - Response time graphs

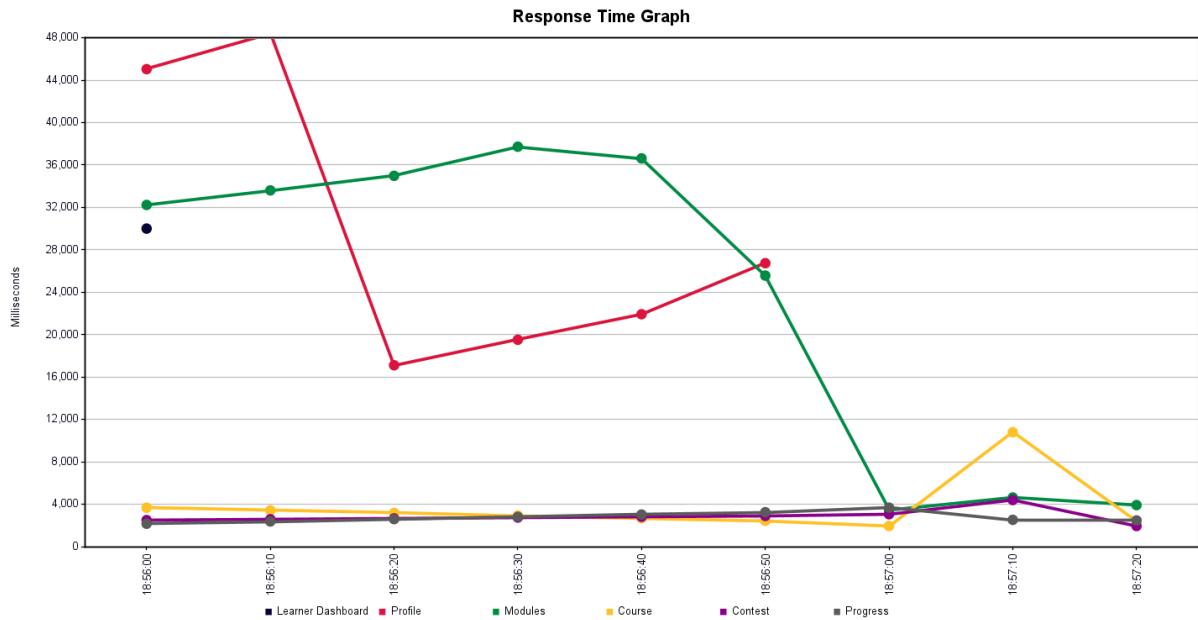
100 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------------------|-----------|---------|-------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Learner Dashbo... | 100 | 10997 | 10179 | 12030 | 529.74 | 0.00% | 7.6/sec | 7.38 | 1.00 | 996.0 |
| Profile | 100 | 1566 | 1149 | 1939 | 284.95 | 0.00% | 32.5/sec | 31.60 | 4.22 | 996.0 |
| Modules | 100 | 1660 | 1332 | 2218 | 258.57 | 0.00% | 31.6/sec | 30.76 | 4.39 | 996.0 |
| Course | 100 | 961 | 471 | 1454 | 279.18 | 0.00% | 50.8/sec | 49.45 | 7.35 | 996.0 |
| Contest | 100 | 367 | 255 | 509 | 58.41 | 0.00% | 116.3/sec | 113.10 | 15.22 | 996.0 |
| Progress | 100 | 307 | 217 | 420 | 60.69 | 0.00% | 154.8/sec | 150.57 | 20.26 | 996.0 |
| TOTAL | 600 | 2643 | 217 | 12030 | 3783.71 | 0.00% | 34.4/sec | 33.49 | 4.63 | 996.0 |



