

How to test performance of site web using Jmeter ?

Step by Step



What is JMeter?

**Open-source Performance Testing
Tool**
Developed by Apache Software Foundation

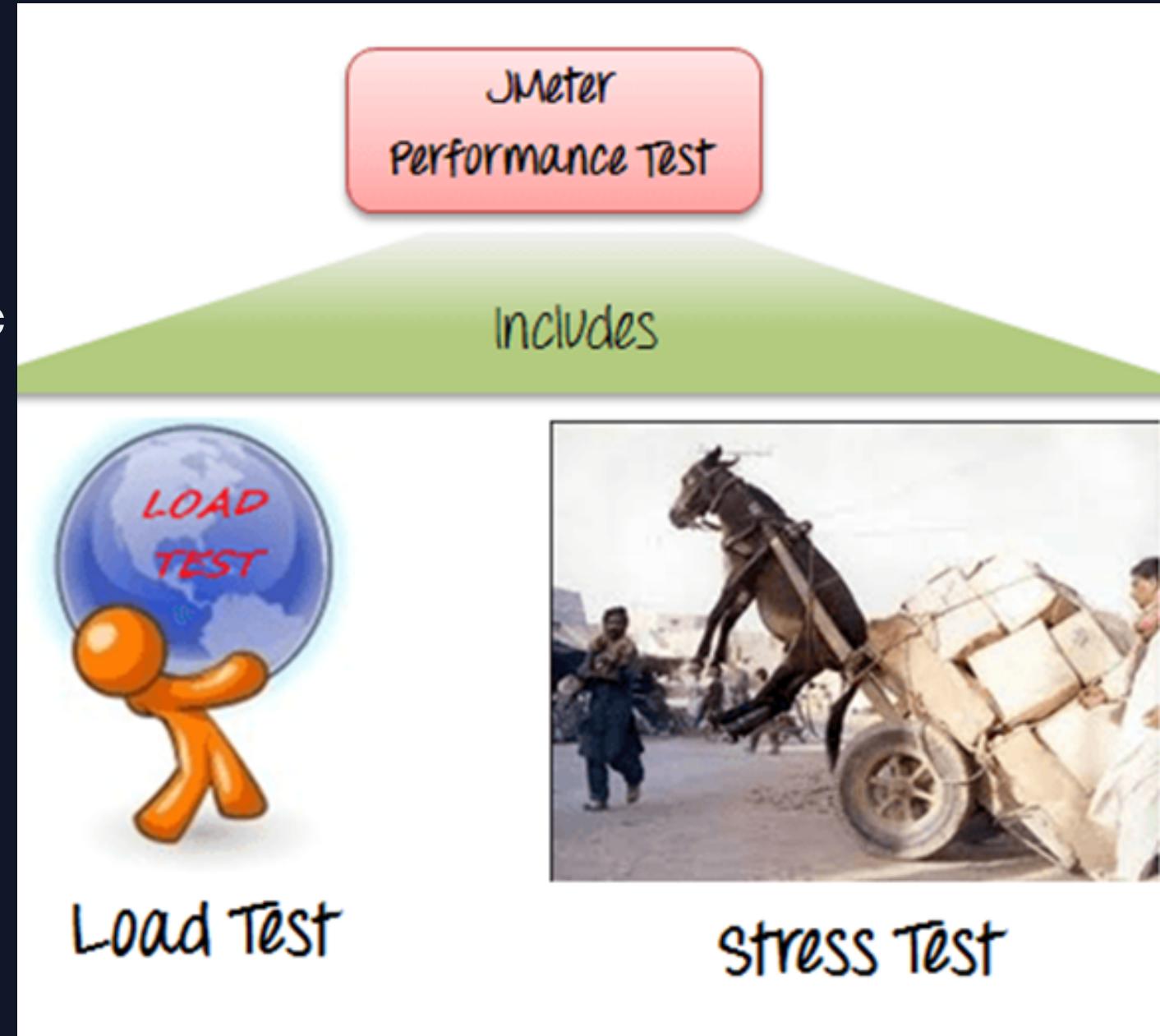


Protocol Support
HTTP, FTP, JDBC, and more

Features
Load and stress testing, functional testing

Apache JMeter testing tool offers following benefit in Performance Testing

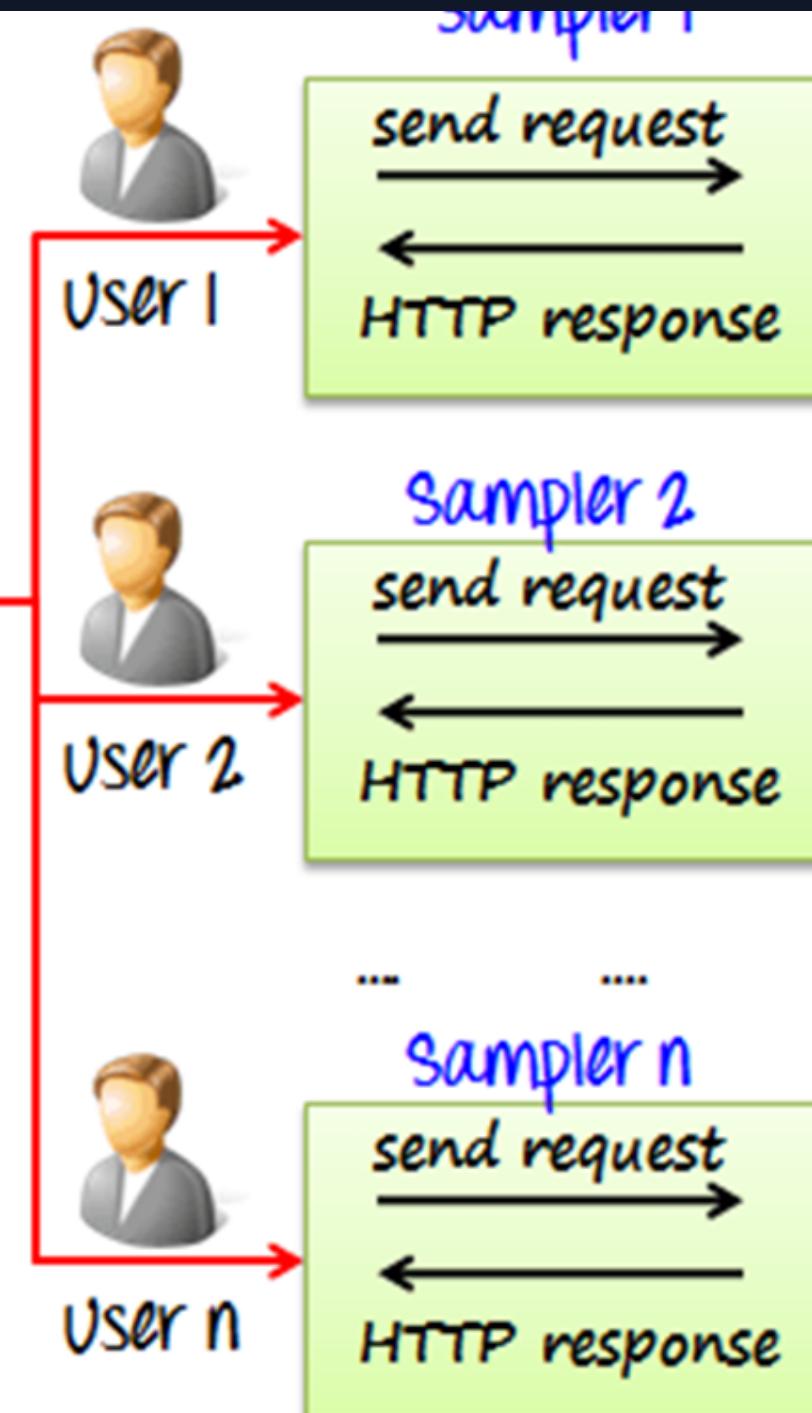
- * JMeter can be used to test the performance of both static resources such as JS and HTML, as well as dynamic resources, such as JSP, Servlets, and AJAX.**
- * JMeter can discover maximum number of concurrent users that your website can handle**
- * JMeter provides a variety of graphical analyses of performance reports.**





