

TECHNOLOGY



Automation Testing

Load and Scalability With JMeter



A Day in the Life of an Automation Test Engineer

Alex's manager has given a newly developed application for scalability and database load testing to his colleague Alex. He instructed Alex to notify actual testing reports via email using the JMeter tool.

To complete his task, he must first develop a complete test plan and used a variety of samplers to notify the same. The JMeter various sampler like SMTP, JDBC, and JUnit will be used to check the load and scalability of online applications and notify the actual reports to the user at the time of testing only.

To achieve the above, he will learn a few concepts in this lesson that will help him come up with a solution.



Learning Objectives

By the end of this lesson, you will be able to:

- 🕒 Define the SMTP sampler
- 🕒 Discuss JDBC sampler
- 🕒 Implement JUnit sampler
- 🕒 Test and result analysis



SMTP Sampler

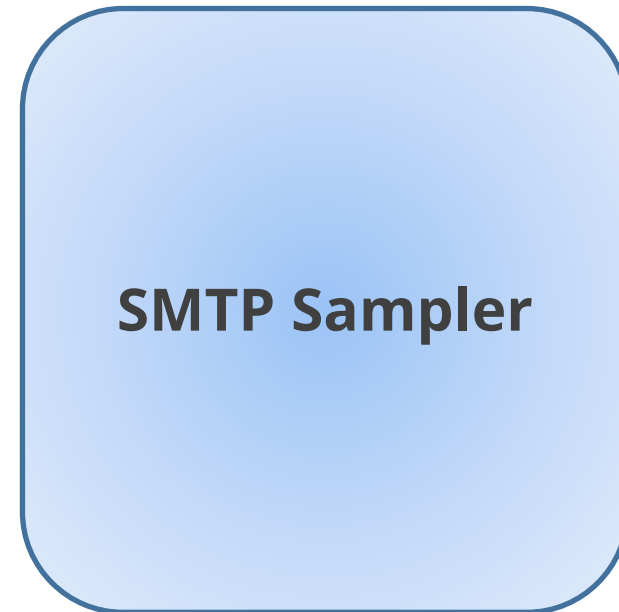
SMTP



- SMTP stands for Simple Mail Transfer Protocol.
- SMTP protocol sends and receives emails to senders and receivers.
- An SMTP email server has an address (or addresses) that can be set by email client or application, usually in the format `smtp.serveraddress.com`.
- For example, Gmail uses `smtp.gmail.com` as its SMTP server.

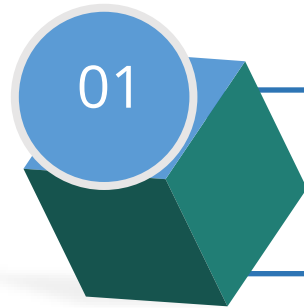
SMTP Sampler

SMTP sampler is used to send and receive test email notifications.

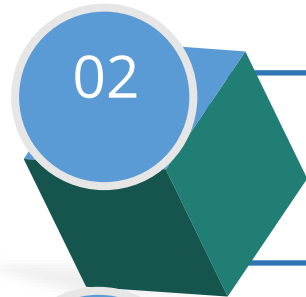


SMTP Environment

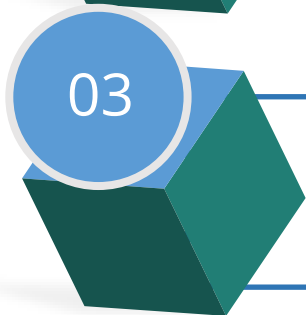
Following are the steps to install Java Mail Jar:



Download the **Java Mail Jar**



Add it to the **JMeter lib directory**

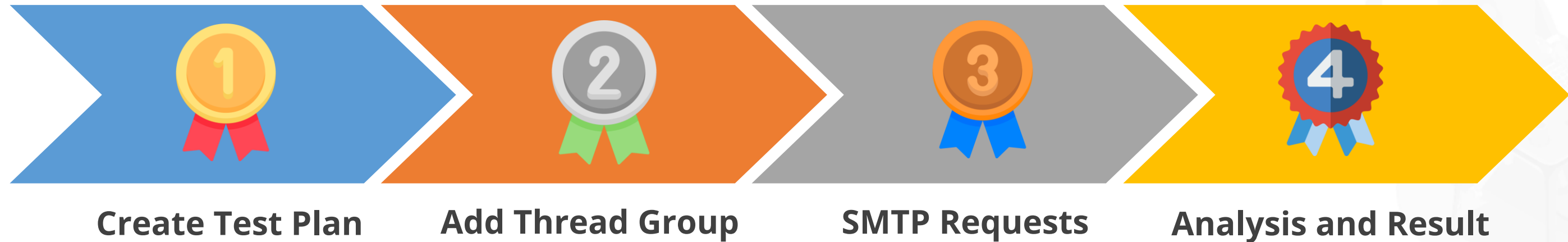


Restart the **JMeter**



Test RoadMap

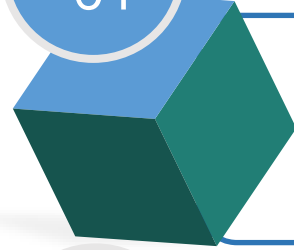
Testing can be performed by following the steps listed below one by one:



Add SMTP Sampler

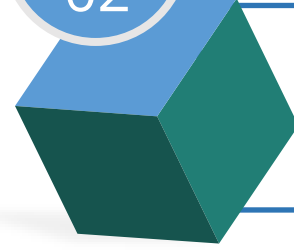
Add an SMTP sampler by following these steps:

01



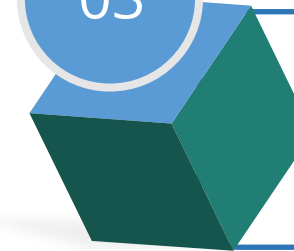
Create a **Test plan** and add a new **Thread Group** under **Test Plan**

