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## **IT - 314: Software Engineering**

Group - 11

### **Non - Functional Testing**

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**Event Sphere**

### **Event Management and Participation Platform**

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# 1. Load and Stress Testing

Non-functional testing is a performance evaluation method that leverages Apache JMeter and BlazeMeter, both open-source tools, to assess the performance and behavior of web applications, APIs, and other services under varying load conditions. By simulating numerous users or requests interacting with the system, it helps analyze factors such as performance, reliability, and scalability. JMeter testing is widely utilized to detect bottlenecks and ensure applications can efficiently manage expected traffic loads.

## Parameters in a JMeter Summary Report

The Summary Report in JMeter offers comprehensive insights into test execution metrics. Here's a breakdown of each parameter:

### 1. Label

- Identifies the name or URL associated with a specific HTTP(s) request.
- If the **"Include group name in label?"** option is enabled, the Thread Group name is prefixed to the label.

### 2. Samples

- Displays the total number of virtual users (requests) executed for a specific label.

### 3. Average

- Shows the **average response time** (in milliseconds) taken by all samples for the specified label.

### 4. Min

- Indicates the **minimum response time** recorded for the label.

## 5. Max

- Represents the **maximum response time** recorded for the label.

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

- Measures the **variation or inconsistency** in response times.
- A **lower standard deviation** signifies more consistent performance.
- **Best Practice:** This value should ideally be less than or equal to half of the average response time.

## 7. Error%

- Displays the **percentage of failed requests** for a specific label.

## 8. Throughput

- Reflects the **number of requests processed per second** by the server.
- Calculated from the start of the first sample to the end of the last sample.
- **Higher throughput** indicates better performance.

## 9. KB/Sec

- Represents the **amount of data (in KB)** downloaded from the server during the test.
- Essentially, it is **Throughput** measured in kilobytes per second.

## Case 1 : Loading Website Home page

### TestCase 1 :

Users - 50

Ramp-up period - 1

Loop Count - 5

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/s	Sent KB/s	Avg. Bytes
Users:HTTP Request	250	59	16	514	88.49	0.00%	211.3271	216.2	26.62	1048
TOTAL	250	59	16	514	88.49	0.00%	211.3271	216.2	26.62	1048

### TestCase 2 :

Users - 250

Ramp-up period - 1

Loop Count - 5

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Users:HTTP Request	1250	3150	15	36188	10147.5	0.00%	33.53004	34.32	4.22	1048
TOTAL	1250	3150	15	36188	10147.5	0.00%	33.53004	34.32	4.22	1048

### TestCase 3 :

Users - 500

Ramp-up period - 1

Loop Count - 5

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Users:HTTP Request	2500	10969	4	42109	16993.58	17.44%	19.1543	25.39	1.99	1357.1
TOTAL	2500	10969	4	42109	16993.58	17.44%	19.1543	25.39	1.99	1357.1

### Case 2 : Loading Website Login page

#### TestCase 1 :

Users - 50

Ramp-up period - 1

Loop Count - 5

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Users:HTTP	250	31	16	171	21.42	0.00%	225.0225	230.3	29.45	1048

Request										
TOTAL	250	31	16	171	21.42	0.00%	225.0225	230.3	29.45	1048

### TestCase 2 :

Users - 250

Ramp-up period - 1

Loop Count - 5

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Users:HTTP	1250	3094	15	36225	10066.61	0.00%	33.532	34.32	4.39	1048
TOTAL	1250	3094	15	36225	10066.61	0.00%	33.532	34.32	4.39	1048

### TestCase 3 :

Users - 500

Ramp-up period - 1

Loop Count - 5

Label	# Sample	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
Users:HTTP Request	2500	12560	16	42328	17786.15	21.52%	19.17413	26.77	1.97	1429.8
TOTAL	2500	12560	16	42328	17786.15	21.52%	19.17413	26.77	1.97	1429.8

### Average Analysis :

Number of Users	Ramp-up Period	Loop Count	Total Samples (Users*Loop)	Average Error(In %)	Throughput (Response/s)
50	1	5	250	0.00	218.174
250	1	5	1250	0.00	33.925
500	1	5	2500	19.48	19.160