Make copy of samplers
and running them in
separate thread

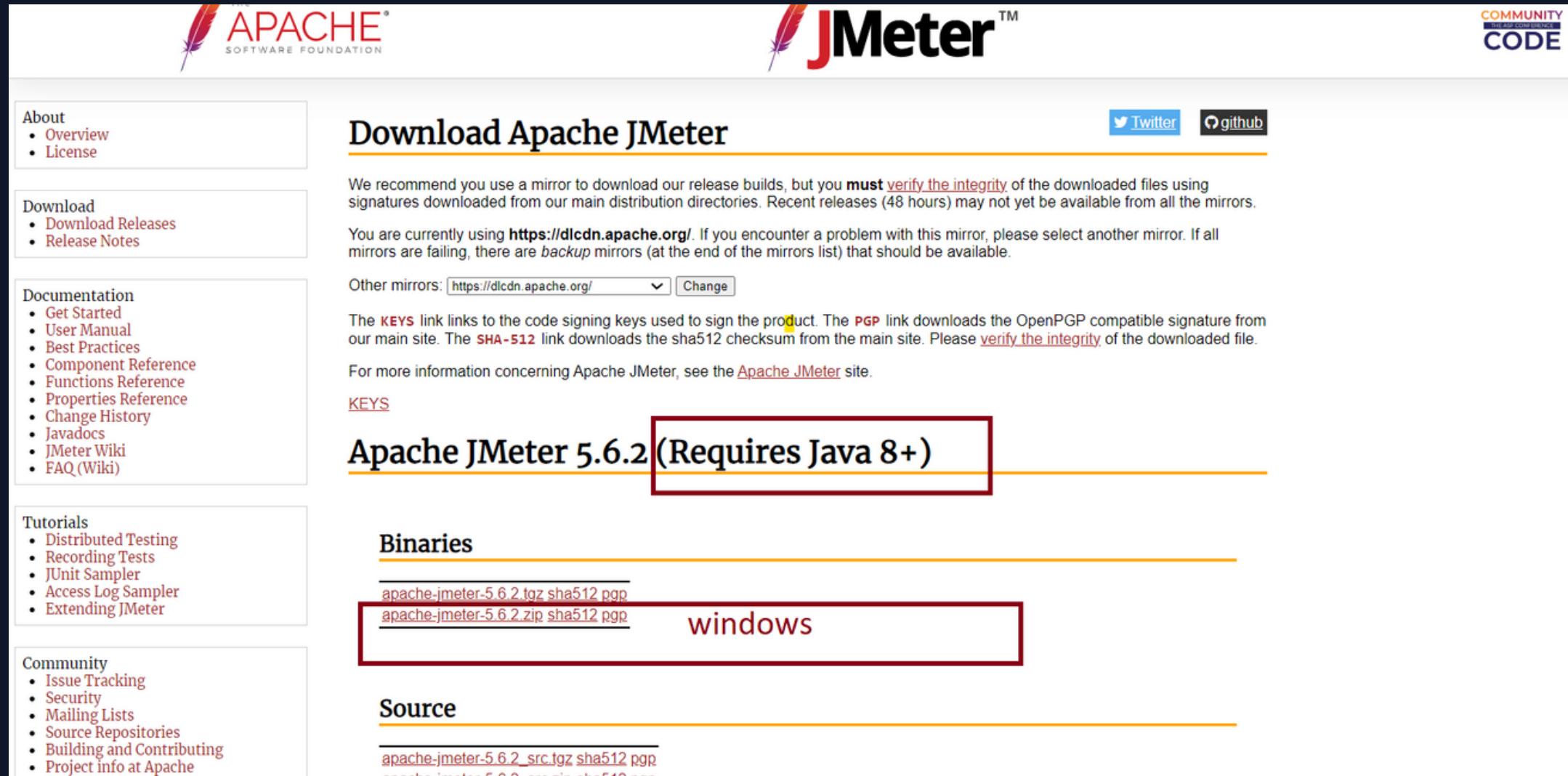
create



Application
Under Test

Installing JMeter

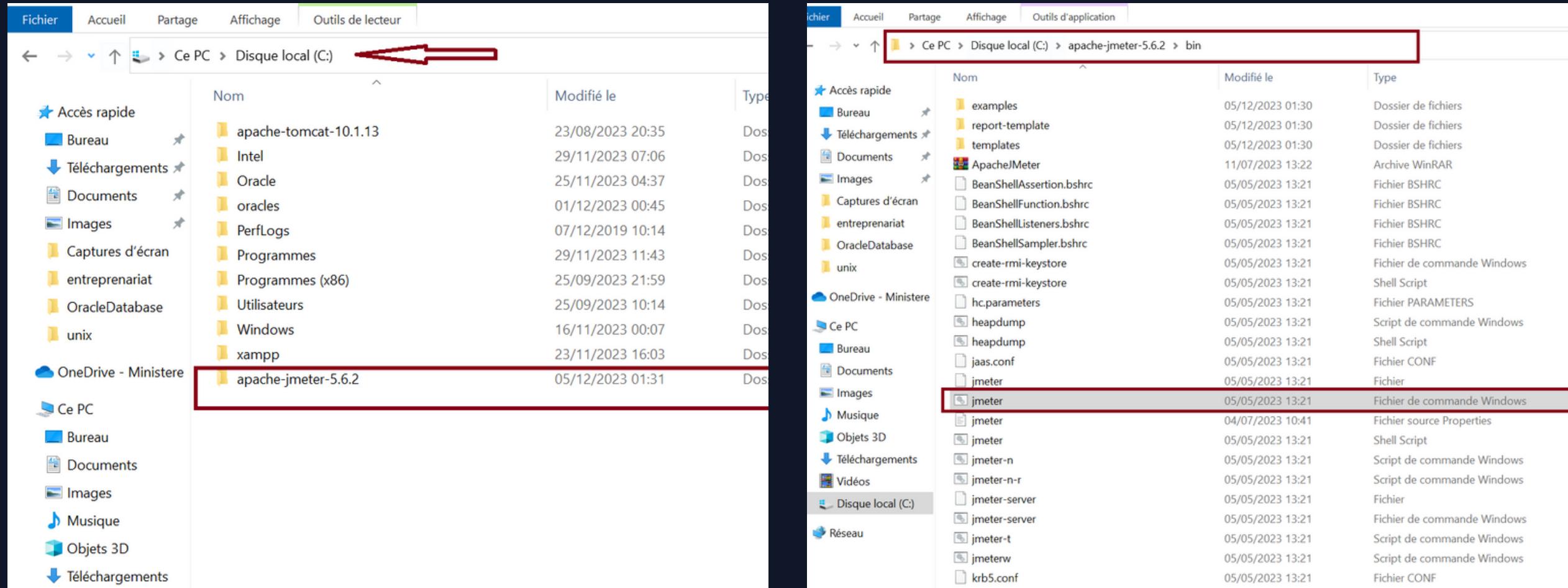
Download JMeter from the official Apache JMeter website: [Apache JMeter](#)



The screenshot shows the Apache JMeter download page. At the top, there are links for the Apache Software Foundation and the JMeter community. On the left, a sidebar contains links for About (Overview, License), Download (Download Releases, Release Notes), Documentation (Get Started, User Manual, Best Practices, Component Reference, Functions Reference, Properties Reference, Change History, Javadocs, JMeter Wiki, FAQ (Wiki)), Tutorials (Distributed Testing, Recording Tests, JUnit Sampler, Access Log Sampler, Extending JMeter), and Community (Issue Tracking, Security, Mailing Lists, Source Repositories, Building and Contributing, Project info at Apache). The main content area has a heading "Download Apache JMeter". It includes a note about using mirrors, a "Other mirrors" dropdown set to "https://dlcdn.apache.org/", and a "KEYS" link. A large red-bordered box highlights "Apache JMeter 5.6.2 (Requires Java 8+)". Below it, under "Binaries", are links for "apache-jmeter-5.6.2.tgz sha512.pgp" and "apache-jmeter-5.6.2.zip sha512.pgp". Another red-bordered box highlights the "windows" link. Under "Source", there are links for "apache-jmeter-5.6.2_src.tgz sha512.pgp" and "apache-jmeter-5.6.2_src.zip sha512.pgp". Social media links for Twitter and GitHub are also present.

