JMeter

**What is JMeter? Why it is used?**

**The Apache JMeterTM is pure Java open source software, which was first developed by Stefano Mazzocchi of the Apache Software Foundation, designed to load test functional behavior and measure performance. You can use JMeter to analyze and measure the performance of web application or a variety of services. Performance Testing means testing a web application against heavy load, multiple and concurrent user traffic. JMeter originally is used for testing Web Application or FTP application. Nowadays, it is used for a functional test, database server test etc.**

**=>Have you ever tested a web server to know how efficiently it works? How many concurrent users can a web server handle? =>Let say that one day, your boss asks you to do performance testing of www.google.com for 100 users. What would you do?**

**It's not feasible to arrange 100 people with PC and internet access simultaneously accessing google.com Think of the infrastructure requirement when you test for 10000 users (a small number for a site like google). Hence you need a software tool like JMeter that will simulate real-user behaviors and performance/load test your site.**

**Dififerent Performence Test Tools**

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**====**

**#1. LoadRunner #2. Gatling #3. Apache Benchmark #4. Loadninja #5. TSung #6. StresStimulus #7. Funkload #8. WebLoad**

**#9. LoadView #10.Jmeter (best)**

JMeter Advantages

JMeter advantages are described as figure below

Apache

JMeter

Open source license

Friendly GUI

Platform independent

Full multi-threading

Visualize Test Result

Easy installation

framework

Highly extensible

Unlimited testing capabilities

Support multi protocol

**=> Performence /Load Test is required at Development/Testing phase**

**of the Project to check wheather website/webservice /MicroService is captable**

**taking simulataenous huge no.of requests or not when it released to Client organization**

**for the Production env.. i.e the tool like Jmeter creates the simulator for the browser/consumer App**

**to generate the huge no.of requests simultaneously and to perform load testing**

• Open source license: JMeter is totally free, allows developer use the source code for the

•

development

Friendly GUI: JMeter is extremely easy to use and doesn't take time to get familiar with it • Platform independent: JMeter is 100% pure Java desktop application. So it can run on multiple platforms (operating systems)

• Full multithreading framework. JMeter allows concurrent and simultaneous sampling of

**different functions by a separate thread group (allows to add more users (threads) to generate more requests)**

• Visualize Test Result: Test result can be displayed in a different format such as chart, table, tree and log file

• Easy installation: You just copy and run the *.bat file to run JMeter. No installation needed.

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**(Extracting the zip file and running the executable jar file)**

Highly Extensible: You can write your own tests. JMeter also supports visualization plugins allow you to extend your testing

Multiple testing strategy: JMeter supports many testing strategies such as Load Testing, Distributed Testing, and Functional Testing.

Simulation: JMeter can simulate multiple users with concurrent threads, create a heavy load against web application under test

• Support multi-protocol: JMeter does not only support web application testing but also evaluate database server performance. All basic protocols such as HTTP, JDBC, LDAP, SOAP, JMS, and FTP are supported by JMeter

• Record & Playback - Record the user activity on the browser and simulate them in a web application using JMeter

• Script Test: Jmeter can be integrated with Bean Shell & Selenium for automated testing.

The completed workflow of JMeter as shown in the figure below

*Test report*

**(5)**

Create request

to target server (website or DB softwarer mail server or ...)

**(1)**

Collect and calculate statistical info

**(4)**

Jmeter simulates

multiple users sending request to target server, and returns the performance result of the target

Saves all responses (3)

**JMeter Installation process**

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**step1) make sure that Java 8+ is installed in ur computer**

**step2) make sure that**

Server

responds (2)

Stable JAVA Versions are

**<java8+_home>/bin directory is added to PATH to activate java/jdk in our computer**

**8,11,14,17,21 (These are also called as LTS) |----> Long Term Support**

**step3) Test the java active version from the command prompt**

```
C:\Users\Nataraz>java

-version

java version "17.0.9" 2023-10-17 LTS

Java(TM) SE Runtime Environment (build 17.0.9+11-LTS-201)

Java HotSpot(TM) 64-Bit Server VM (build 17.0.9+11-LTS-201, mixed mode, sharing)
```

**step4) Download the Jmeter software**

c

jmeter.apache.org/download_jmeter.cgi

Binaries

apache-jmeter-5.6.2.tgz sha512 pgp apache-jmeter-5.6.2.zip sha512 pgp

**step5) Extract the zip file**

This PC > Local Disk (D:) > JmeterSoft apache-jmeter-5.6.2

ənal

Name

Date modified

Type

backups

bin

docs

09-10-2023 19:48 09-10-2023 18:57 09-10-2023 18:57

File folder

File folder

File folder

extras

09-10-2023 18:57

File folder

lib

09-10-2023 18:57

File folder

licenses

09-10-2023 18:57

File folder

printable_docs LICENSE

09-10-2023 18:57

File folder

29-06-2023 16:55

File

M NOTICE

29-06-2023 16:55

File

README.md

29-06-2023 16:08

MD File

**step5) Launch the Jmeter software by running the executable jar file**

This PC > Local Disk (D:) > JmeterSoft > apache-jmeter-5.6.2 > bin

Name

examples

report-template

templates ApacheJMeter

**right click on this jar file --->**

Apache JMeter (5.6.2)

File Edit Search Run Options Tools Help

A Test Plan

+

**open with ---> Java Platform**

Test Plan

Name:

Test Plan

Comments:

User Defined Variables

Name:

Detail

Add

Add from Clipboard

Delete

**Jmeter Terminologies**

**=> TestPlan :: It is project that represents entire Jmeter Test process**

**=> Threads:: represents the users to generate the requests ..Each user can generate multiple requests**

**=> Listeners :: The places where generated Test reports can be seen/viewed**

View Results Tree

Summary Report Aggregate Report

**Different Listeners**

Backend Listener

Aggregate Graph

Assertion Results

Comparison Assertion Visualizer

Generate Summary Results

Graph Results

JSR223 Listener

Mailer Visualizer

Response Time Graph

Save Responses to a file

Simple Data Writer

View Results in Table

BeanShell Listener

**=>_samplers :: users (threads) can add requests of different types specifying the details**

**=>Timers ::**

**and etc..**

Flow Control Action

HTTP

Request

Debug Sampler

JSR223 Sampler

AJP/1.3 Sampler Access Log Sampler BeanShell Sampler

Bolt Request

FTP Request

GraphQL HTTP Request

**The users(Threads) add different types of Samplers (requests/connections) to test the performance of the different server s/ws like DB s/ws, web sites, mail servers and etc...**

JDBC Request

JMS Point-to-Point

JMS Publisher

JMS Subscriber

JUnit Request

Java Request

**TestPlan (Project)**

---------->Threads (users)

**|---->Samplers (types of requests) |----> listeners (env for showing report)**

LDAP Extended Request

LDAP Request

Mail Reader Sampler

OS Process Sampler

SMTP Sampler

TCP Sampler

**Allows to enable timer services in the testing env..**

Constant Timer

Uniform Random Timer

Precise Throughput Timer Constant Throughput Time

Gaussian Random Timer JSR223 Timer

Poisson Random Timer

Synchronizing Timer

BeanShell Timer

**Timers are useful to generate various types concurrent or simultaneous requests**

**Different types in Performence Testing**

**using**

**JMeter**

Types of Performance Testing

**Stress Testing**

Spike Testing

**Load Testing**

Performance Testing

Scalability Testing

Endurance Testing

Volume Testing

**Performence Testing**

**Banking Project functional features are :: Open the account, close the account withdraw money, deposite money and etc.. Banking Project non-functional features are :: Performence testing, health check, heap dump, thread dump and etc...**

O Software performance testing is a type of non-functional testing in which the performance of the application is evaluated under expected or higher load.

O

Performance testing is carried out to measure different performance attributes of the system like - response

time (speed), reliability, resource usage, scalability, Stability under variety of load conditions etc.

Load Testing

• Load testing is a type of performance testing that simulates a real-world load on any software, application, or website.

o

It helps to determine how the system behaves under both normal and at peak conditions.

• Load testing can be performed under controlled lab conditions to compare the capabilities of different systems or to accurately measure the capabilities of a single system.

Stress Testing

o Stress testing is also a type of performance testingwhich helps to determine the ability of a computer, network, program or device to maintain certain level of effectiveness under unfavourable conditions.

o

Stress testing is also known as Fatigue testing.

What Does Spike Testing Mean?

**(if website executing env is having limited memory,**

**CPU Time then also we can check weather website behaving upto its potential or not)**

Spike testing is a type of performance testing that measures an application's ability to respond to large changes in demand volume. It is a common part of routine testing for applications in order to spot weaknesses and potential problems in a production environment.

**eg: daily e-commerce app is getting 1000 requests, On a sale day it is getting 1cr requets all of sudden wheather our e-commerce app is ready for that or not**

**Enduracne Testing/Soak Testing**

**Endurance Testing is a type of Software Testing that is performed to observe whether an application can resist the processing load it is expected to have to endure for a long period. During endurance testing, memory consumption is considered to determine potential failures. Performance quality is also calculated during Endurance Testing.**

**Endurance testing is mainly performed to measure the response of a tested element under potential simulated conditions for**

**a specific period and for a certain load. Observations recorded during the endurance testing are further used to improve the corresponding parameters of the software application. Endurance testing is also known as Soak Testing.**

**eg:: e-commerce app has got more no.of requests all of sudden and they are continuing for so many days back to back in that situation, we test wheather e-commerice app can take that load for long time or not**

**What is Volume Testing?**

**Volume testing, a non-functional testing, is essential software testing that evaluates the system's ability to handle extensive data or transactions efficiently and reliably. This type of testing is a part of performance testing.**

It ensures the application can operate under expected and peak load conditions without impacting performance or causing outages. During this testing, testers generate large amounts of data to simulate real-world usage scenarios and observe the system's response.

This helps to identify potential bottlenecks and performance issues, such as slow response times, data loss, and memory leaks.

Do you know Volume Testing is also called Flood Testing?

Scalability Testing

Scalability Testing is a non functional testing method that measures performance of a system or network when the number of user requests are scaled up or down. The purpose of Scalability testing is to ensure that the system can handle projected increase in user traffic, data volume, transaction counts frequency, etc. It tests system ability to meet the growing needs.

It is also referred to as performance testing, as such, it is focused on the behavior of the application when deployed to a larger system or tested under excess load. In Software Engineering, Scalability Testing is to measure at what point the application stops scaling and identify the reason behind it.

How can we make jar file as the Executable jar file?

Ans) we need to add manifest file in META-INF folder of the jar file specifying the manifest

version and main class name as shown below

META-INF/MANIFEST.MF

Manifest-Version: 1.0 Main-Class: org.apache.jmeter.NewDriver

It is java class having main(-) method