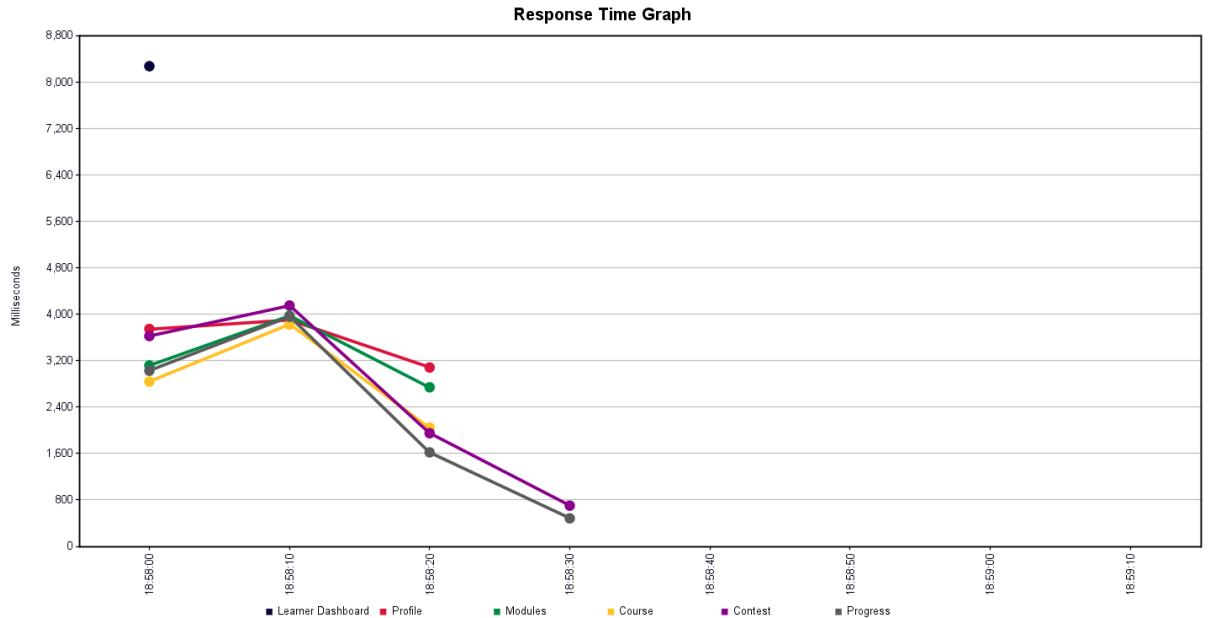
500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------------------|-----------|---------|-------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Learner Dashboard | 500 | 30005 | 14057 | 49651 | 16227.88 | 100.00% | 9.5/sec | 29.81 | 0.00 | 3212.7 |
| Profile | 500 | 21588 | 6804 | 49175 | 7494.23 | 81.00% | 7.0/sec | 19.26 | 0.17 | 2800.2 |
| Modules | 500 | 22787 | 87 | 50582 | 16834.39 | 50.20% | 9.4/sec | 19.05 | 0.65 | 2082.8 |
| Course | 500 | 6919 | 63 | 20744 | 59044.45 | 0.00% | 18.0/sec | 17.56 | 2.61 | 996.0 |
| Contest | 500 | 1720 | 87 | 22378 | 2271.38 | 0.00% | 18.0/sec | 17.48 | 2.35 | 996.0 |
| Progress | 500 | 1012 | 86 | 22050 | 18754.5 | 0.00% | 18.8/sec | 18.33 | 2.47 | 996.0 |
| TOTAL | 3000 | 14005 | 63 | 50582 | 15313.43 | 38.53% | 34.1/sec | 61.49 | 2.84 | 1847.3 |