Case 3 : Loading All Page Together ( login, student-login, college-login, FAQs page, AboutUs Page, Blog and Event Pages)

TestCase Scenario:

Users - 100

Ramp-up period - 1

Loop Count - 1

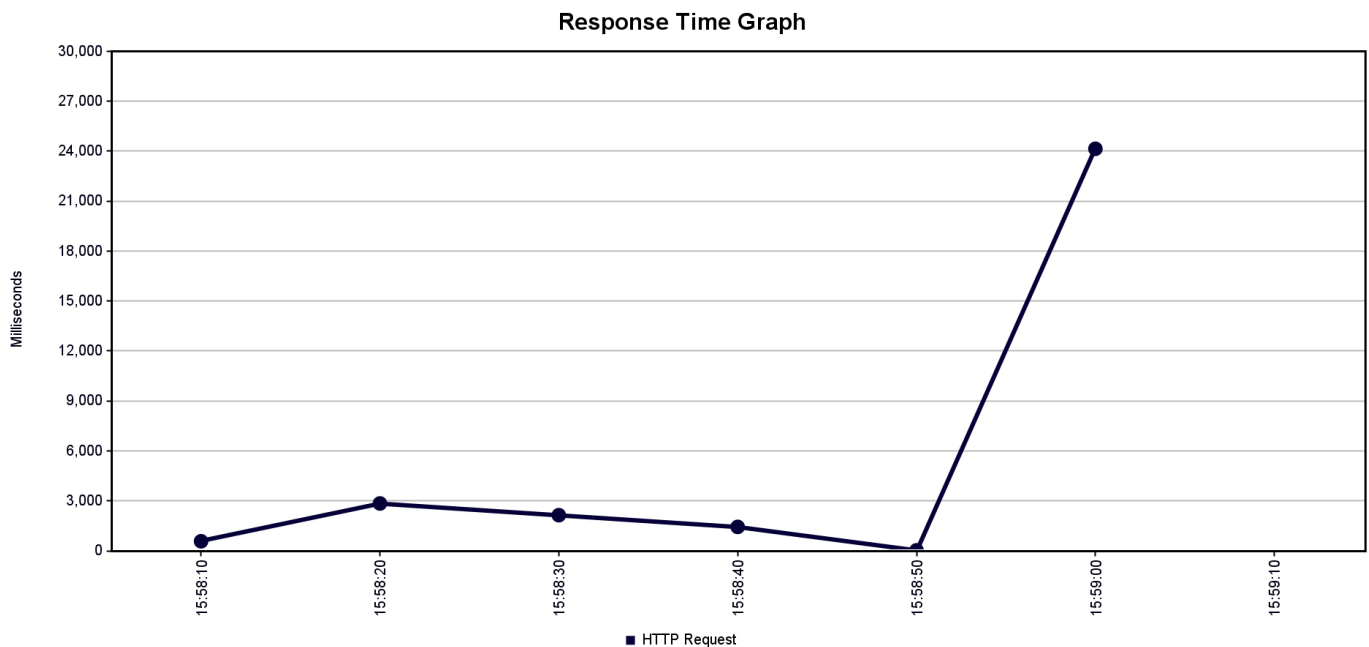


Label	# Samples	Average	Median	90% Line	95% Line	99% Line	Min	Max	Error %	Throughput	Received KB/sec	Sent KB/sec
HTTP Request	700	11914	73	42071	42100	60279	16	78247	11.57%	6.75018	9.4	1.34
TOTAL	700	11914	73	42071	42100	60279	16	78247	11.57%	6.75018	9.4	1.34

TestCase Scenario:

Users - 300  
Ramp-up period - 1  
Loop Count - 3

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throughput	Received KB/sec	Sent KB/sec	Avg. Bytes
HTTP Request	6300	1151	15	42114	6245.15	0.59%	92.78487	95.98	16.67	1059.3
TOTAL	6300	1151	15	42114	6245.15	0.59%	92.78487	95.98	16.67	1059.3



## 2. Performance Test

### Objective:

To evaluate the website's load speed and performance with a focus on identifying bottlenecks and opportunities for optimization.

### Tool Used:

GTMetrix – a widely used tool for analyzing web performance, offering insights into page load time, structure, and optimization opportunities.