02



Right-click on **Thread Group** and select **Add**

03

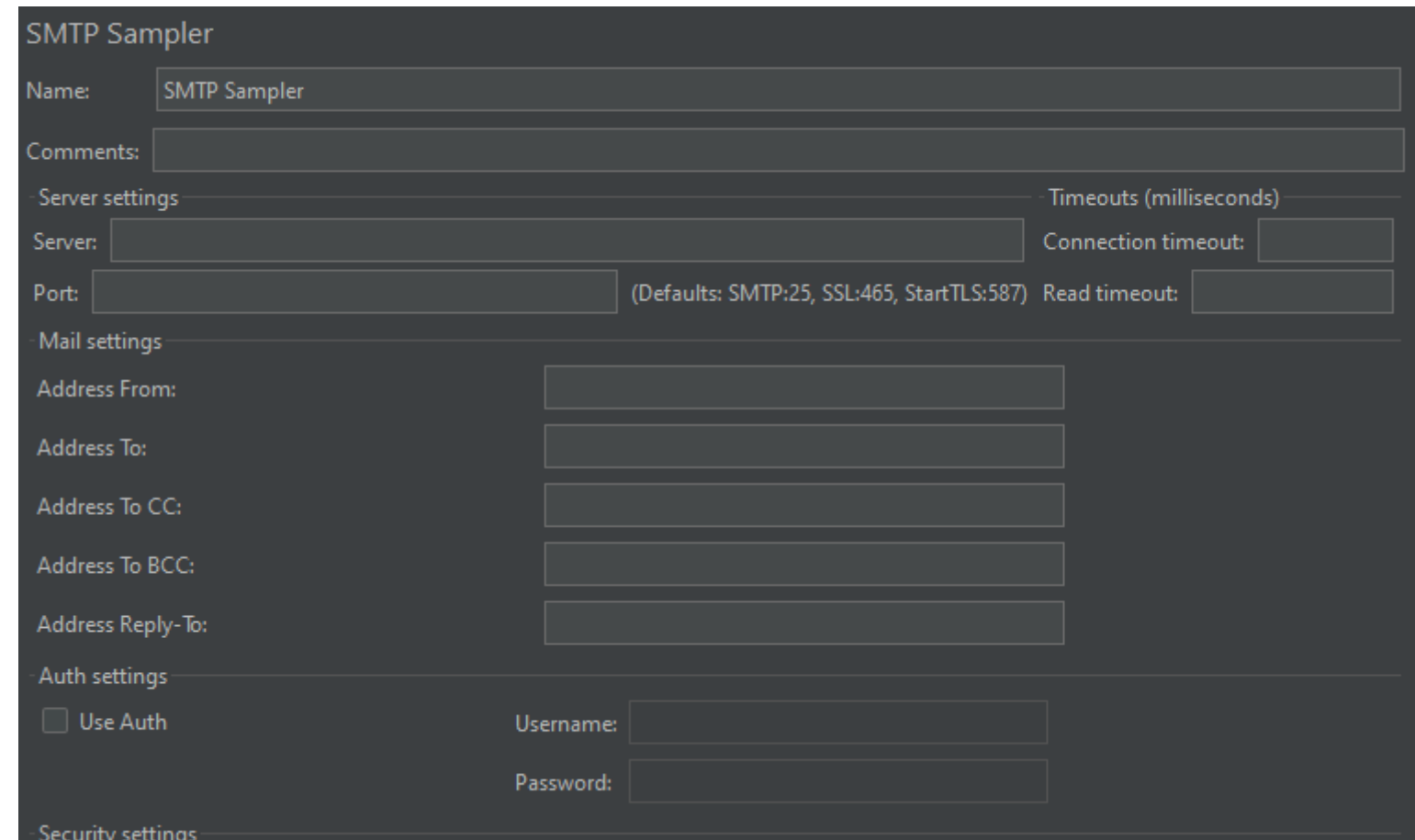


Hover over the **Sampler** and select the **SMTP Sampler**



SMTP Sampler Window

The following properties can be set in the SMTP sampler window:



The screenshot shows the 'SMTP Sampler' configuration window. It includes fields for Name, Comments, Server, Port, and various timeouts. There are also sections for Mail settings (Address From, To, CC, BCC, Reply-To) and Auth settings (Use Auth, Username, Password). The Security settings section is partially visible at the bottom.

SMTP Sampler

Name: SMTP Sampler

Comments:

Server settings

Server: Connection timeout: (milliseconds)

Port: (Defaults: SMTP:25, SSL:465, StartTLS:587) Read timeout: (milliseconds)

Mail settings

Address From:

Address To:

Address To CC:

Address To BCC:

Address Reply-To:

Auth settings

☐ Use Auth Username:

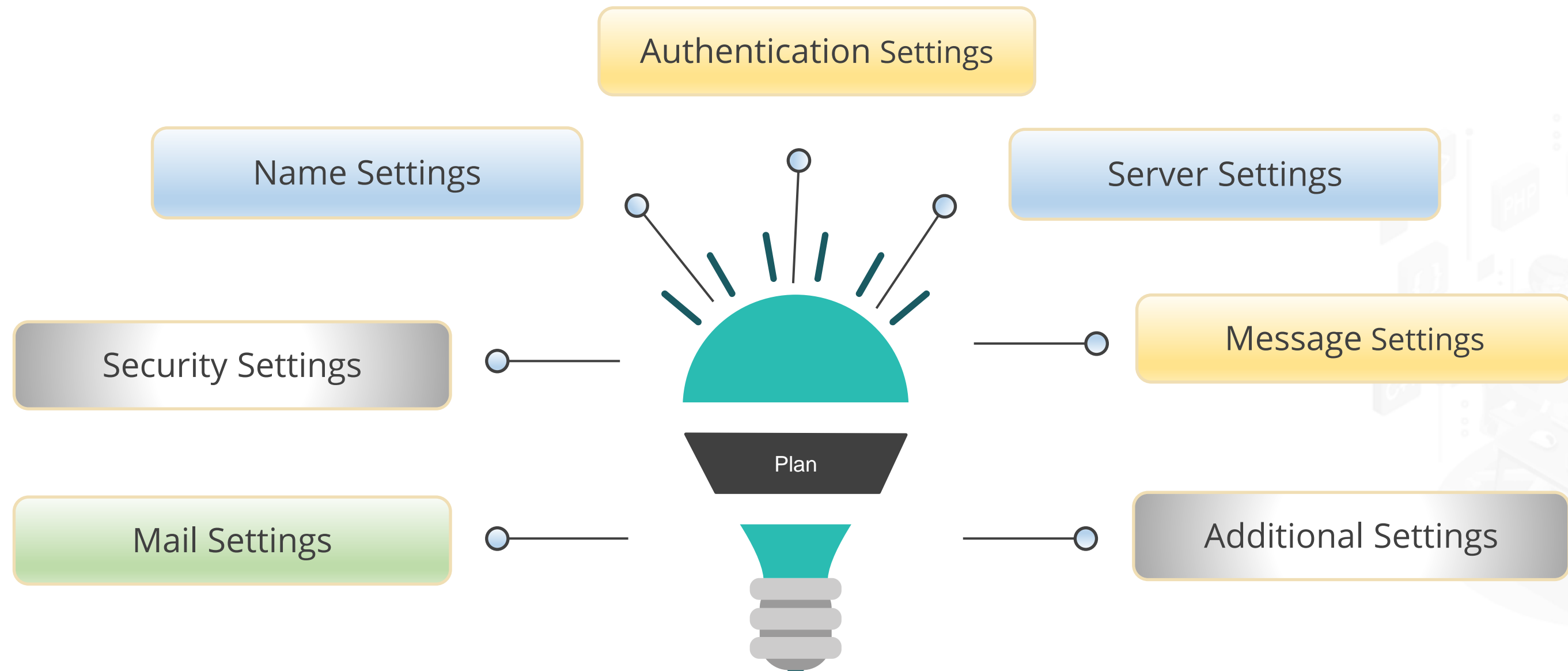
Password:

Security settings



SMTP Sampler Properties

Many properties can be set in the SMTP sampler window.



Name Settings

Set the name of the SMTP sampler.

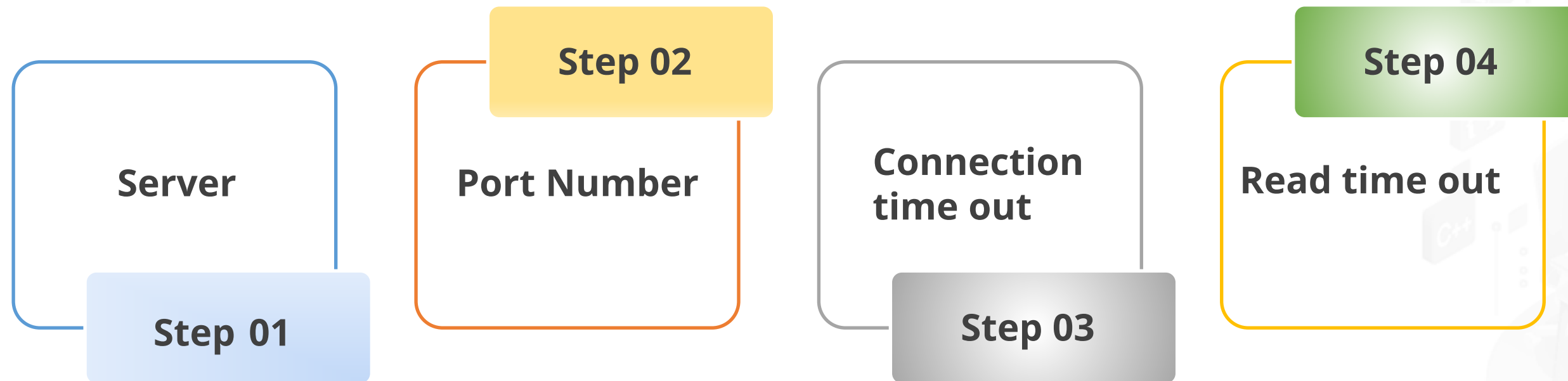
SMTP Sampler

Name:

Comments:

Server Settings

In the SMTP sampler, the user must fill in the details of the SMTP server.