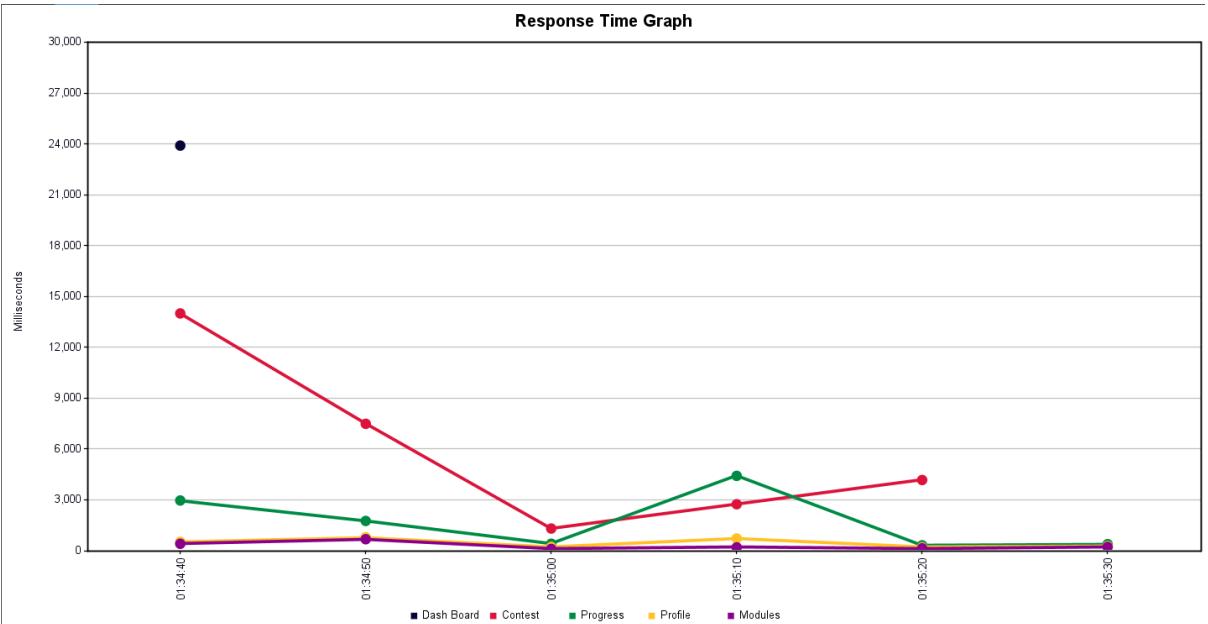
1000 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|-------------------|-----------|---------|-----|-------|-----------|---------|------------|-----------------|-------------|------------|
| Learner Dashboard | 1000 | 8278 | 677 | 72469 | 8313.81 | 7.90% | 13.3/sec | 15.29 | 1.61 | 1179.4 |
| Profile | 1000 | 3646 | 471 | 10954 | 1505.57 | 5.60% | 13.3/sec | 14.56 | 1.63 | 1122.3 |
| Modules | 1000 | 3151 | 54 | 8990 | 1284.84 | 0.00% | 13.4/sec | 12.99 | 1.85 | 996.0 |
| Course | 1000 | 2661 | 49 | 4605 | 989.59 | 0.00% | 13.8/sec | 13.42 | 1.99 | 996.0 |
| Contest | 1000 | 2119 | 49 | 4651 | 799.47 | 0.00% | 14.3/sec | 13.95 | 1.88 | 996.0 |
| Progress | 1000 | 1598 | 42 | 4441 | 680.15 | 0.00% | 15.2/sec | 14.76 | 1.99 | 996.0 |
| TOTAL | 6000 | 3576 | 42 | 72469 | 4169.09 | 2.25% | 78.6/sec | 80.46 | 10.34 | 1047.6 |



2500 users

| Label | # Samples | Average | Min | Max | Std. Dev. | Error % | Throughput | Received KB/sec | Sent KB/sec | Avg. Bytes |
|------------|-----------|---------|------|-------|-----------|---------|------------|-----------------|-------------|------------|
| Dash Board | 2500 | 23907 | 1226 | 42125 | 14489.36 | 28.56% | 56.2/sec | 84.88 | 5.30 | 1545.3 |
| Contest | 2500 | 4825 | 57 | 36332 | 6516.86 | 9.28% | 42.6/sec | 51.31 | 5.06 | 1233.5 |
| Progress | 2500 | 1666 | 40 | 28294 | 3799.50 | 0.60% | 47.3/sec | 46.70 | 6.15 | 1011.4 |
| Profile | 2500 | 471 | 38 | 28306 | 1500.40 | 0.00% | 49.9/sec | 48.56 | 6.48 | 996.0 |
| Modules | 2500 | 304 | 39 | 894 | 238.40 | 0.00% | 51.0/sec | 49.64 | 7.08 | 996.0 |
| TOTAL | 12500 | 6235 | 38 | 42125 | 11599.27 | 7.69% | 205.7/sec | 232.25 | 25.15 | 1156.4 |



| Samples (no.of) | Ramp-up period (sec) | Loop count | Average throughput (Kb/sec) | Error (%) |
|-----------------|----------------------|------------|-----------------------------|-----------|
| 100 | 2 | 1 | 34.4 | 0.00 |
| 1000 | 2 | 1 | 78.6 | 2.25 |
| 2500 | 2 | 1 | 205.7 | 7.69 |

- At 2500 individual user threads, the system's error rate rose significantly to 7.69 and at 3000 user threads it went on beyond range increasing rapidly indicating system's stress limit is at 2500 users on an average. This shows the system begins to struggle under increasing load beyond this point, compromising its performance.

Conclusion:

The non-functional testing carried out using Apache JMeter effectively evaluated the performance, stability, and scalability of the Fluentify web application. Load and stress tests were executed across multiple modules, including Login, Dashboard, Profile, Modules, Contests, Progress, and Admin Dashboard.