Installing JMeter

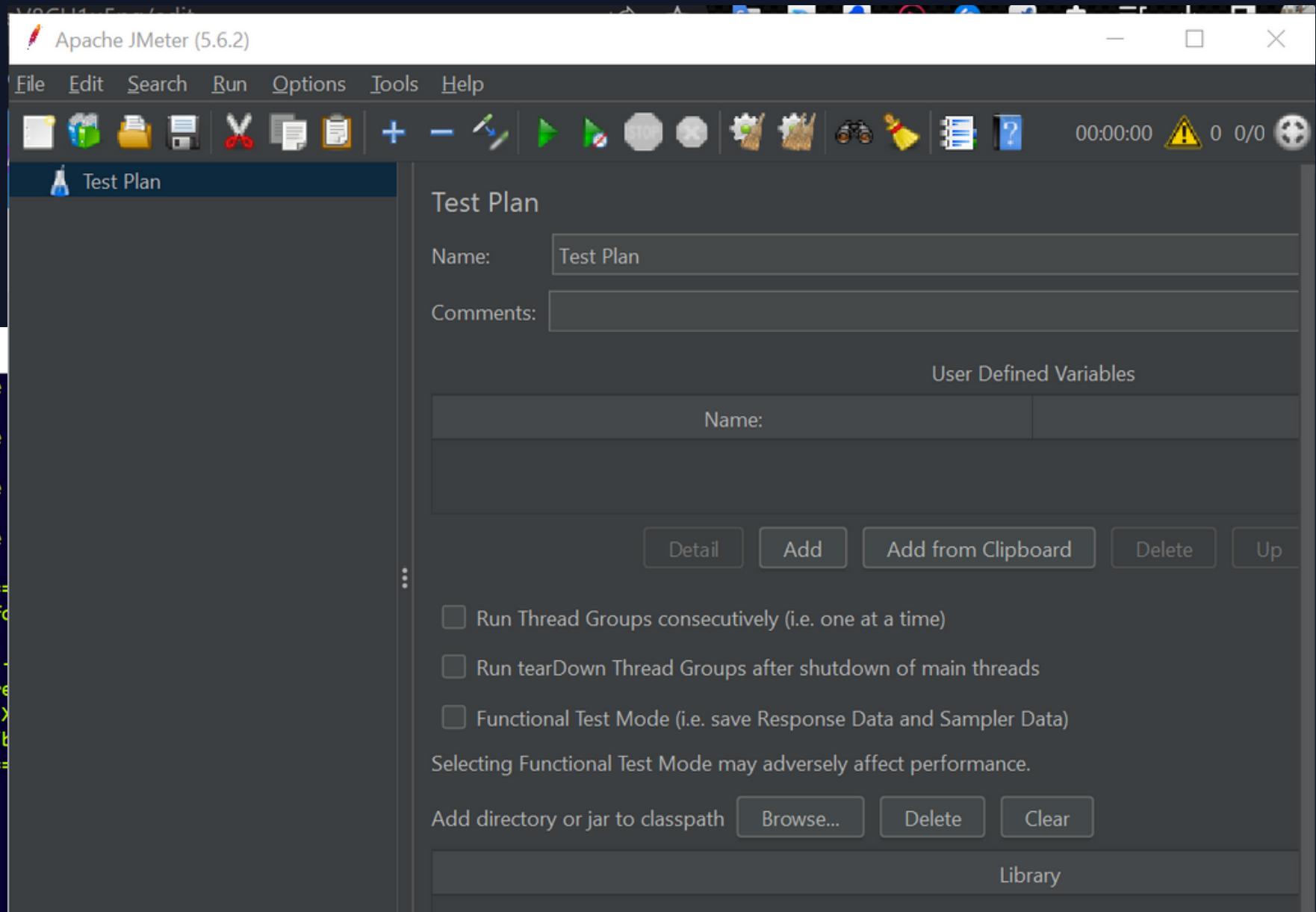
Extract the ZIP file



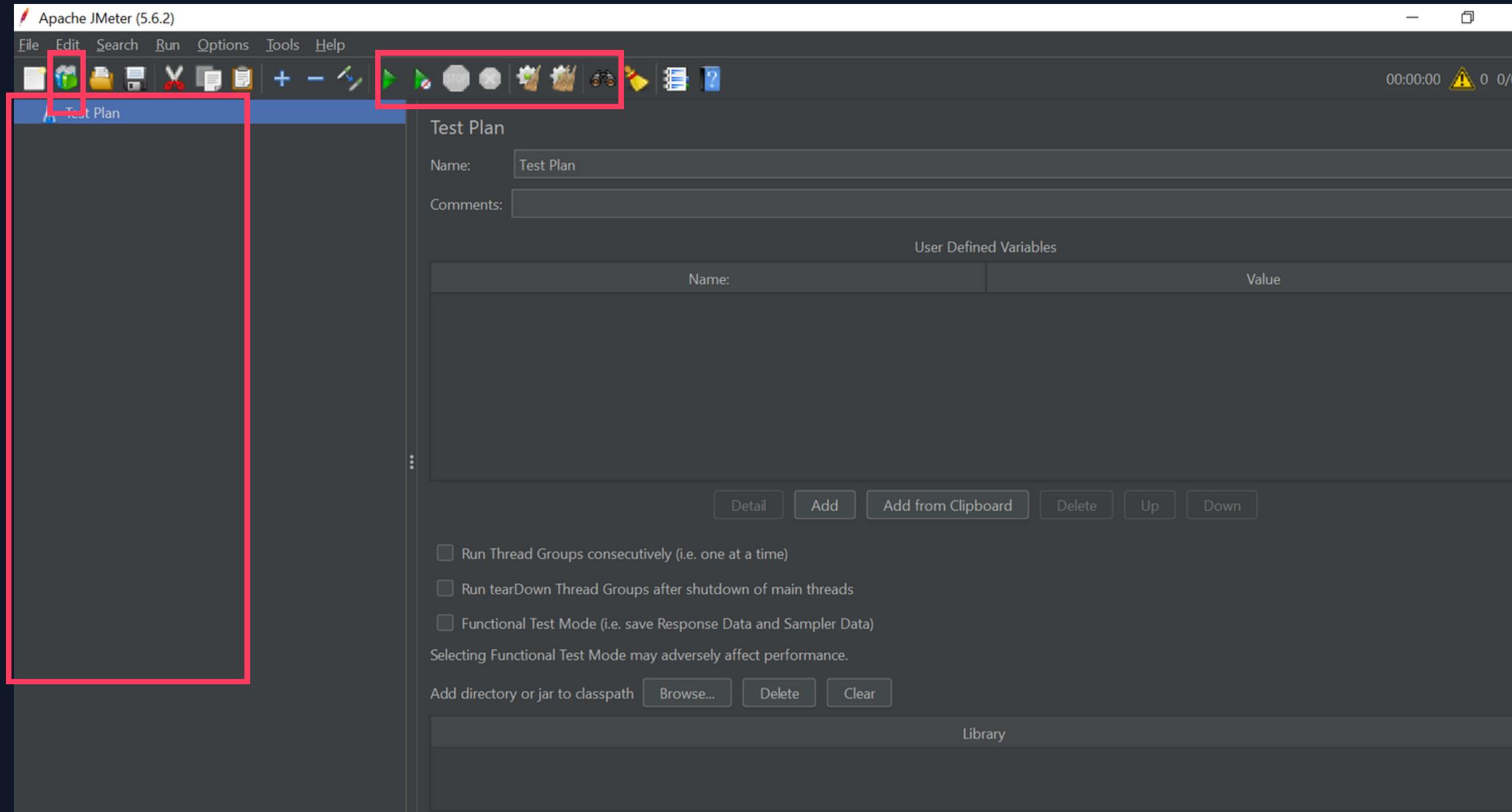
Installing JMeter

Start JMeter

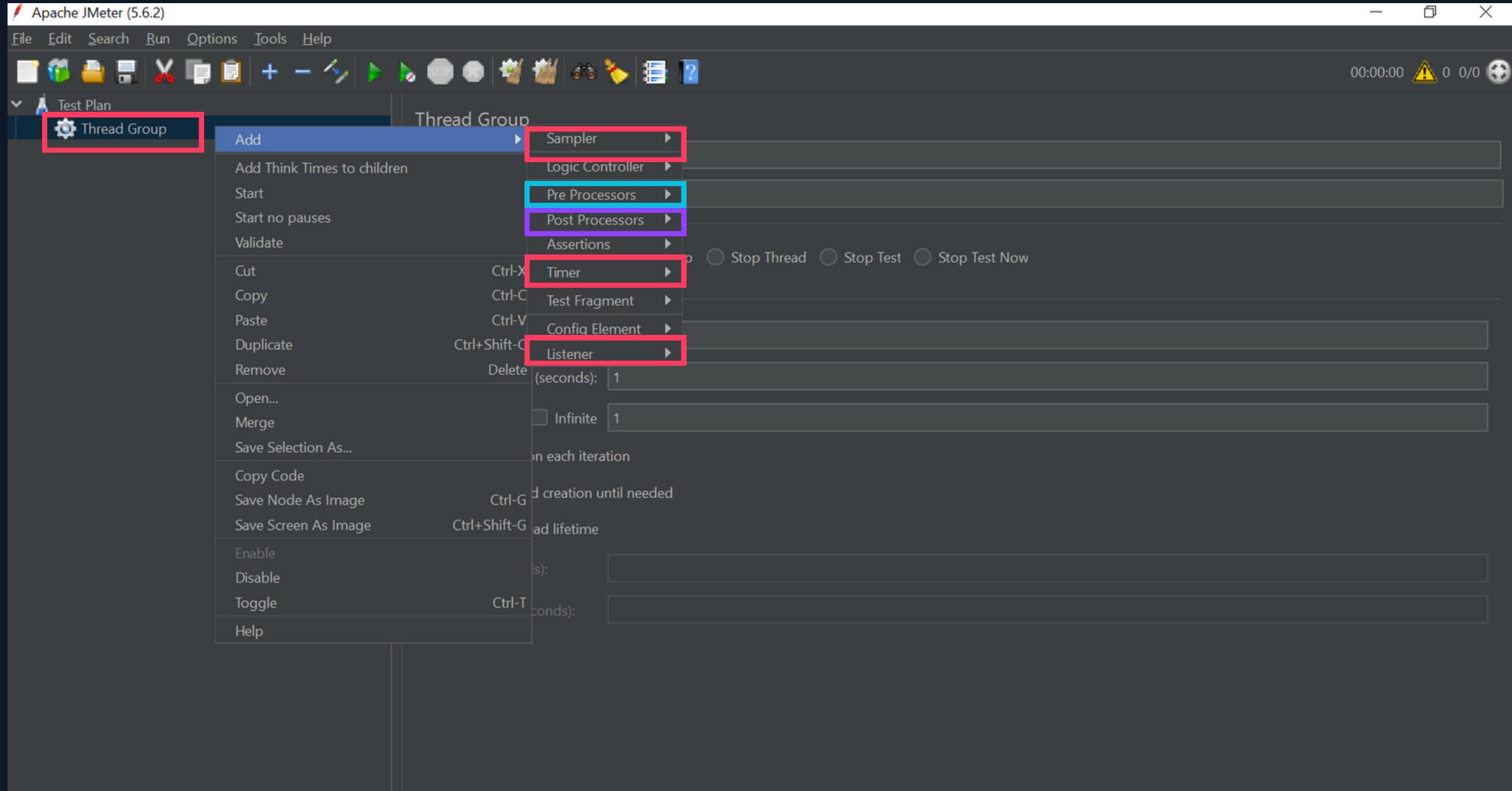
```
C:\Windows\system32\cmd.exe
WARN StatusConsoleListener The use of package
elease
=====
Don't use GUI mode for load testing !, only fo
For load testing, use CLI Mode (was NON GUI):
  jmeter -n -t [jmx file] -l [results file]
& increase Java Heap to meet your test require