Server Settings Output

:Here is a screenshot of the configuration window for the server settings:

Server settings

Server:

Port:

(Defaults: SMTP:25, SSL:465, StartTLS:587)

Timeouts (milliseconds)

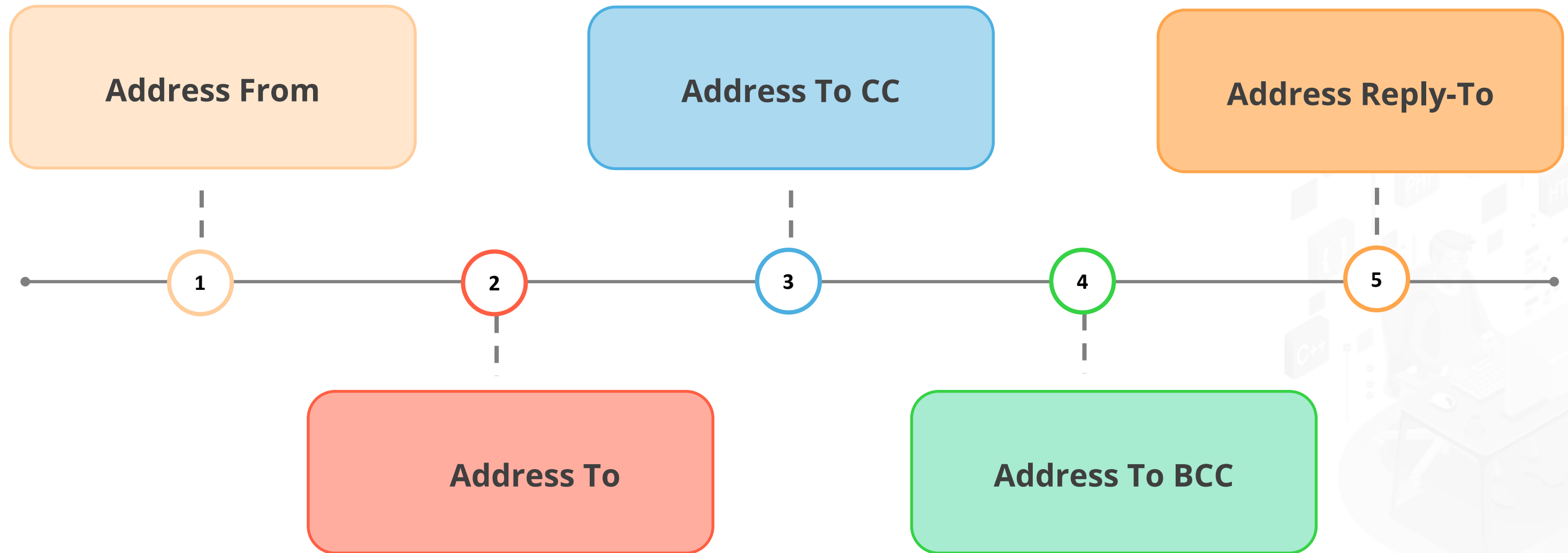
Connection timeout:

Read timeout:



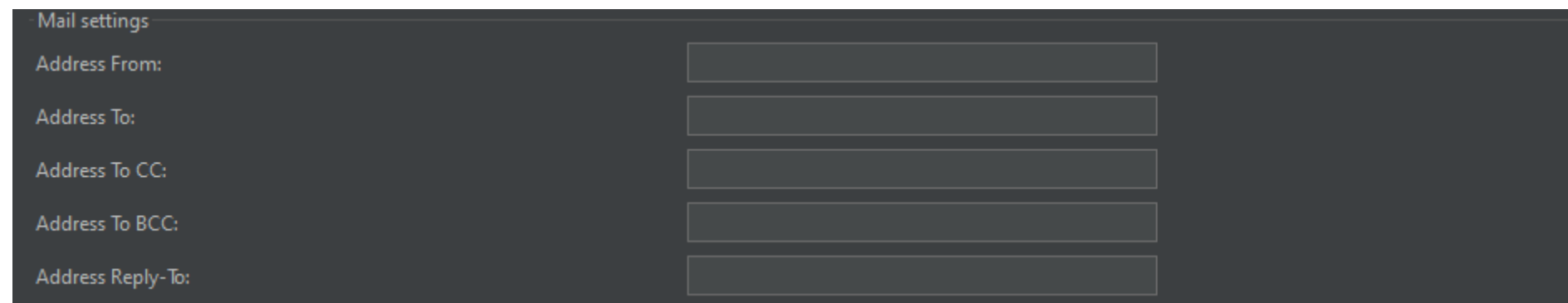
Mail Settings

JMeter performs the following steps during mail settings:



Mail Settings Output

:
Here is a screenshot of the configuration window for the mail settings:



The screenshot shows a dark-themed configuration window titled "Mail settings". It contains five input fields, each preceded by a label:

- Address From:
- Address To:
- Address To CC:
- Address To BCC:
- Address Reply-To:



Authentication Properties

To authenticate the process, the user must fill in the username and password in the SMTP sampler.



Authentication Settings Output

Here is a screenshot of the configuration authentication settings:

Auth settings

☐ Use Auth

Username:

Password:



Security Settings

To ensure the communication's security, the user must enable security protocols.



Use no security features



Use Start TLS



Use SSL

Security Settings Output

Here is a screenshot of the configuration of security settings:

Security settings

☒ Use no security features

☐ Use SSL

☐ Use StartTLS

☐ Trust all certificates

☐ Use local truststore

☐ Enforce StartTLS

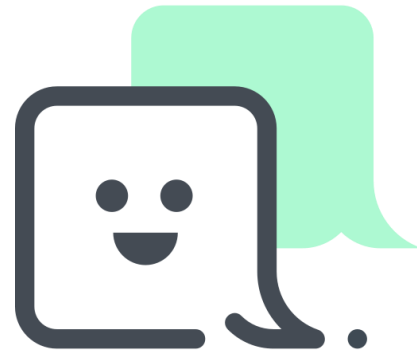
Local truststore:

Override System SSL/TLS Protocols:



Message Settings Output

The user must put in the message subject and body in the message setting window.
Additionally, users can attach files to their messages.



Insert message subject and message body

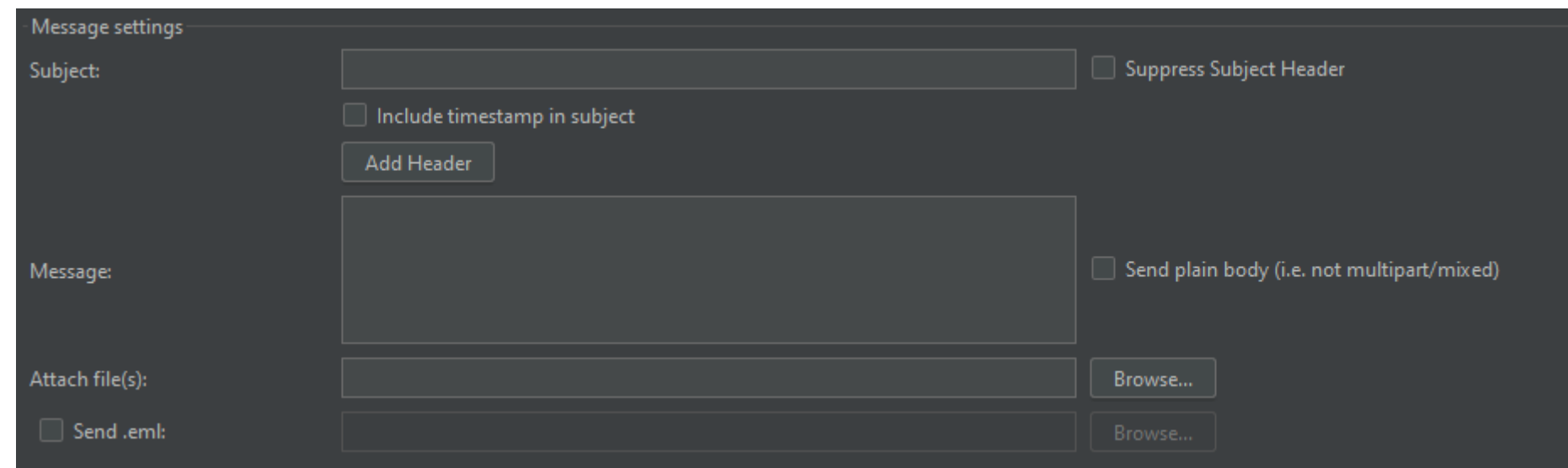


Attach files to the message



Message Settings Output

Here is a screenshot of the configuration of message settings:



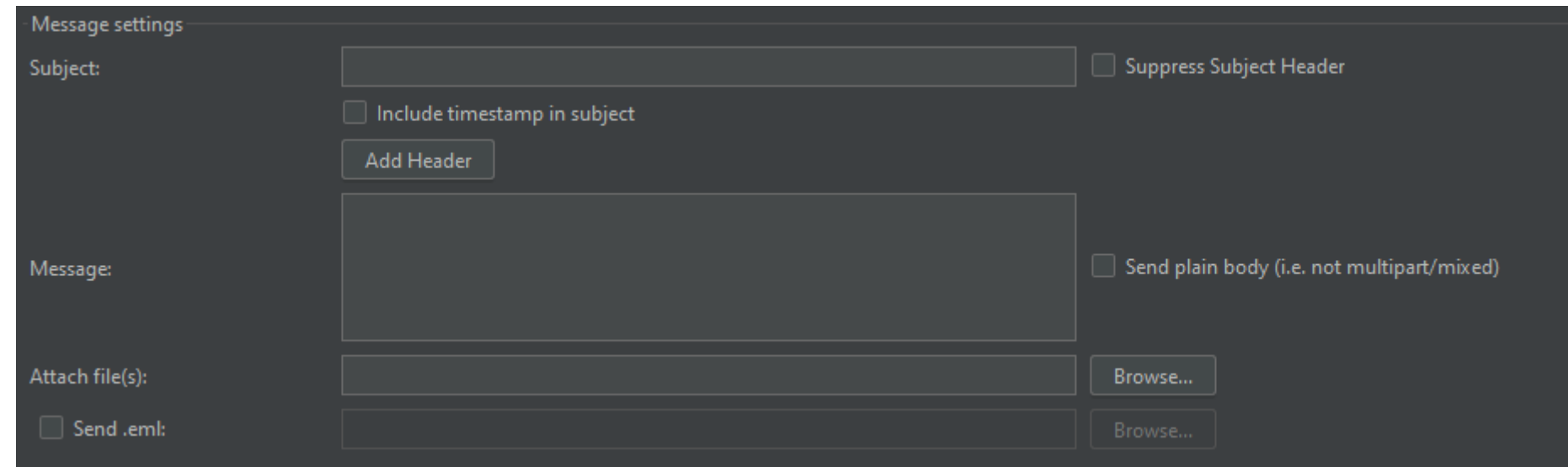
The screenshot shows a 'Message settings' dialog box with a dark theme. It contains the following elements:

- Subject:** A text input field, a checkbox for 'Include timestamp in subject', a checkbox for 'Suppress Subject Header', and an 'Add Header' button.
- Message:** A large text area for the message body and a checkbox for 'Send plain body (i.e. not multipart/mixed)'.
- Attach file(s):** A text input field and a 'Browse...' button.
- Send .eml:** A checkbox and a 'Browse...' button.



Message Settings Output

Here is a screenshot of the configuration of message settings:



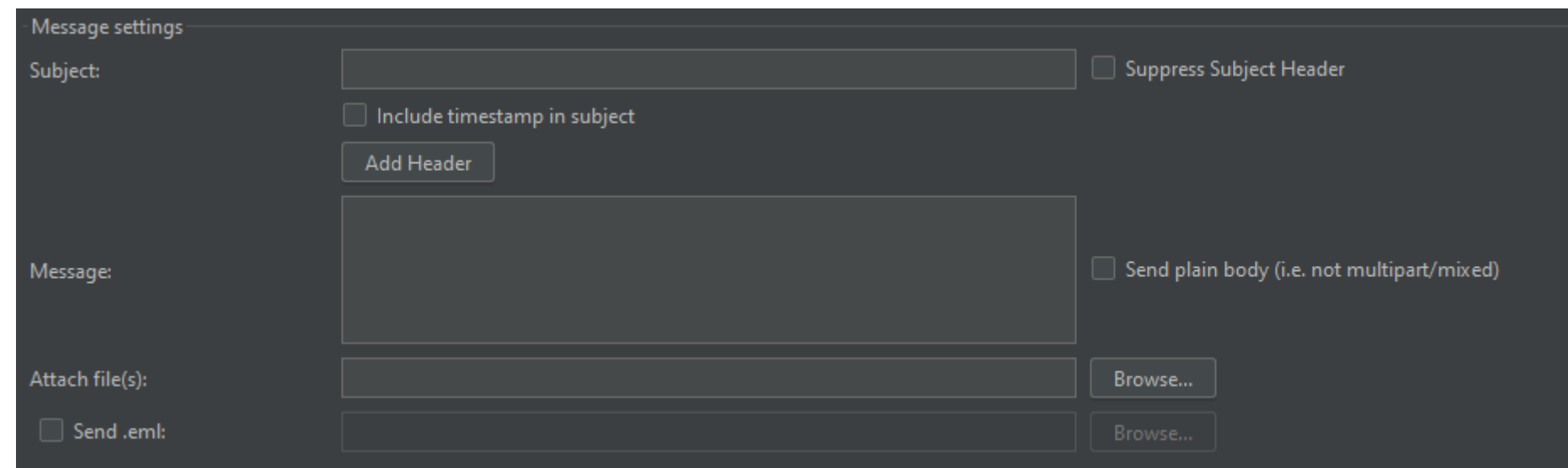
The screenshot shows a 'Message settings' dialog box with the following elements:

- Subject:** A text input field.
- ☐ Include timestamp in subject
- ☐ Suppress Subject Header
- Add Header**: A button.
- Message:** A large text area for the message body.
- ☐ Send plain body (i.e. not multipart/mixed)
- Attach file(s):** A text input field.
- Browse...**: A button next to the 'Attach file(s)' field.
- ☐ Send .eml:
- Browse...**: A button next to the 'Send .eml:' field.



Message Settings Output

Here is a screenshot of the configuration of message settings:



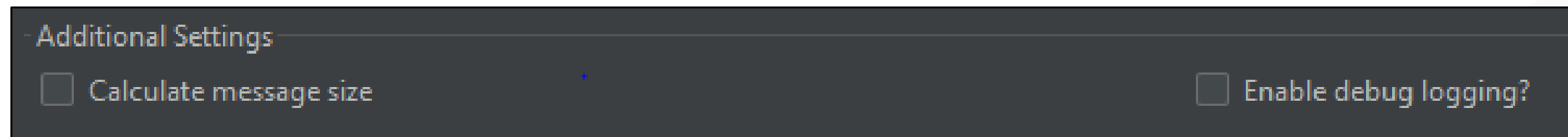
The screenshot shows a 'Message settings' dialog box with the following elements:

- Subject:** A text input field.
- ☐ Include timestamp in subject
- ☐ Suppress Subject Header
- Add Header**: A button.
- Message:** A large text area for the message body.
- ☐ Send plain body (i.e. not multipart/mixed)
- Attach file(s):** A text input field.
- Browse...**: A button next to the 'Attach file(s)' field.
- ☐ Send .eml:
- Browse...**: A button next to the 'Send .eml:' field.

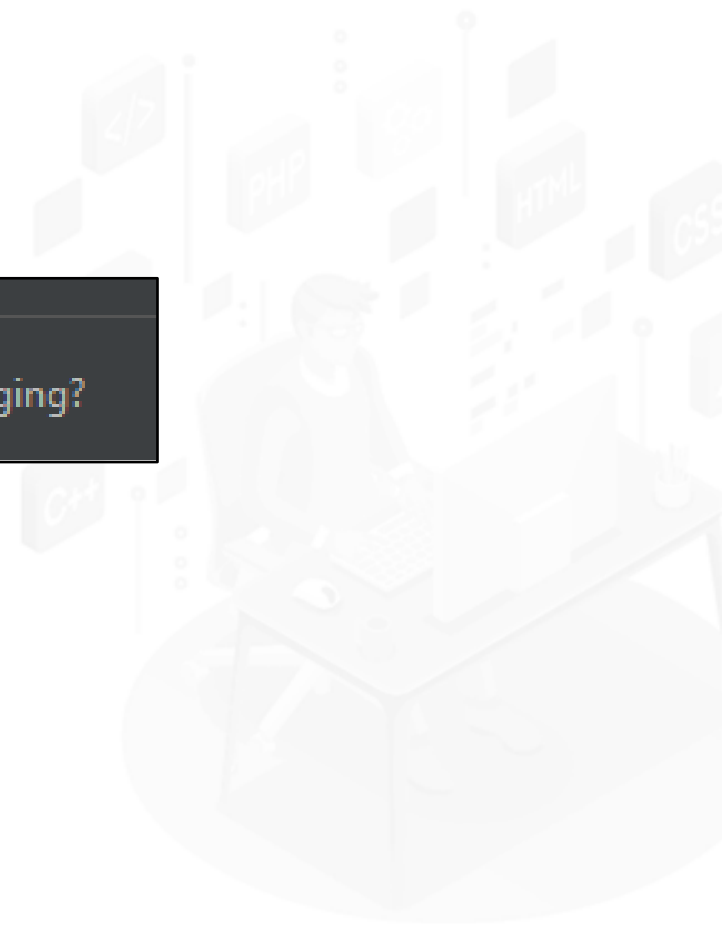


Additional Settings Output

Here is a screenshot of the configuration of additional settings:



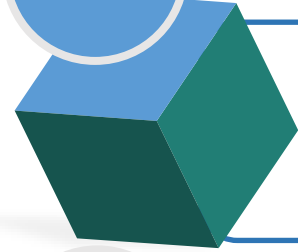
A screenshot of a dark-themed settings panel. The title 'Additional Settings' is at the top left. Below it are two checkboxes: 'Calculate message size' on the left and 'Enable debug logging?' on the right. Both checkboxes are currently unchecked.