Security and Privacy:

Overview:

ZAP scanning helps evaluate the security posture of a web application by analysing requests, responses, and system behaviour across different scanning modes. In all three scans performed—API Scan, DevTools Scan and Full Scan—**0 alerts** were reported. This indicates that ZAP did not identify any exploitable vulnerabilities within the covered categories. The scan results, which can be viewed through ZAP's reporting and alert management features, summarize the security assessment and can be exported for further review or documentation.

Different tools used:

- OWASP ZAP (Active scan, API scan, DevTools scan)
- Browse DevTools
- Automated vulnerability plugins included in ZAP

Test types conducted:

- API Security test
- DevTools Automated scan
- Active scan

Different scan categories covered:

list of security checks performed across all scans:

- Path Traversal
- Remote File Inclusion
- External Redirect

- Server Side Include
- SQL Injection (MySQL, PostgreSQL, Oracle, SQLite)
- Cross-Site Scripting (Reflected, Persistent, DOM)
- Server-Side Code Injection
- Remote OS Command Injection (Regular & Time Based)
- XPath Injection
- XML External Entity Attack (XXE)
- Cloud Metadata Exposure
- Directory Browsing
- Buffer Overflow
- Format String Error
- CRLF Injection
- Parameter Tampering
- Spring Actuator Information Leak
- Log4Shell
- XSLT Injection
- SOAP XML Injection
- Hidden File Finder
- GET for POST
- User Agent Fuzzer
- ELMAH / Trace.axd / .htaccess / .env leak tests

Test Results:

1. API Security Test

| https://fluentify-rho.vercel.app Scan Progress | | | | | | |
|--|----------|----------------|-----------|------|--------|--------|
| Progress | | Response Chart | | | | |
| Host: | Strength | Progress | Elapsed | Reqs | Alerts | Status |
| Analyser | | | 00:00:294 | 4 | | |
| Plugin | | | | | | |
| Remote File Inclusion | Medium | | 00:00:148 | 0 | 0 | ✓ |
| External Redirect | Medium | | 00:00:149 | 0 | 0 | ✓ |
| Server Side Include | Medium | | 00:00:144 | 0 | 0 | ✓ |
| SQL Injection | Medium | | 00:00:143 | 0 | 0 | ✓ |
| Server Side Code Injection | Medium | | 00:00:154 | 0 | 0 | ✓ |
| Remote OS Command Injection | Medium | | 00:00:156 | 0 | 0 | ✓ |
| XPath Injection | Medium | | 00:00:147 | 0 | 0 | ✓ |
| XML External Entity Attack | Medium | | 00:00:159 | 0 | 0 | ✓ |
| Cloud Metadata Potentially Exposed | Medium | | 00:00:714 | 9 | 0 | ✓ |
| Server Side Template Injection | Medium | | 00:00:648 | 0 | 0 | ✓ |
| Server Side Template Injection (Blind) | Medium | | 00:00:150 | 0 | 0 | ✓ |
| Remote OS Command Injection (Time Based) | Medium | | 00:00:152 | 0 | 0 | ✓ |
| Directory Browsing | Medium | | 00:00:746 | 8 | 0 | ✓ |
| Buffer Overflow | Medium | | 00:00:153 | 0 | 0 | ✓ |
| Format String Error | Medium | | 00:00:146 | 0 | 0 | ✓ |
| CRLF Injection | Medium | | 00:00:138 | 0 | 0 | ✓ |
| Parameter Tampering | Medium | | 00:00:149 | 0 | 0 | ✓ |
| Spring Actuator Information Leak | Medium | | 00:00:241 | 2 | 0 | ✓ |
| XSLT Injection | Medium | | 00:00:176 | 0 | 0 | ✓ |
| Script Active Scan Rules | Medium | | 00:00:085 | 0 | 0 | ✗ |
| SOAP Action Spoofing | Medium | | 00:00:310 | 0 | 0 | ✓ |
| SOAP XML Injection | Medium | | 00:00:177 | 0 | 0 | ✓ |
| Totals | | | 00:04:665 | 64 | 0 | |

The above result shows that all the security plugins have been successfully completed. No security alerts have been reported. All the API end points responded safely to the injection tests.

