



Software Testing and Quality Assurance

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Experiment No. 7

Aim: To study software Automation Testing with JMeter

Theory:

Software automation testing is the process of using tools to automatically execute test cases, validate results, and detect issues in applications. **Apache JMeter** is a powerful, open-source automation tool primarily used for **performance testing** and **functional testing** of web-based applications. It simulates real-world loads on servers and measures system performance under stress.

JMeter is a Java-based desktop application designed to:

- Load test functional behavior.
- Measure performance and response times.
- Test applications like Web (HTTP), FTP, SOAP, REST, JDBC, JMS, and more.

It is widely used in **automated load testing** and **API testing**, especially in CI/CD pipelines.

Features of JMeter:

- **Multi-threading:** Simulates multiple users (threads) simultaneously.
- **Extensibility:** Supports plugins for advanced reporting and graphs.
- **Supports Multiple Protocols:** HTTP, HTTPS, JDBC, JMS, SOAP, FTP, etc.
- **Scripting Capabilities:** Built-in assertions and post-processors.
- **GUI and CLI Modes:** Easy to design tests via GUI, and run them headlessly using command line for automation.

How JMeter Works

JMeter builds test plans with components like:



- **Thread Group:** Defines the number of users and loop count.
- **Samplers:** Simulate user actions like HTTP requests.
- **Listeners:** Record and display results graphically or in logs.
- **Assertions:** Validate expected responses (like status code 200).
- **Post-Processors:** Extract dynamic data using regular expressions.

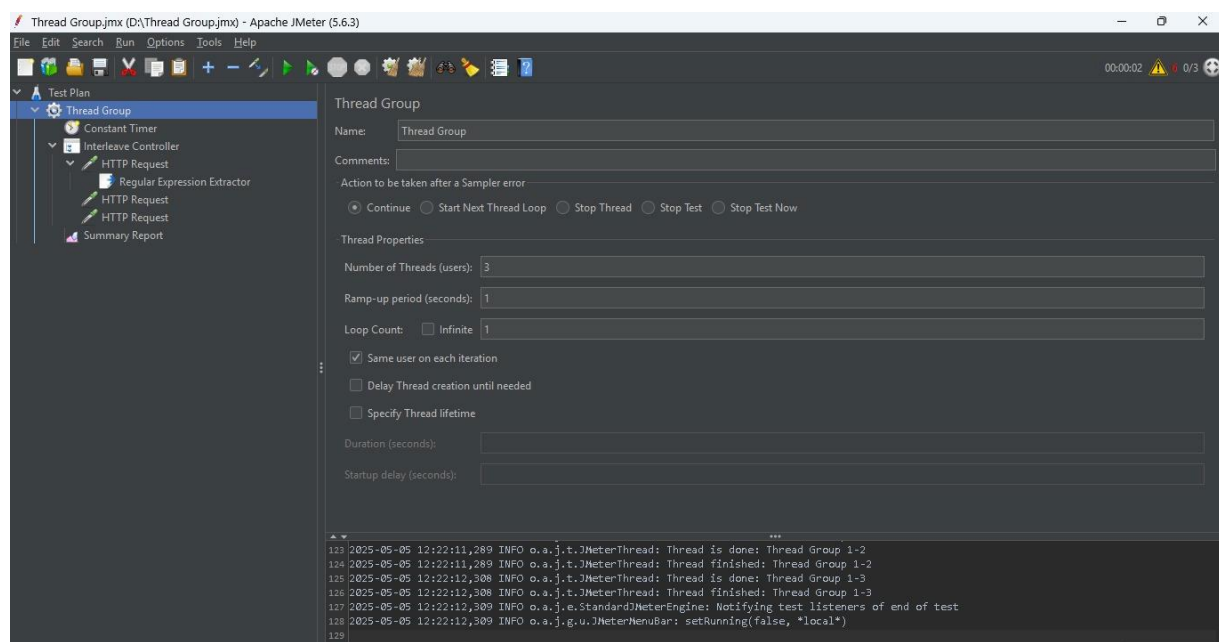
Automation Use Cases

- **Load Testing:** Check how many users a web application can handle.
- **API Testing:** Automate requests and validate REST/SOAP responses.
- **Regression Testing:** Ensure new code doesn't break existing functionality.
- **Stress Testing:** Determine system limits by increasing load until failure.