Add Listeners

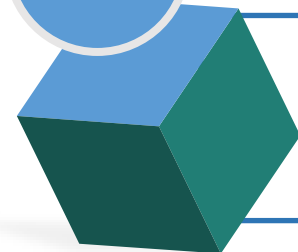
To add listeners, the user must follow the below steps:

01



Right-click on the **Thread Group** under the **Test Plan**

02



Select **Add** from the menu

03

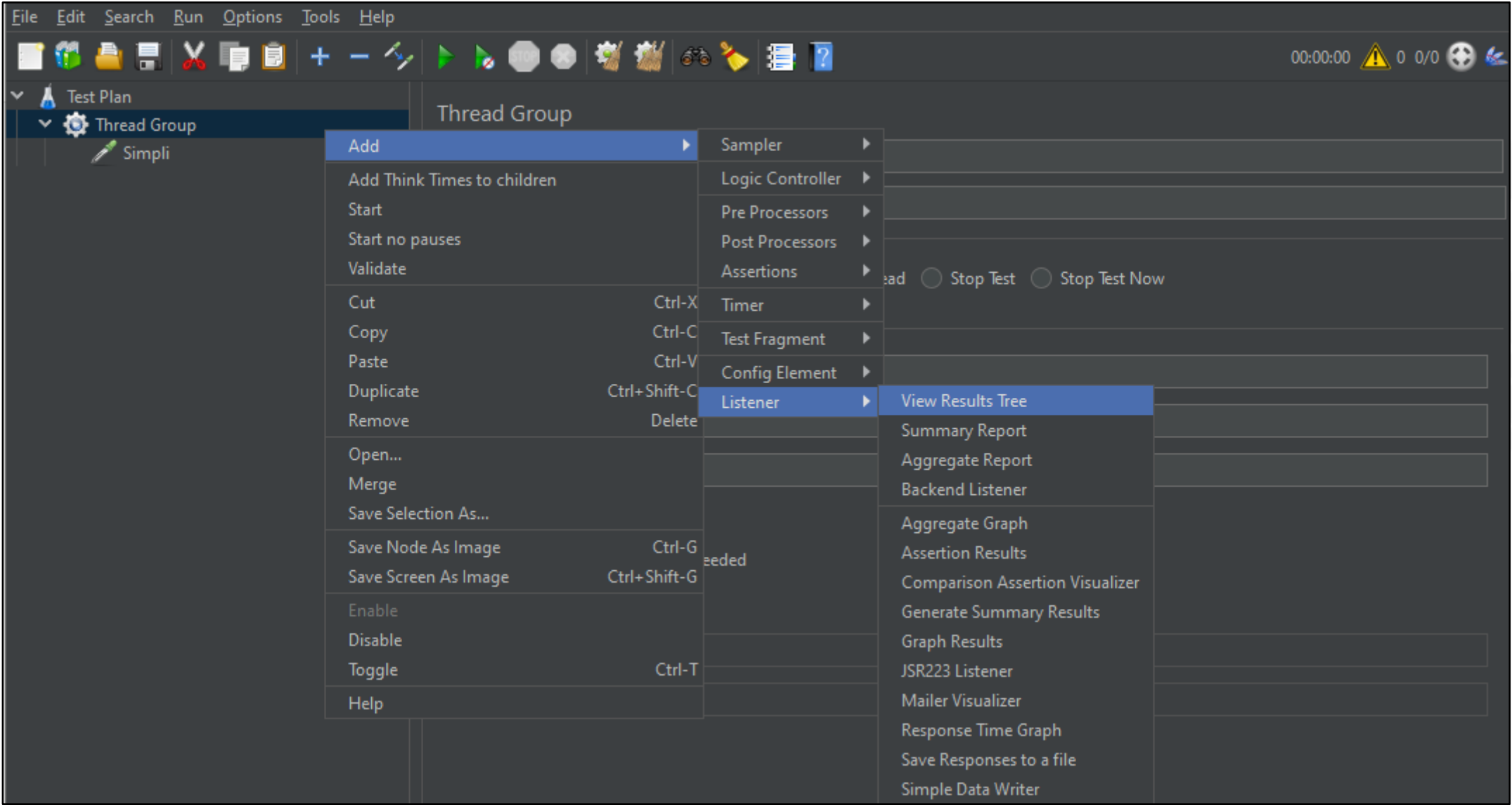


Hover over the **Listener** and select the **View Results Tree**



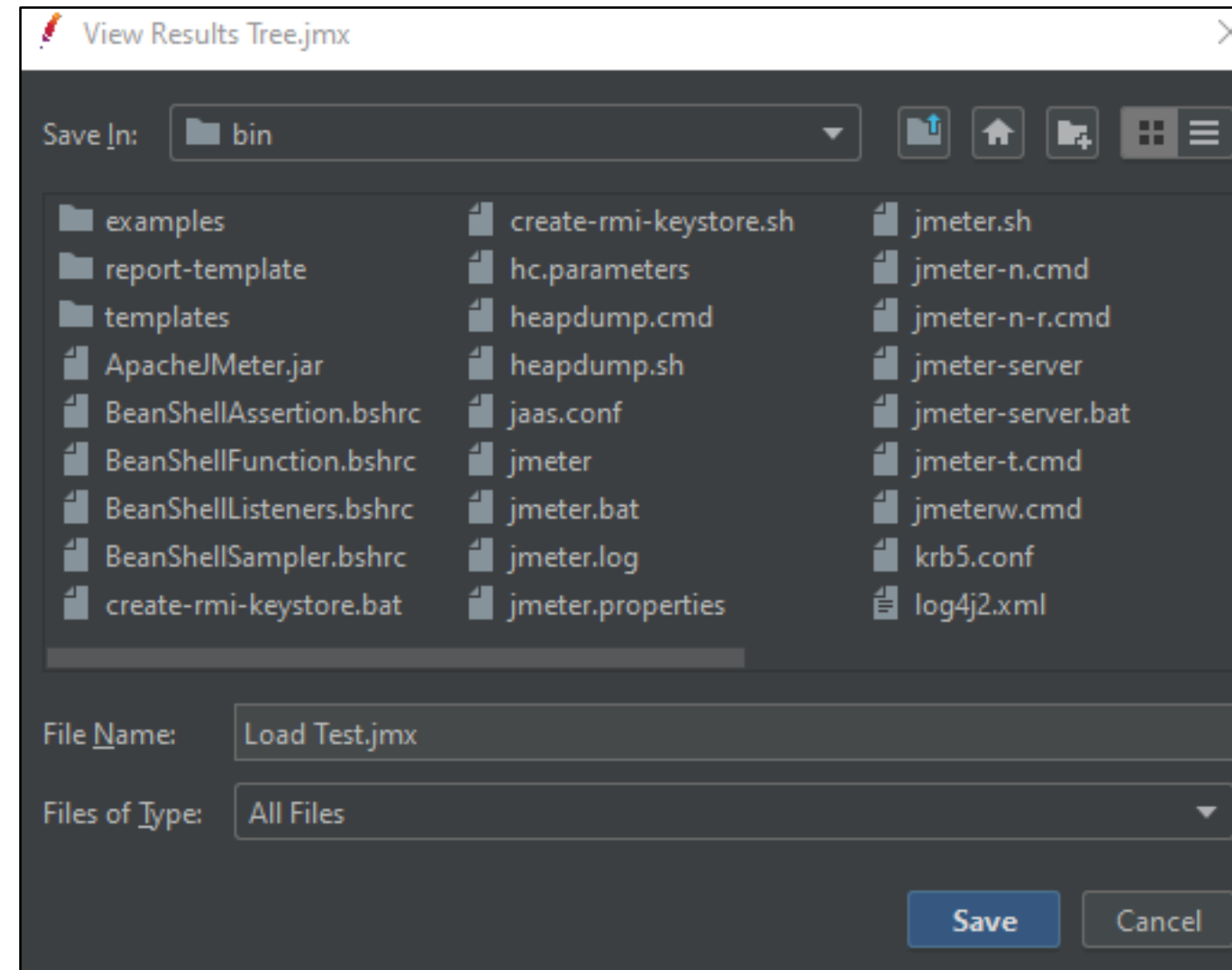
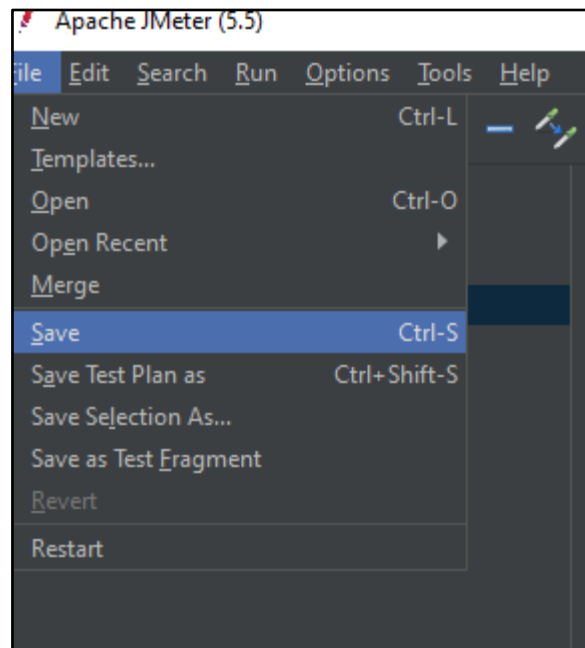
Listener Output Window