  Modify current env variable HEAP="-Xms1g -X
Check : https://jmeter.apache.org/usermanual/t
=====
```



JMeter Architecture



JMeter Architecture



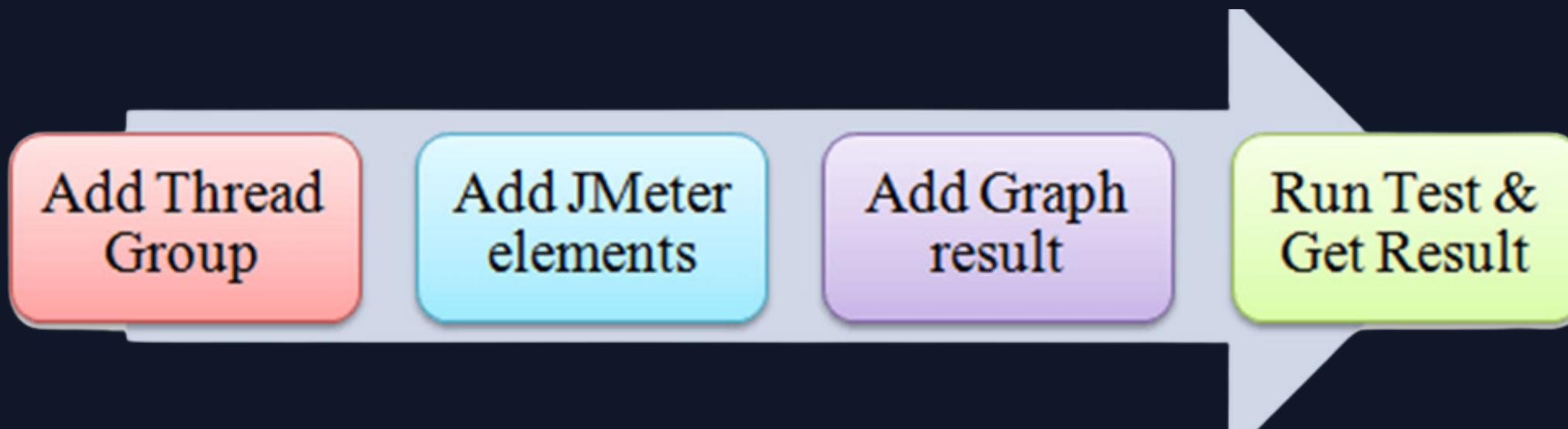
Create a Performance Test Plan in JMeter

Before testing the performance of target web application, we should determine

Normal Load: Average number of users visit your website

Heavy Load: The maximum number of users visit your website

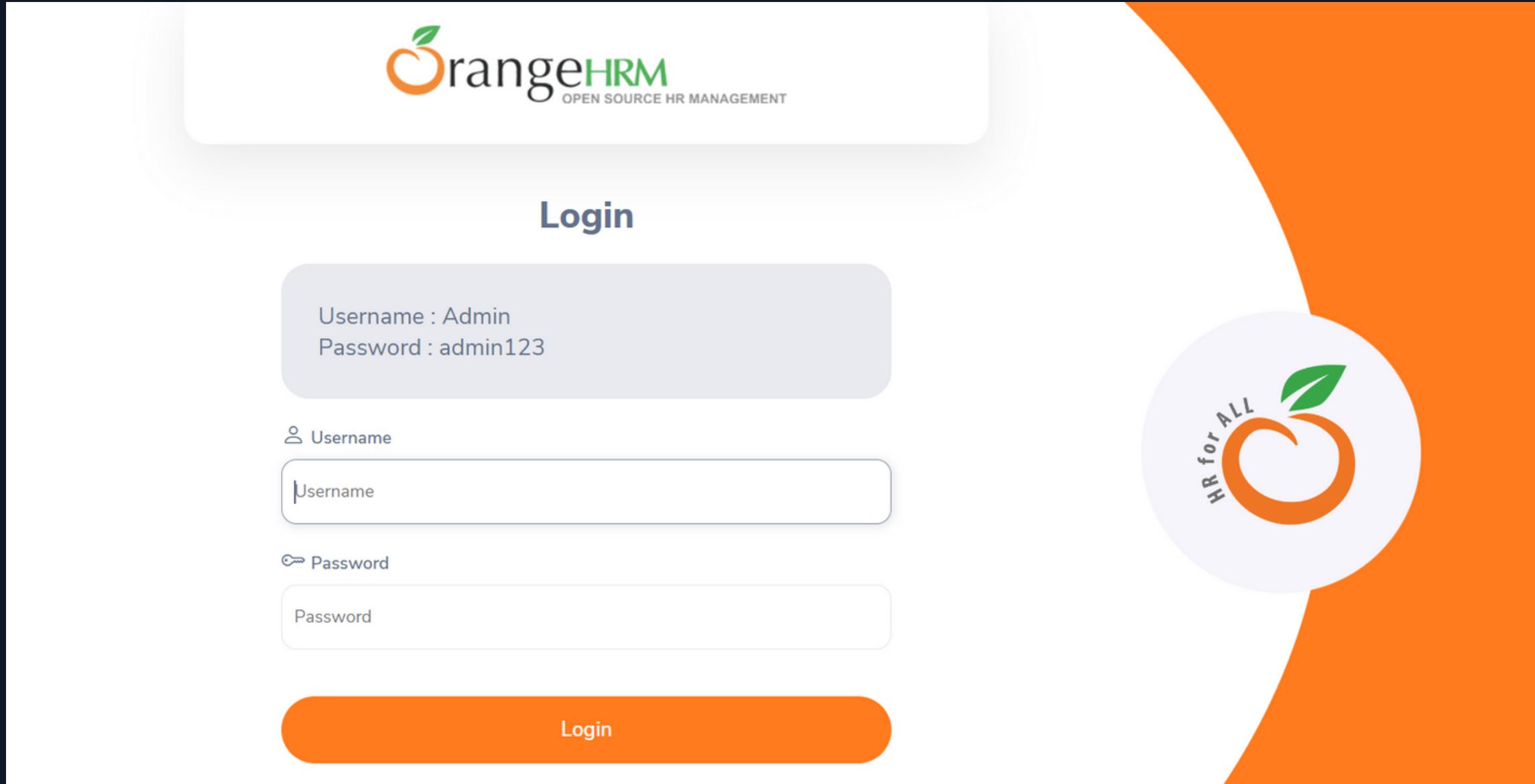
What is your target in this test?