### Scope of the Test:

The analysis was performed on the **Landing Page** as it serves as the first interaction point for users and significantly impacts the overall user experience.



## Latest Performance Report for:

<https://event-sphere-g11.vercel.app/>

Report generated: Sun, Dec 1, 2024 11:59 AM -0800

Test Server Location: 🇨🇦 Vancouver, Canada

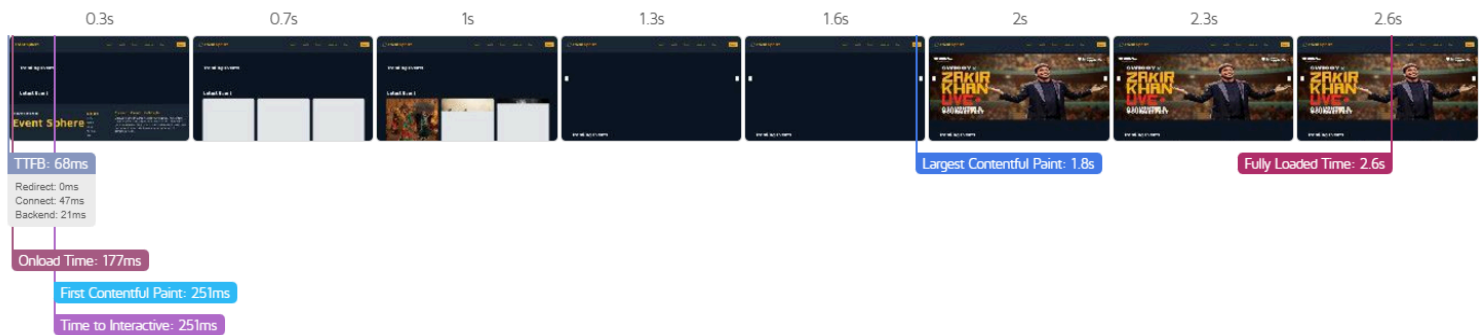
Using: 🌐 Chrome 117.0.0.0, Lighthouse 11.0.0

## Key Performance Metrics and Analysis

- 1. Speed Visualization:** Captures intervening screen states during the loading process, providing a step-by-step visual timeline of how the page loads. This insight helps identify elements that delay the user-perceived load time.
- 2. Performance Score:** Represents the Lighthouse Performance Score as measured by GTMetrix. Influenced by custom audits, analysis options, browser configuration, and hardware specifications.
- 3. Structure:** Evaluates how well the page is built for optimal performance. Highlights adherence to best practices in web development.
- 4. Largest Contentful Paint (LCP):** Measures the time taken for the largest visible content element (e.g., a hero image or heading text) to render within the visitor's viewport. For a good user experience, aim for an LCP of **2.5 seconds or less**.
- 5. Total Blocking Time (TBT):** Indicates the time blocked by scripts during the page loading process. For a smooth experience, aim for a TBT of **150 milliseconds or less**.

**6. Cumulative Layout Shift (CLS): Definition:** Measures the amount of unexpected layout shift experienced by visitors as the page loads. A CLS score of **0.1 or less** is recommended for a stable user experience.

#### Speed Visualization ?



#### GTmetrix Grade ?

**B**

Performance ?

**73%**

Structure ?

**94%**

#### Web Vitals ?

Largest Contentful Paint ?

**1.8s**

Total Blocking Time ?

**0ms**

Cumulative Layout Shift ?

**0.41**

#### Page Details ?

Pages with smaller total sizes and fewer requests tend to load faster.



Total Page Size - 1.94MB



Total Page Requests - 15



Look into reducing JavaScript, reducing web-fonts, and image optimization to ensure a lightweight and streamlined website.

# Performance Test Results (Key Issues)

## Top Issues

These audits are identified as the top issues impacting **your performance**.

- All
- FCP
- LCP
- TBT
- CLS

Med	Use explicit width and height on image elements CLS	1 image found	▼
Med	Avoid large layout shifts CLS	5 elements found	▼
Med-Low	Serve static assets with an efficient cache policy	Potential savings of 141KB	▼
Low	Efficiently encode images	Potential savings of 555KB	▼
Low	Properly size images	Potential savings of 550KB	▼