The listener output window will look like this:



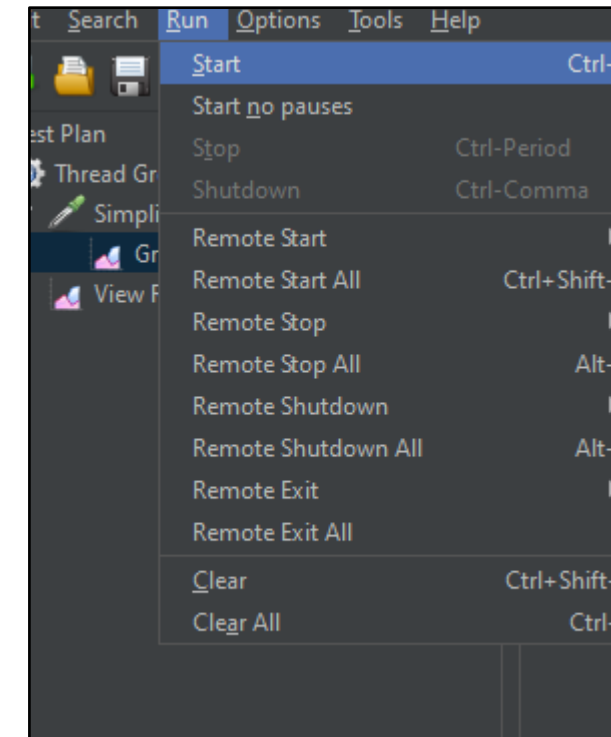
Save the Test

Ensure to save the test after completing all the steps.



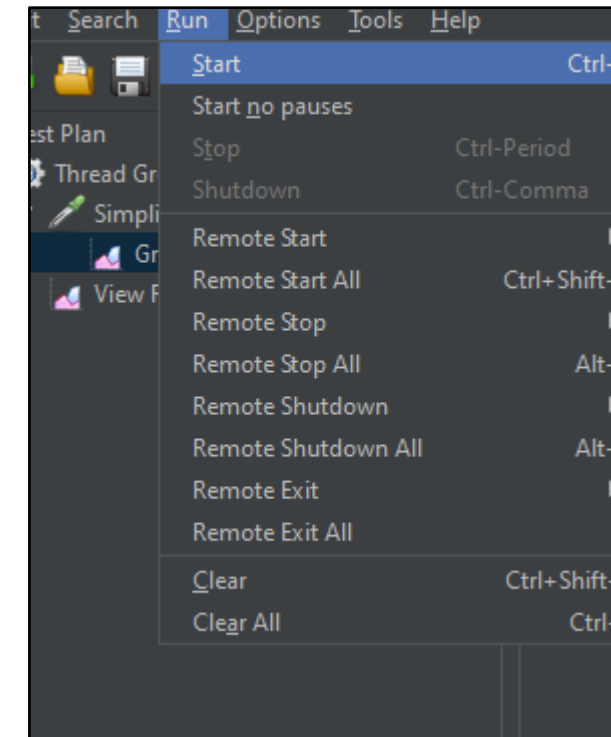
Run the Test

It is now time to run the test after completing all the steps. The user can either select **Run** or press the green triangle button in the menu bar.



Run the Test

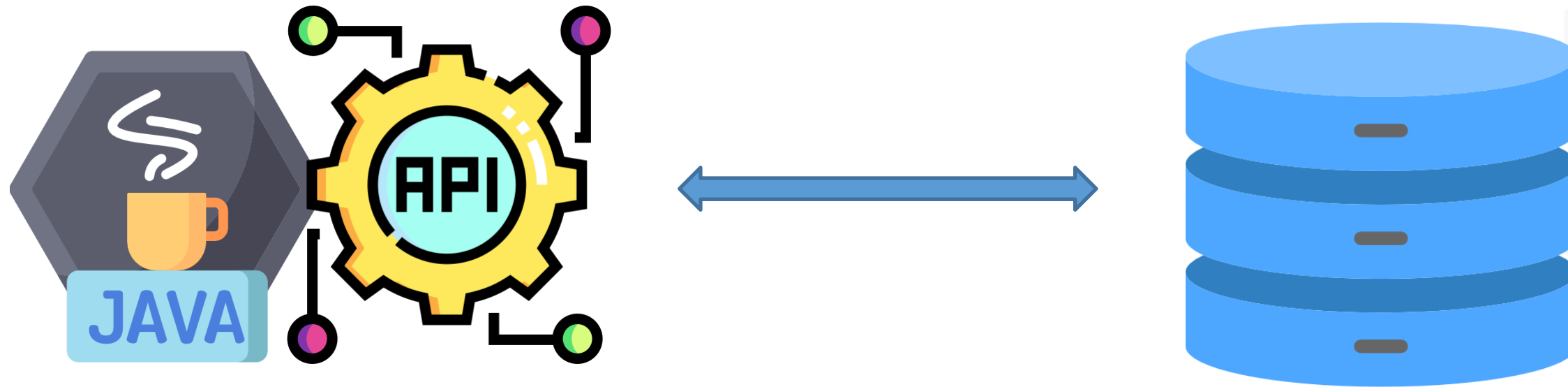
It is now time to run the test after completing all the steps. The user can either select **Run** or press the green triangle button in the menu bar.