Performance Testing and Optimization of a Web Application

EXAMPLE

website used in the test <https://opensource-demo.orangehrmlive.com/>



The image shows the login page of the OrangeHRM application. The header features the OrangeHRM logo with the text "OPEN SOURCE HR MANAGEMENT". Below the header, the word "Login" is centered. A light gray callout box displays sample credentials: "Username : Admin" and "Password : admin123". The main form contains two input fields: "Username" and "Password". The "Username" field is labeled with a user icon and the placeholder "Username". The "Password" field is labeled with a key/circle icon and the placeholder "Password". At the bottom center is a large orange button with the word "Login". To the right of the login form is a decorative graphic consisting of a white circle containing an orange stylized fruit logo, with a white curved shape and an orange curved shape extending from behind it.

OrangeHRM
OPEN SOURCE HR MANAGEMENT

Login

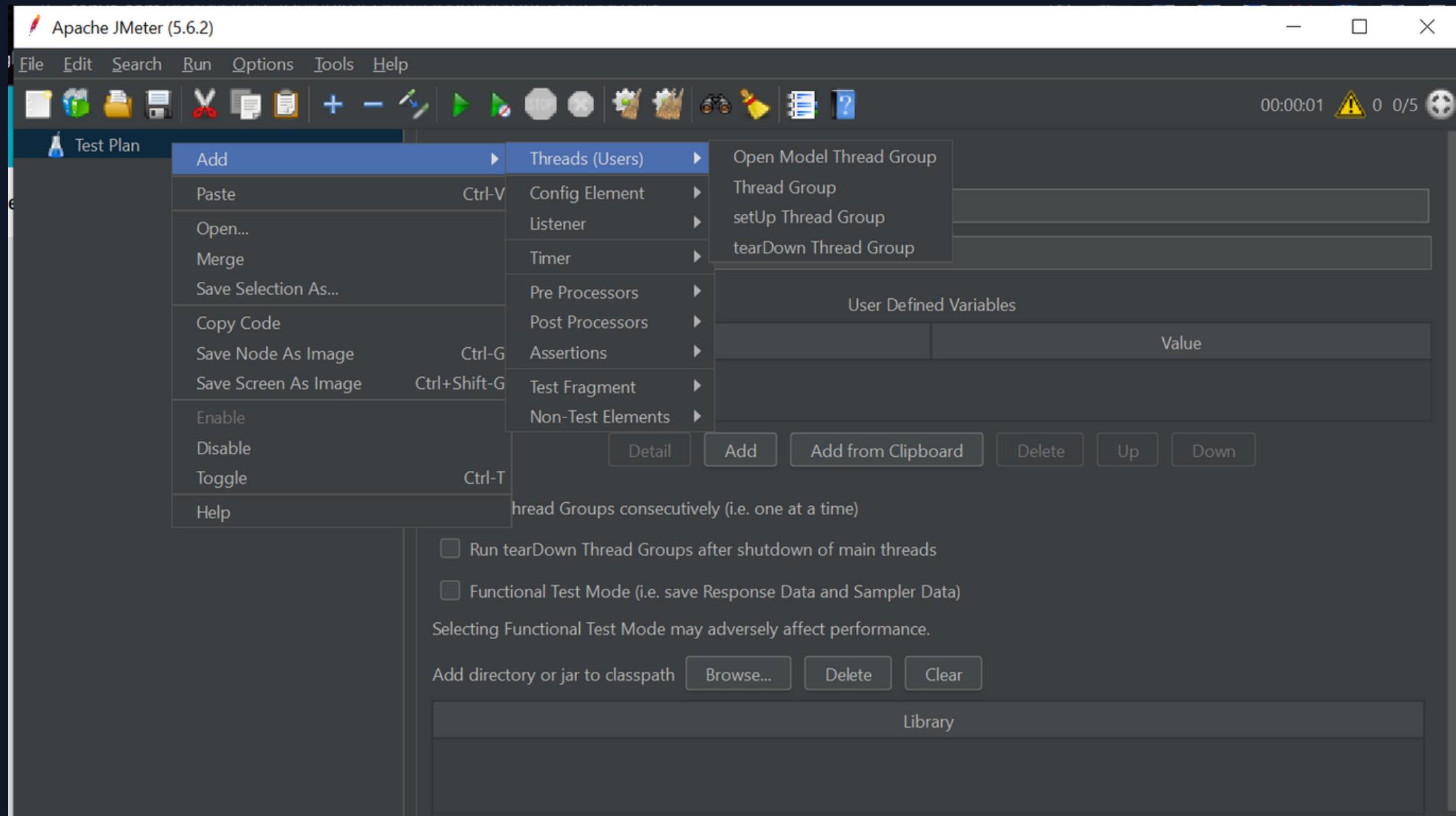
Username : Admin
Password : admin123

Username

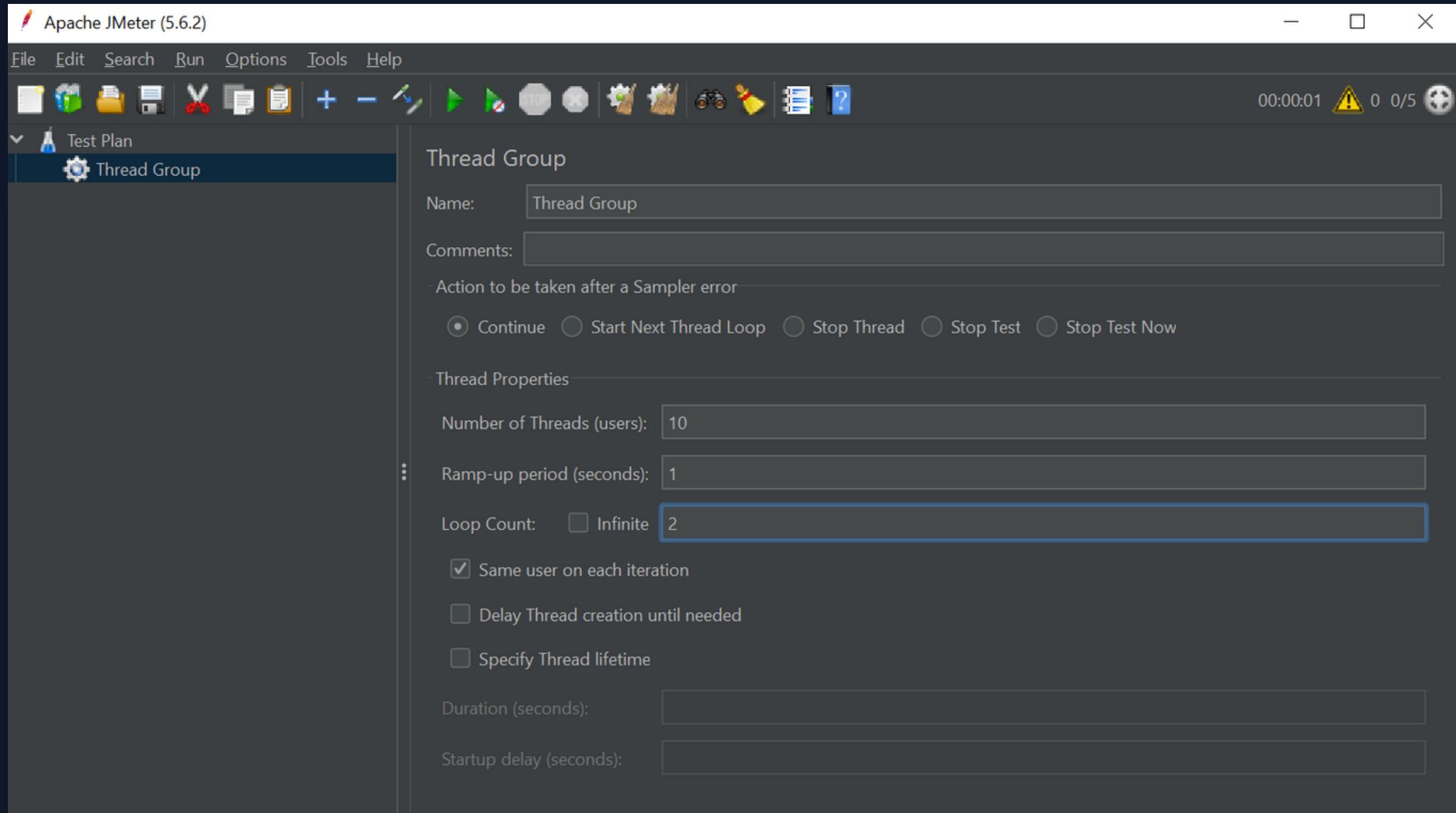
Password

Login

Create a Test Plan: Add Thread Group



Create a Test Plan: Configure Thread Group



**Number of Threads: 10
(Number of users connects to the target website: 100)**

Loop Count: 2 (Number of time to execute testing)

Ramp-Up Period: 1 s

Thread Group

Name: Thread Group

Comments:

Action to be taken after a Sampler error:

Continue Start Next Thread Loop Stop Thread Stop Test

Thread Properties

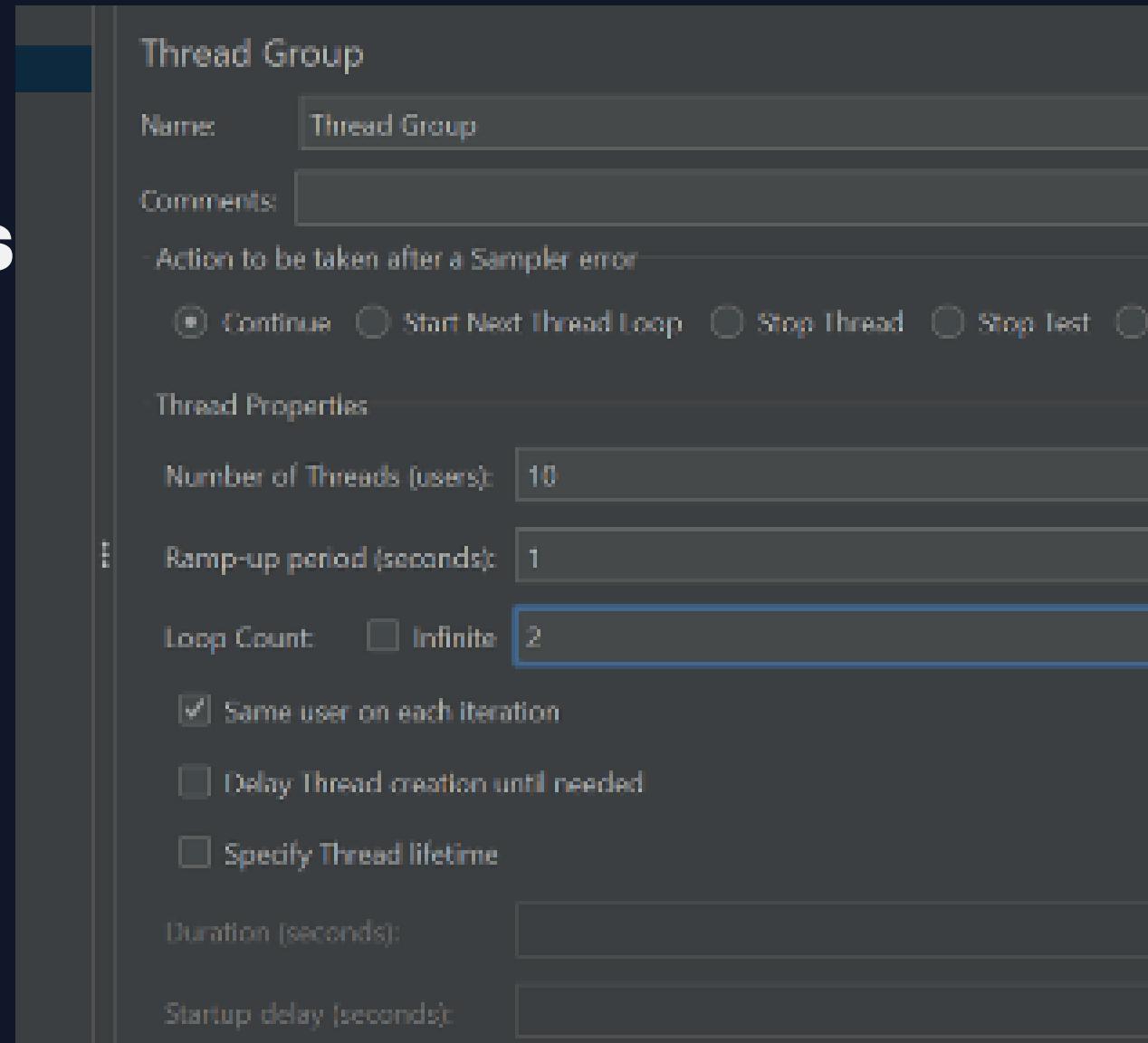
Number of Threads (users): 10

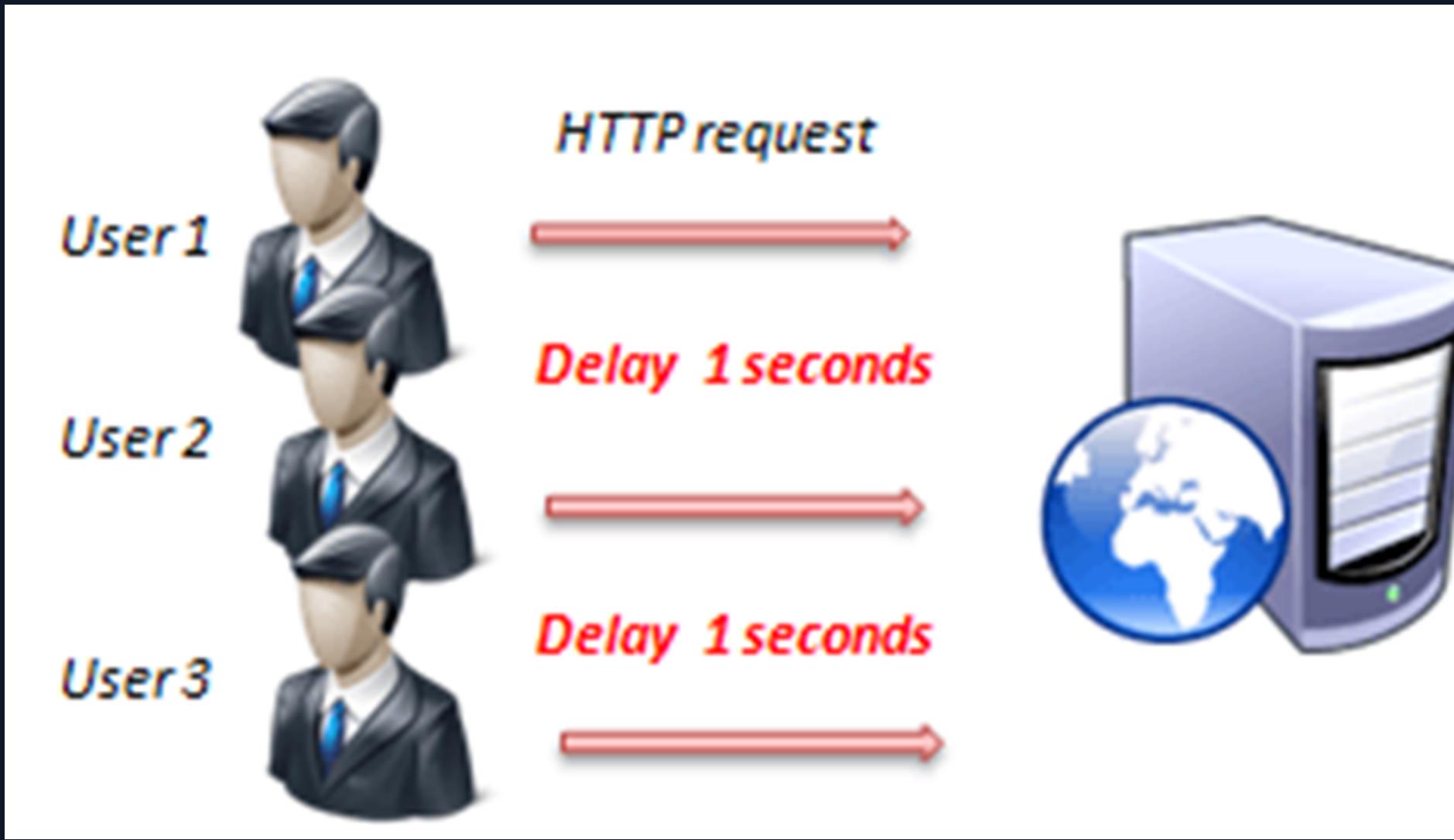
Ramp-up period (seconds): 1

Loop Count: Infinite 2 Same user on each iteration Delay Thread creation until needed Specify Thread lifetime

Duration (seconds):

Startup delay (seconds):





Ramp-Up Period tells JMeter how long to delay before starting the next user. For example, if we have 100 users and a 100-second Ramp-Up period, then the delay between starting users would be 1 second (100 seconds /100 users)

Create a Test Plan: Add Sampler : HTTP Request

The screenshot shows the JMeter interface with a context menu open over a Thread Group. The menu path is **Thread Group > Add > Sampler**. The 'Sampler' submenu is expanded, showing options like Logic Controller, Pre Processors, Post Processors, Assertions, Timer, Test Fragment, Config Element, and Listener. The 'Flow Control Action' submenu is also expanded, listing various request types such as HTTP Request, Debug Sampler, JSR223 Sampler, AJP/1.3 Sampler, Access Log Sampler, BeanShell Sampler, Bolt Request, FTP Request, GraphQL HTTP Request, JDBC Request, JMS Point-to-Point, JMS Publisher, JMS Subscriber, JUnit Request, Java Request, LDAP Extended Request, LDAP Request, Mail Reader Sampler, OS Process Sampler, SMTP Sampler, and TCP Sampler. The status bar at the bottom right displays the message "read: Thread finished: Thread Group 1-497".

Create a Test Plan: Add Sampler: HTTP Request

The screenshot shows the JMeter interface version 5.4.1. The title bar reads "www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie...)".

The menu bar includes File, Edit, Search, Run, Options, Tools, and Help. The toolbar contains various icons for file operations and monitoring.

The left sidebar shows the "Test Plan" tree, with "Thread Group" expanded, revealing "HTTP Request", "Graph Results", "View Results in Table", "Summary Report", and "View Results Tree".

The main panel displays the configuration for the selected "HTTP Request" sampler:

- Name:** HTTP Request
- Comments:** (empty)
- Basic** tab selected, **Advanced** tab available.
- Web Server** section:
 - Protocol [http]:
 - Server Name or IP: opensource-demo.orangehrmlive.com
 - Port Number:
- HTTP Request** section:
 - Method: GET
 - Path: /web/index.php/auth/login
 - Content encoding:
 - Checkboxes:
 - Redirect Automatically
