Distributed Report Analysis of Apache JMeter

Environment Setup

Apache JMeter: Version 5.6.1
Java: Version is 17.07.
Operating System: Windows 10 and 11 Pro 64-bit.

HTML Report

*** **APDEX (Application Performance Index):** In our test report we have found that **APDEX value is 0.085** which is **not good**. ***

For more information regarding APDEX please visit: https://en.wikipedia.org/wiki/Apdex. Because according to standard of APDEX value its performance is following:

Its value range is 0 to 1.0. The **satisfied range is 0.83 to 1.0,** tolerating range is 0.70 to 0.82 and below 0.70 range is frustrated.

Since the APDEX value we have found from our test report is 0.085 and it is in the frustrated range so it is not good. Please note that calculation of APDEX value depends on various factors. For the sake of clarification we are providing the formula to calculate the APDEX value. The formula is:

$$\text{Apdex}_t = \frac{\text{SatisfiedCount} + (0.5 \cdot \text{ToleratingCount}) + (0 \cdot \text{FrustratedCount})}{\text{TotalSamples}}$$

Here:

SatisfiedCount = 84.665
ToleratingCount = 500ms (0.5 sec)
FrustratedCount = 1500ms(1.5sec)
TotalSamples = 999
APDEX = 0.085

Calculating SatisfiedCount Using the above APDEX formula:

$$0.085 = \frac{SatisfiedCount+(0.5*0.5)+(0*1.5)}{999}$$

0.085*999 = SatisfiedCount+0.25+0

84.915=SatisfiedCount+0.25

SatisfiedCount=84.915-0.25

∴ SatisfiedCount=84.665

The TotalSamples means number of Thread count (users).

How to Achieve Good APDEX Value

By changing Threshold value, APDEX value will change accordingly. In our case we did not get good APDEX result because the threshold value was set to default. By increasing these threshold value **good APDEX value can be achieved**.

Requests Summary

In our test report all the threads run successfully. So we have **100% success** rate with **0% fail** rate.

Statistics

In statistics section from our test report we have Requests, Executions, Response Times (ms), Throughput, Network (KB/sec) column. Some of these column have sub-column as well. Please consider the following:

1. Requests have sub-column named **Label** which indicates the testing API in our case which is: https://testr.bdjobs.com/authentication/api/authentication.

2. From Executions column we have #Samples, FAIL, Error sub-column. **Here Samples indicates** total number of thread (user) which is 999, **FAIL indicates** number of failed samples and **Error indicates** the error percentage calculated from FAIL samples.

3. From Response Times (ms) we have quite a few sub-columns and they are: Average, Min, Max, Median, 90^{th} pct, 95^{th} pct, and 99^{th} pct.

4. **Average means** average response time of total threads. The value of average response time is 7123.71ms from 999 threads.

5. **Min means** minimum response time of total threads. The value of minimum response time is 193ms from 999 threads.

6. **Max means** maximum response time of total threads. The value of maximum response time is 17504ms from 999 threads.

7. Median is calculated via algorithm. Here value of median is 7496.00ms. Please visit the given link for more information about Median: https://en.wikipedia.org/wiki/Median. The formula to calculate median is given below:

$$\text{if } n \text{ is odd, } \operatorname{med}(x) = x_{(n+1)/2}$$

$$\text{if } n \text{ is even, } \operatorname{med}(x) = \frac{x_{(n/2)} + x_{((n/2)+1)}}{2}$$

Here:

n = Total number of threads
x = Data set (from Log file)

8. **90th** pct represent the response time for 90% of the **total thread transaction request**. In Our case the value of 90th pct is **11236.00ms, which indicates the time taken for 90% of the requests to be completed successfully.**
   For more information: https://www.vskills.in/certification/tutorial/jmeter-90th-percentile/#:~:text=In%20JMeter%2C%20the%2090%25%20line,requests%20to%20be%20completed%20successfully

9. **95th** pct represent the response time for 95% of the **total thread transaction request**. On our case the value of 95th pct is **11547.00ms, which indicates the time taken for 95% of the requests to be completed successfully.**

10. **99th** pct represent the response time for 99% of the **total thread transaction request**. On our case the value of 99th pct is **11995.00ms, which indicates the time taken for 99% of the requests to be completed successfully.**

11. **Throughput column** has one sub column named as **Transaction/s**. **It represents** set of a requests that represent a logical business transaction or a user action on a web application. In our case the value of transaction/s is 47.89ms.