JDBC Sampler

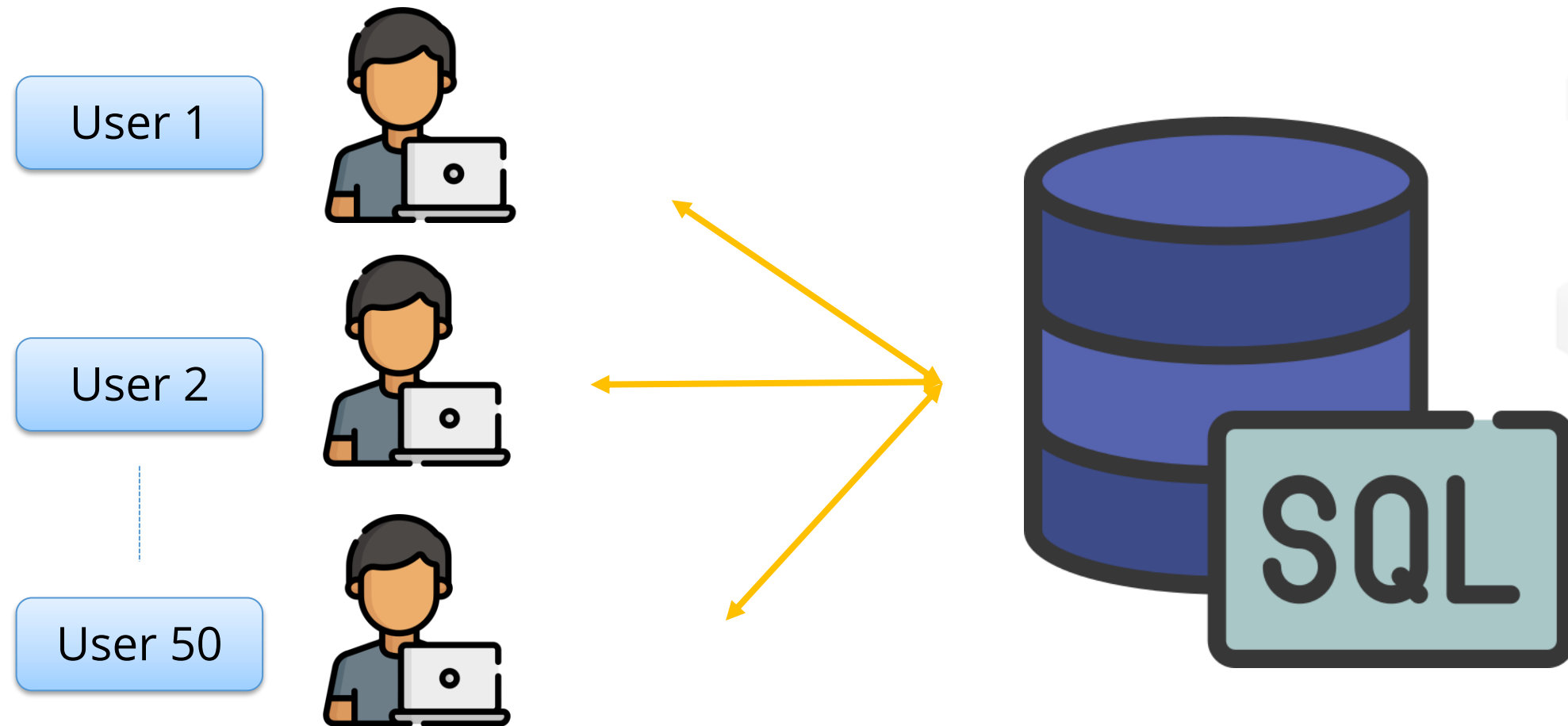
JDBC

JDBC stands for Java Database Connectivity, a Java API that connects Java programming with a wide range of databases.



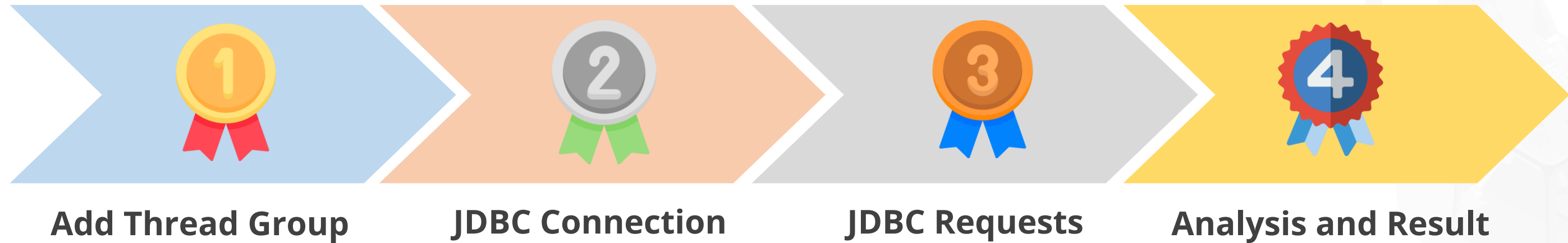
JDBC Sampler

JDBC sampler helps to perform a load test on SQL Server. JDBC sampler helps to create an SQL query for the database.



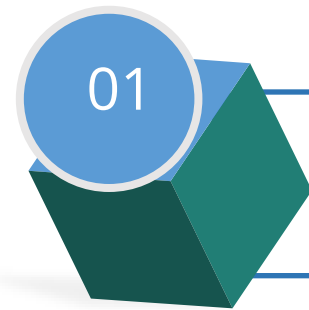
Test RoadMap

Testing can be performed by following the steps listed below one by one:

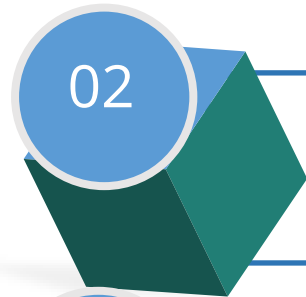


JDBC Environment

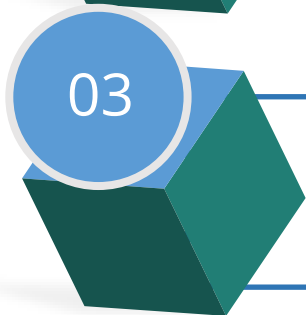
Following are the steps to install MySQL JDBC Jar:



Download the **MySQL JDBC Jar**



Add it to the **JMeter lib directory**



Restart the **JMeter**



Create SQL Database

To perform JDBC testing, users must have access to an SQL database.



Add JDBC Connection Configuration

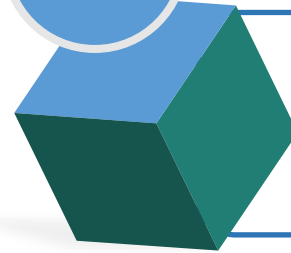
Add JDBC sampler by following these steps:

01



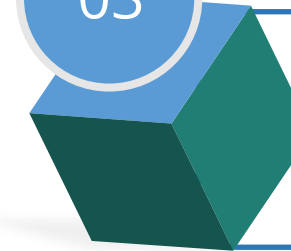
Add a new **Thread Group** and set the properties of **Thread Group**