 - Follow Redirects (checked)
 - Use KeepAlive (checked)
 - Use multipart/form-data
 - Browser-compatible headers
- Parameters** tab selected, **Body Data** and **Files Upload** tabs available.
- Send Parameters With the Request:** Table with columns: Name, Value, URL Encode?, Content-Type, Include Equals?

Add Listeners : View Results Tree

The screenshot shows the JMeter interface with a test plan containing a Thread Group and an HTTP Request sampler. A context menu is open over the 'HTTP Request' sampler, with the 'Listener' option selected. The 'View Results Tree' option under 'Listener' is highlighted. The main panel displays the 'HTTP Request' configuration, including the server name 'e.com', port number, content encoding, and browser-compatible headers.

www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie... — X

File Edit Search Run Options Tools Help

Test Plan Thread Group HTTP Requests

Add Insert Parent Cut Copy Paste Duplicate Remove Open... Merge Save Selection As... Save as Test Fragment Copy Code Save Node As Image Save Screen As Image Enable Disable Toggle Help

Assertions Timer Pre Processors Post Processors Config Element Listener View Results Tree Summary Report Aggregate Report 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

HTTP Request

Path: /web/index.html

Server Name or IP: e.com Port Number: []

Content encoding: []

Browser-compatible headers []

Content-Type [] Include Equals? []

02:52:18,614 INF 02:52:18,614 INF 02:52:18,614 INF 02:52:18,614 INF

ead is done: Thread Group 1-394
ead finished: Thread Group 1-394
ine: Notifying test listeners of end of
setRunning(false, *local*)

1000 2023-12-09 1001

Login

Add Listeners : Summary Report

The screenshot shows the JMeter interface with a test plan containing a Thread Group and an HTTP Request sampler. A context menu is open over the HTTP Request sampler, specifically on the 'Listener' submenu. The 'Summary Report' option is selected. The main panel displays configuration for the HTTP Request, including the URL 'nlive.com', port number, content encoding, and browser-compatible headers.

HTTP Request configuration:

- Path: /web/ir
- Automatically
- Follow Redirects:
- Body Data
- Files Upload
- Name:

Request:

Method: <input type="text"/> GET	Content-Type: <input type="text"/> application/x-www-form-urlencoded	Include Equals?: <input type="checkbox"/>
----------------------------------	--	---

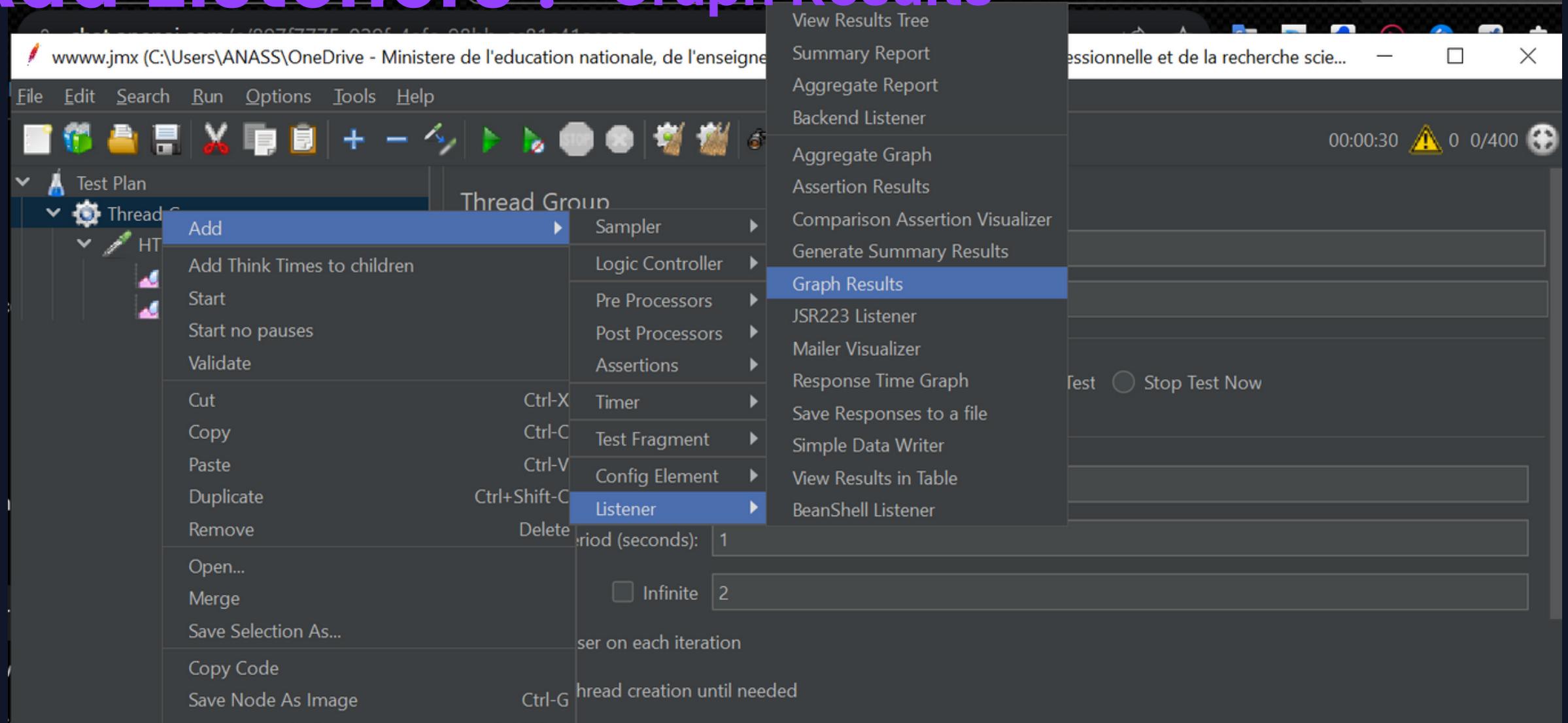
Selected Listener:

- View Results Tree
- Summary Report** (selected)
- Aggregate Report
- 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

Log output:

```
2023-12-09 02:52:18,614 INFO o.a.j.t.ThreadListener: Thread is done: Thread Group 1-394
2023-12-09 02:52:18,614 INFO o.a.j.t.ThreadListener: Thread finished: Thread Group 1-394
2023-12-09 02:52:18,614 INFO o.a.j.e.Engine: Notifying test listeners of end of thread
2023-12-09 02:52:18,614 INFO o.a.j.g.SimpleDataWriter: setRunning(false, *local*)
```

Add Listeners : Graph Results



Click on the "Run" menu and choose "Start" to run the test plan.

Analyze Results

TEST LOGIN WITH 15 USERS

www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie...)

File Edit Search Run Options Tools Help

Test Plan Thread Group HTTP Request Graph Results View Results in Table Summary Report View Results Tree

00:00:01 ! 0 0/15

View Results in Table

Name: View Results in Table

Comments:

- Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Su

Sample #	Start Time	Thread Name	Label	Sample Tim...	Status	Bytes	Sent Bytes	Late
1	13:05:49.081	Thread Grou...	HTTP Request	374	✓	4592	159	
2	13:05:49.015	Thread Grou...	HTTP Request	453	✓	4592	159	
3	13:05:49.148	Thread Grou...	HTTP Request	361	✓	4594	159	
4	13:05:49.215	Thread Grou...	HTTP Request	424	✓	4602	159	
5	13:05:49.283	Thread Grou...	HTTP Request	419	✓	4595	159	
6	13:05:49.349	Thread Grou...	HTTP Request	408	✓	4602	159	
7	13:05:49.416	Thread Grou...	HTTP Request	454	✓	4605	159	
8	13:05:49.483	Thread Grou...	HTTP Request	412	✓	4579	159	
9	13:05:49.551	Thread Grou...	HTTP Request	347	✓	4606	159	

Analyze Results

TEST LOGIN WITH 15 USERS

The screenshot shows the JMeter interface with a dark theme. The left sidebar displays the Test Plan structure, with the 'Summary Report' item selected. The main panel shows the 'Summary Report' configuration and a detailed table of results.

Summary Report Configuration:

- Name: Summary Report
- Comments: (empty)
- Write results to file / Read from file
- Filename: (empty)
- Log/Display Only: Errors Successes Configure

Test Results Table:

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throug...	Receive...	Sent KB...	Avg. By...
HTTP Request	15	406	0	464	35.06	0.00%	11.3/sec	50.49	1.75	4594.9
TOTAL	15	406	0	464	35.06	0.00%	11.3/sec	50.49	1.75	4594.9

At the bottom of the table area, there are two checkboxes: Include group name in label? and Save Table Header.

Analyze Results

www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche\Java\jmeter)

TEST LOGIN WITH 15 USERS

File Edit Search Run Options Tools Help

Test Plan Thread Group HTTP Request Graph Results View Results in Table Summary Report View Results Tree

Graph Results

Name: Graph Results

Comments:

- Write results to file / Read from file

Filename Browse... Log/Display Only:

Graphs to Display Data Average Median Deviation

341 ms

0 ms

No of Samples 15

Latest Sample 325

Deviation 6

Throughput 712.025/minute

Analyze Results

TEST LOGIN WITH 500 USERS

The screenshot shows the JMeter interface after a test run. The title bar indicates the file is named "www.jmx" and is located at "C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie...". The menu bar includes File, Edit, Search, Run, Options, Tools, and Help. The toolbar contains various icons for file operations and monitoring. The left sidebar shows the "Test Plan" structure, with "Thread Group" expanded to show "HTTP Request", "Graph Results", "View Results in Table", "Summary Report", and "View Results Tree". The "View Results Tree" item is selected and highlighted in blue. The main panel displays the "View Results Tree" configuration dialog. The "Name" field is set to "View Results Tree". The "Comments" field is empty. Below it, a note says "- Write results to file / Read from file". The "Filename" field contains the path "Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scientifique\Bureau\zzzzzz". There are "Browse..." and "Log/Display Only:" checkboxes; the "Log/Display Only:" checkbox is checked, while "Errors" is checked and "Success" is unchecked. Below the dialog are search and filter controls: "Search:" input field, "Case sensitive" and "Regular exp." checkboxes, and "Search" and "Reset" buttons. The results pane shows a list of "Sampler result" entries under the "Text" tab. Each entry has a red shield icon followed by "HTTP Request". The first few entries are: "HTTP Request", "HTTP Request", "HTTP Request", "HTTP Request", "HTTP Request", and "HTTP Request". To the right of the list, tabs for "Sampler result", "Request", and "Response data" are visible. The "Sampler result" tab is active, displaying detailed metrics for the first request: Thread Name: Thread Group 1-86, Sample Start: 2023-12-09 13:11:46 WEST, Load time: 1777, Connect Time: 891, Latency: 1777, Size in bytes: 360, Sent bytes: 159, and Total bytes: 179.

Analyze Results

TEST LOGIN WITH 500 USERS

www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie... — X

File Edit Search Run Options Tools Help

Test Plan Thread Group HTTP Request Graph Results View Results in Table Summary Report View Results Tree

00:00:08 ⚠ 0 0/500

Summary Report

Name:

Comments:

- Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes

Label	# Samples	Average	Min	Max	Std. Dev.	Error %	Throug...	Receive...	Sent KB...	Avg. By...
HTTP Request	73	2653	0	7440	933.01	0.00%	9.0/sec	40.21	1.39	4594.0
TOTAL	73	2653	0	7440	933.01	0.00%	9.0/sec	40.21	1.39	4594.0

Include group name in label? Save Table Header

Analyze Results

TEST LOGIN WITH 500 USERS

www.jmx (C:\Users\ANASS\OneDrive - Ministere de l'education nationale, de l'enseignement supérieur, de la formation professionnelle et de la recherche scie... — X

File Edit Search Run Options Tools Help

Test Plan Thread Group HTTP Request Graph Results View Results in Table Summary Report View Results Tree

Graph Results

Name: Graph Results

Comments:

- Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes

Graphs to Display Data Average Median Deviation Throughput

3187 ms

0 ms

No of Samples 73 Deviation 933

Latest Sample 7440 Throughput 537.819/minute

Average 2653 Median 2832

At the bottom of the picture, there are the following statistics, represented in colors:

Black: The total number of current samples sent.

Blue: The current average of all samples sent.

Red: The current standard deviation.

Green: Throughput rate that represents the number of requests per minute the server handled

Throughput

The Throughput is the most important parameter. It represents the ability of the server to handle a heavy load. The higher the Throughput is, the better is the server performance.

Deviation

The deviation is shown in red - it indicates the deviation from the average.

The smaller the better.

Thank you for your
attention



Directed by :

ANASS EL HABTI

ABDERRAHMANE EL KAIMOUNI

course:
development process