2. DevTools Automated Scan

| https://fluentify-rho.vercel.app Scan Progress | | | | | | |
|--|----------------------------------|----------------|-----------|------|--------|--------|
| Progress | | Response Chart | | | | |
| Host: | https://fluentify-rho.vercel.app | | | | | |
| | Strength | Progress | Elapsed | Reqs | Alerts | Status |
| Analyser | | | 00:00:299 | 4 | | |
| Plugin | | | | | | |
| Path Traversal | Medium | | 00:00:156 | 0 | 0 | ✓ |
| Remote File Inclusion | Medium | | 00:00:171 | 0 | 0 | ✓ |
| External Redirect | Medium | | 00:00:152 | 0 | 0 | ✓ |
| Server Side Include | Medium | | 00:00:160 | 0 | 0 | ✓ |
| Cross Site Scripting (Reflected) | Medium | | 00:00:154 | 0 | 0 | ✓ |
| Cross Site Scripting (Persistent) - Prime | Medium | | 00:00:161 | 0 | 0 | ✓ |
| Cross Site Scripting (Persistent) - Spider | Medium | | 00:00:728 | 8 | 0 | ✓ |
| Cross Site Scripting (Persistent) | Medium | | 00:00:141 | 0 | 0 | ✓ |
| SQL Injection | Medium | | 00:00:150 | 0 | 0 | ✓ |
| SQL Injection - MySQL (Time Based) | Medium | | 00:00:155 | 0 | 0 | ✓ |
| SQL Injection - Hypersonic SQL (Time Based) | Medium | | 00:00:143 | 0 | 0 | ✓ |
| SQL Injection - Oracle (Time Based) | Medium | | 00:00:146 | 0 | 0 | ✓ |
| SQL Injection - PostgreSQL (Time Based) | Medium | | 00:00:138 | 0 | 0 | ✓ |
| Cross Site Scripting (DOM Based) | Medium | | 00:00:130 | 0 | 0 | ✗ |
| SQL Injection - MsSQL (Time Based) | Medium | | 00:00:144 | 0 | 0 | ✓ |
| Server Side Code Injection | Medium | | 00:00:137 | 0 | 0 | ✓ |
| Remote OS Command Injection | Medium | | 00:00:140 | 0 | 0 | ✓ |
| XPath Injection | Medium | | 00:00:137 | 0 | 0 | ✓ |
| XML External Entity Attack | Medium | | 00:00:132 | 0 | 0 | ✓ |
| Server Side Template Injection | Medium | | 00:00:131 | 0 | 0 | ✓ |
| Server Side Template Injection (Blind) | Medium | | 00:00:139 | 0 | 0 | ✓ |
| Remote OS Command Injection (Time Based) | Medium | | 00:00:133 | 0 | 0 | ✓ |
| CRLF Injection | Medium | | 00:00:138 | 0 | 0 | ✓ |
| Parameter Tampering | Medium | | 00:00:145 | 0 | 0 | ✓ |
| XSLT Injection | Medium | | 00:00:137 | 0 | 0 | ✓ |
| Script Active Scan Rules | Medium | | 00:00:064 | 0 | 0 | ✗ |
| SOAP Action Spoofing | Medium | | 00:00:139 | 0 | 0 | ✓ |
| SOAP XML Injection | Medium | | 00:00:133 | 0 | 0 | ✓ |
| Totals | | | 00:04:843 | 67 | 0 | |

The above results indicate no vulnerabilities have been reported. DevTools automation covered client-side vulnerabilities such as XSS, redirects, and metadata leaks.