12. Network (KB/sec) column has two sub-column and they are Received and Sent. The value of Received is 13.22 KB/sec and Sent is 23.12 KB/sec. It represents data receive and sent speed.

CSV Report

1. **TimeStamp:** In our test we have got 1.7E+12 value of timestamp. It represents how much time it takes when a particular sample is executed. In our particular test 1.7E+12 means 1.7*10^12 ms.

2. **Elapse:** It means total time taken for a specific sample or a request to execute. As we have 999 thread in our test so our elapse time varies on a different ranges. In our test we got:

   - **Maximum elapse value 17504 ms from 172.16.2.147-Thread Group 1-68.**
   - **Minimum elapse value 193ms from 172.16.2.147-Thread Group 1-154.**

3. **Label:** Please see section 1 from **statistics** of HTML report.

4. **Response Code:** It represents the communication between server and web browser. It indicates whether a specific HTTP request successfully completed. In our test all the request have successfully completed so response code is 200.
5. **Response Message:** Every response message have a specific code. It describe the code meaning. In our test we got "OK" message that means connection establish between server and web browser.

6. **Thread Name:** It means name of thread or virtual user (pointed with IP addresses) that executed a particular sample during test. Thread group 1-192 means a range from which the sample was executed. In our testing we have verities of thread group from 1 to 192 and 3 virtual users.

7. **DataType:** It tells which type of data we are sending to server as request. In our test we are sending username and password to server as request.

8. **Success:** It tells if the HTTP request successful or not. In our test all the thread runs successfully that's why it shows true message.

9. **Failure Message:** It shows the cause of failure of a request. In our test there is no failure thread that's why it is empty.

10. **Bytes:** It represents the size of response data in bytes received from the server for a particular sample. In our test we have received 493 bytes as minimum and 497 bytes are maximum.

11. **GrpThreads:** It typically represents the number of threads belong to a particular thread group during the execution of a JMeter test. In other words**:**

    - **Thread group represents range of threads that is available for user to use at the time of testing**.

    Generally group threads has different type of range.

12. **AllThreads:** It represents total number of threads that was used by a particular user or thread. In our test we have verities (starting from 164 to 333) of values as we have total 999 threads.

13. **URL:** It the address of the API which is equivalent to label from HTML report. In our report the URL is: https://testr.bdjobs.com/authentication/api/authentication.

14. **Latency:** It represents how much time it takes to send a request and first byte of response to received. In our testing we have latency from various range.

    - **Minimum we found 193 ms which is from 172.16.2.147-Thread Group: 1-40.**
    - **Maximum we found 17504 ms which is from 172.16.2.147-Thread Group: 1-68**

15. **IdleTime:** It means how long a thread was idle. In our test we got:

    - **Maximum IdleTime 1826 ms which we received from 172.16.2.147-Thread Group: 1-68.**
    - **Minimum IdleTime 0 ms which we received from 172.16.2.147-Thread Group: 1-40, 172.16.9.129-Thread Group: 1-163, 172.16.2.142-Thread Group: 1-169.**

16. **Connect:** It states time it takes to establish a connection with server during the execution of a particular sample. . In our test we got:

    - **Maximum connect time 86142 ms which we received from 172.16.2.147-Thread Group: 1-68.**
    - **Minimum connect time 120 ms which we received from 172.16.2.147-Thread Group: 1-40.**