Advantages of Using JMeter for Automation:

- **Open Source** and free to use.
- **Scalable and Lightweight.**
- Supports **test recording**, scripting, and **data-driven testing**.
- Integrates with **Jenkins** and other CI tools for continuous testing.

Execution:





Thread Group.jmx (D:\Thread Group.jmx) - Apache JMeter (5.6.3)

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Test Plan

- Thread Group
 - Constant Timer
 - Interleave Controller
 - HTTP Request
 - Regular Expression Extractor
 - HTTP Request
 - HTTP Request
 - Summary Report

HTTP Request

Name: HTTP Request

Comments:

Basic Advanced

Web Server

Protocol (http): Server Name or IP: httpbin.org Port Number:

HTTP Request

GET Path: /anything/contact Content encoding:

☐ Redirect Automatically ☒ Follow Redirects ☒ Use KeepAlive ☐ Use multipart/form-data ☐ Browser-compatible headers

Parameters Body Data Files Upload

Send Parameters With the Request:

Name	Value	URL Encode?	Content-Type	Include Equals?
------	-------	-------------	--------------	-----------------

Detail Add Add from Clipboard Delete Up Down

```
123 2025-05-05 12:22:11,289 INFO o.a.j.t.JMeterThread: Thread is done: Thread Group 1-2
124 2025-05-05 12:22:11,289 INFO o.a.j.t.JMeterThread: Thread finished: Thread Group 1-2
125 2025-05-05 12:22:12,308 INFO o.a.j.t.JMeterThread: Thread is done: Thread Group 1-3
126 2025-05-05 12:22:12,308 INFO o.a.j.t.JMeterThread: Thread finished: Thread Group 1-3
127 2025-05-05 12:22:12,309 INFO o.a.j.e.StandardJMeterEngine: Notifying test listeners of end of test
128 2025-05-05 12:22:12,309 INFO o.a.j.g.u.JMeterMenuBar: setRunning(false, *local*)
129
```

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Test Plan

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Regular Expression Extractor

Name: Regular Expression Extractor

Comments:

Apply to:

☐ Main sample and sub-samples ☒ Main sample only ☐ Sub-samples only ☐ JMeter Variable Name to use

Field to check:

☒ Body ☐ Body (unescaped) ☐ Body as a Document ☐ Response Headers ☐ Request Headers ☐ URL ☐ Response Code ☐ Response Message

Name of created variable: authToken

Regular Expression: "token"/(.*?)"

Template (\$1\$ where i is capturing group number, starts at 1): \$1\$

Match No. (0 for Random): 1

Default Value: NOT_FOUND ☐ Use empty default value

```
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HTTP Request

Name: HTTP Request

Comments:

Basic Advanced

Web Server

Protocol (http): Server Name or IP: httpbin.org Port Number:

HTTP Request

POST Path: /anything/login Content encoding:

☐ Redirect Automatically ☒ Follow Redirects ☒ Use KeepAlive ☐ Use multipart/form-data ☐ Browser-compatible headers

Parameters Body Data Files Upload

Send Parameters With the Request:

Name	Value	URL Encode?	Content-Type	Include Equals?
test	test123	<input type="checkbox"/>	text/plain	<input checked="" type="checkbox"/>

Detail Add Add from Clipboard Delete Up Down

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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/...	Sent KB/sec	Avg. Bytes
HTTP Request	6	711	428	1113	263.92	0.00%	9.5/min	0.09	0.02	585.0
TOTAL	6	711	428	1113	263.92	0.00%	9.5/min	0.09	0.02	585.0

☐ Include group name in label? ☒ Save Table Header

```
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Observations:

Creating test plan and executing it:

Observations: You can observe the performance metrics such as response time, throughput, and error rate during the test execution.

Technical Problems Noticed: Issues related to concurrency, resource utilization, and server bottlenecks might be identified.

Adding timer to a thread group:

Observations: You can observe the effect of different timings on the performance of your



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application.

Technical Problems Noticed: Timer misconfigurations leading to inaccurate test results or unrealistic load scenarios.

Interleaved logic controller:

Observations: You can observe how threads are distributed among different paths based on the logic controller settings.

Technical Problems Noticed: Problems with thread distribution, such as uneven distribution or incorrect sequencing.

Conclusion:

Apache JMeter plays a crucial role in automated software testing by simulating real-world user behavior and verifying application reliability and performance. Its simplicity, flexibility, and powerful feature set make it a go-to tool for testers and DevOps teams in both development and production environments.