3. Active Scan:

| https://fluentify-rho.vercel.app Scan Progress | | | | | | |
|--|----------------------------------|----------------|-----------|------|--------|--------|
| Progress | | Response Chart | | | | |
| Host: | https://fluentify-rho.vercel.app | | | | | |
| | Strength | Progress | Elapsed | Reqs | Alerts | Status |
| Analyser | | | 00:00:318 | 4 | | |
| Plugin | | | | | | |
| Path Traversal | Medium | | 00:00:156 | 0 | 0 | ✓ |
| Remote File Inclusion | Medium | | 00:00:156 | 0 | 0 | ✓ |
| Heartbleed OpenSSL Vulnerability | Medium | | 00:00:687 | 4 | 0 | ✓ |
| Source Code Disclosure - /WEB-INF Folder | Medium | | 00:00:803 | 6 | 0 | ✓ |
| Source Code Disclosure - CVE-2012-1823 | Medium | | 00:00:650 | 1 | 0 | ✓ |
| Remote Code Execution - CVE-2012-1823 | Medium | | 00:00:572 | 16 | 0 | ✓ |
| External Redirect | Medium | | 00:00:282 | 0 | 0 | ✓ |
| Server Side Include | Medium | | 00:00:272 | 0 | 0 | ✓ |
| Cross Site Scripting (Reflected) | Medium | | 00:00:152 | 0 | 0 | ✓ |
| Cross Site Scripting (Persistent) - Prime | Medium | | 00:00:144 | 0 | 0 | ✓ |
| Cross Site Scripting (Persistent) - Spider | Medium | | 00:00:827 | 8 | 0 | ✓ |
| Cross Site Scripting (Persistent) | Medium | | 00:00:141 | 0 | 0 | ✓ |
| SQL Injection | Medium | | 00:00:140 | 0 | 0 | ✓ |
| SQL Injection - MySQL (Time Based) | Medium | | 00:00:174 | 0 | 0 | ✓ |
| SQL Injection - Hypersonic SQL (Time Based) | Medium | | 00:00:168 | 0 | 0 | ✓ |
| SQL Injection - Oracle (Time Based) | Medium | | 00:00:141 | 0 | 0 | ✓ |
| SQL Injection - PostgreSQL (Time Based) | Medium | | 00:00:141 | 0 | 0 | ✓ |
| SQL Injection - SQLite (Time Based) | Medium | | 00:00:143 | 0 | 0 | ✓ |
| Cross Site Scripting (DOM Based) | Medium | | 00:00:224 | 0 | 0 | ✗ |
| SQL Injection - MsSQL (Time Based) | Medium | | 00:00:137 | 0 | 0 | ✓ |
| Log4Shell | Medium | | 00:00:070 | 0 | 0 | ✗ |
| Spring4Shell | Medium | | 00:00:715 | 17 | 0 | ✓ |
| Server Side Code Injection | Medium | | 00:00:320 | 0 | 0 | ✓ |
| Remote OS Command Injection | Medium | | 00:00:154 | 0 | 0 | ✓ |
| XPath Injection | Medium | | 00:00:158 | 0 | 0 | ✓ |
| XML External Entity Attack | Medium | | 00:00:151 | 0 | 0 | ✓ |
| Generic Padding Oracle | Medium | | 00:00:151 | 0 | 0 | ✓ |
| Cloud Metadata Potentially Exposed | Medium | | 00:01:309 | 9 | 0 | ✓ |
| Server Side Template Injection | Medium | | 00:01:236 | 0 | 0 | ✓ |
| Server Side Template Injection (Blind) | Medium | | 00:00:324 | 0 | 0 | ✓ |
| Remote OS Command Injection (Time Based) | Medium | | 00:00:151 | 0 | 0 | ✓ |

| | | | | | |
|----------------------------------|--------|-----------|-----|---|---|
| Directory Browsing | Medium | 00:00:807 | 8 | 0 | ✓ |
| Buffer Overflow | Medium | 00:00:146 | 0 | 0 | ✓ |
| Format String Error | Medium | 00:00:146 | 0 | 0 | ✓ |
| CRLF Injection | Medium | 00:00:147 | 0 | 0 | ✓ |
| Parameter Tampering | Medium | 00:00:148 | 0 | 0 | ✓ |
| ELMAH Information Leak | Medium | 00:00:134 | 1 | 0 | ✓ |
| Trace and Information Leak | Medium | 00:00:209 | 3 | 0 | ✓ |
| .htaccess Information Leak | Medium | 00:00:223 | 2 | 0 | ✓ |
| .env Information Leak | Medium | 00:00:217 | 2 | 0 | ✓ |
| Spring Actuator Information Leak | Medium | 00:00:206 | 2 | 0 | ✓ |
| Hidden File Finder | Medium | 00:04:060 | 52 | 0 | ✓ |
| XSLT Injection | Medium | 00:03:907 | 0 | 0 | ✓ |
| GET for POST | Medium | 00:00:154 | 0 | 0 | ✓ |
| User Agent Fuzzer | Medium | 00:05:453 | 96 | 0 | ✓ |
| Script Active Scan Rules | Medium | 00:00:072 | 0 | 0 | ✗ |
| SOAP Action Spoofing | Medium | 00:00:143 | 0 | 0 | ✓ |
| SOAP XML Injection | Medium | 00:00:145 | 0 | 0 | ✓ |
| Totals | | 00:20:758 | 319 | 0 | |

Full scan is executed in 319 requests. The web application has passed out all the vulnerability checks without detecting issues. All the plugins have been marked as successful.

Conclusion:

After combining the test results with manual testing, secure coding reviews and continuous monitoring the security posture of the website based on all these reports appears strong with no vulnerabilities detected ensuring users with their data privacy.