02



Right-click on **Thread Group** and select **Add**

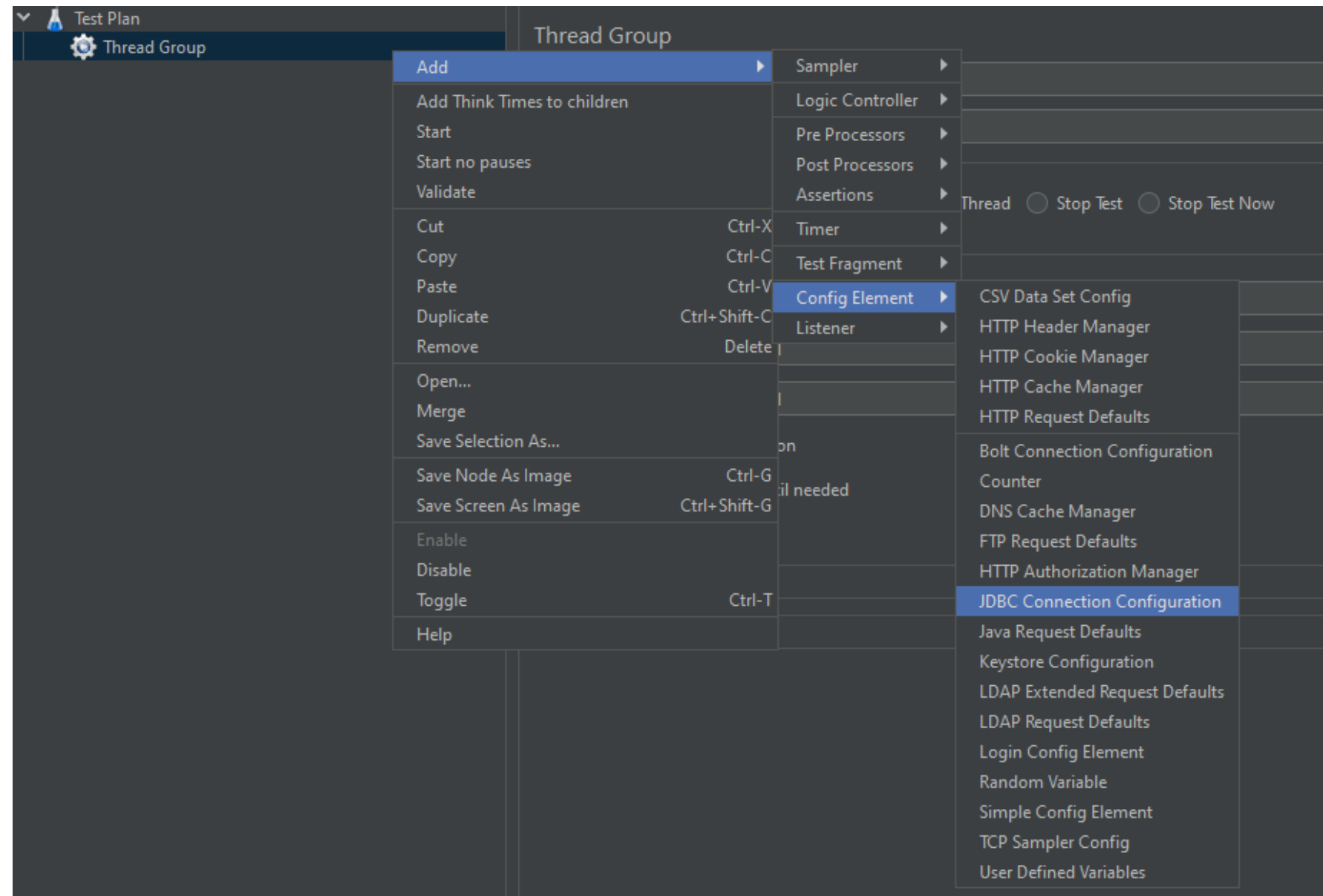
03



Hover over the **Config Element** and select the **JDBC Connection Configuration**

JDBC Connection Configuration Window

The JDBC connection configuration output window will look like this:



JDBC Configuration Setting

To access the database, the user must set the database URL, drivers, username, and password details in the configuration settings.



Database Connection Configuration

Database URL:

JDBC Driver class:

Username:

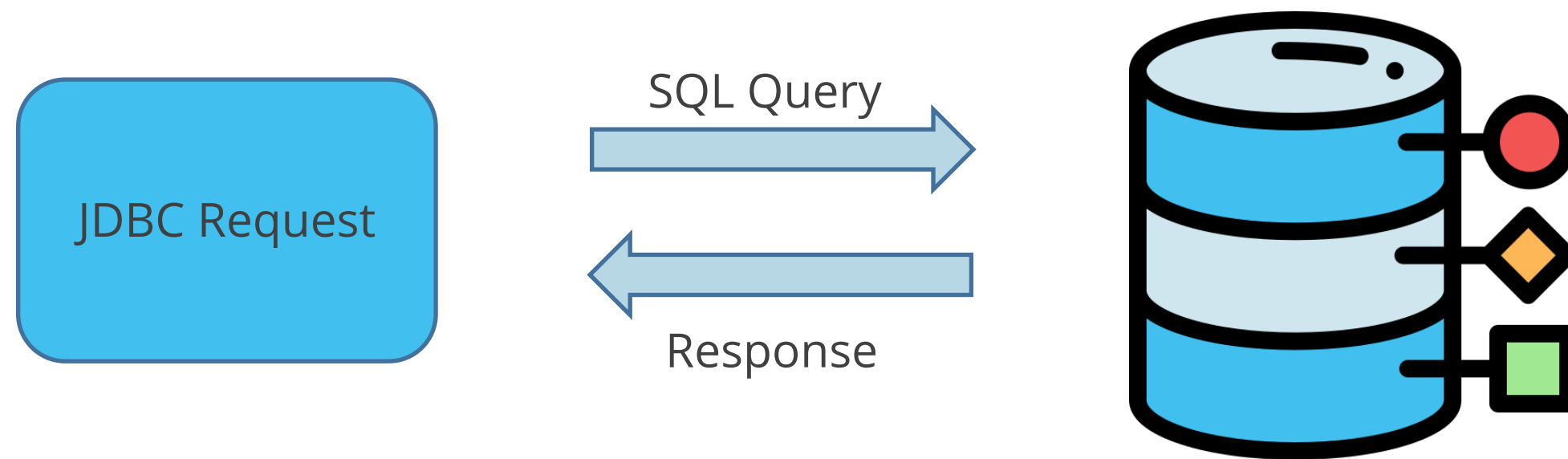
Password:

Connection Properties:



JDBC Request

The JDBC request allows the user to perform database load and performance testing. It sends a JDBC request to the database, which is an SQL query.



Add JDBC Request

The following steps will guide the user to add a JDBC request:

01

Add a new **Thread Group** and set the properties of **Thread Group**

02

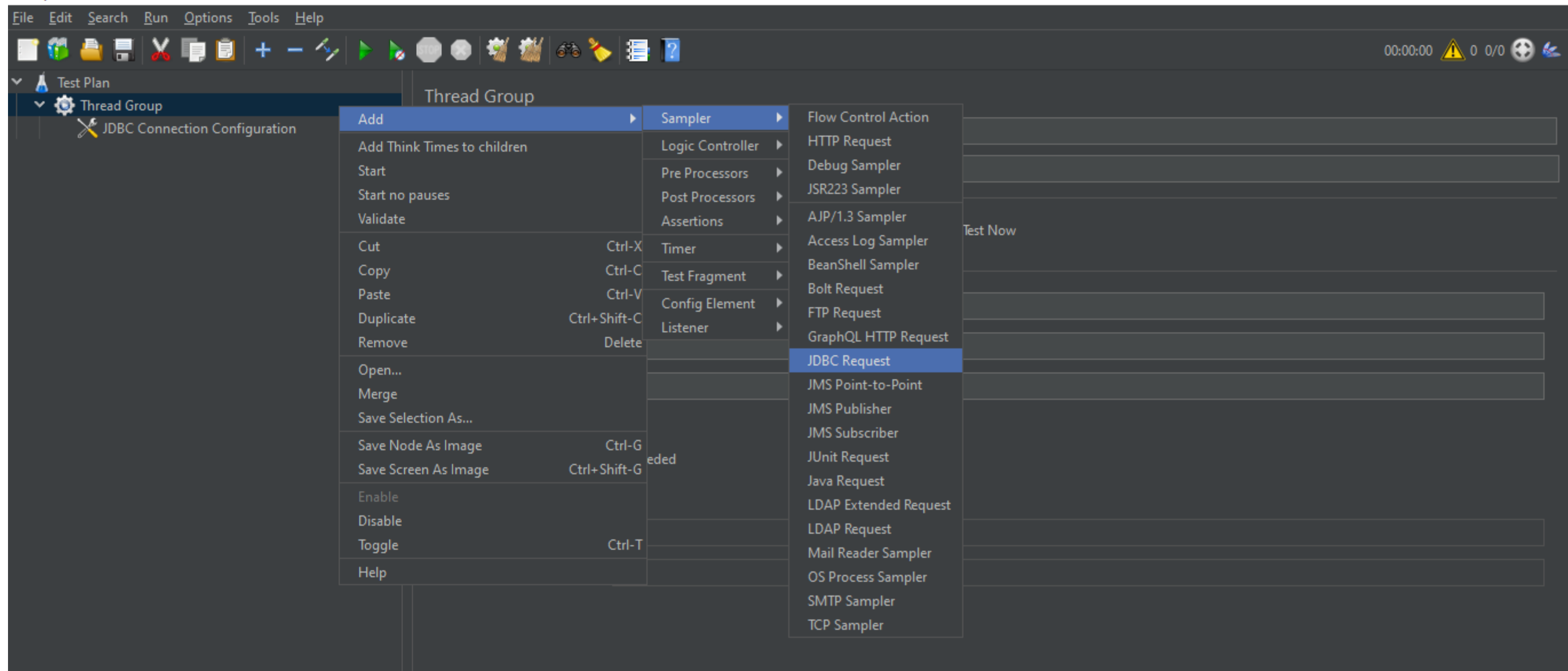
Right-click on **Thread Group** and select **Add**

03

Hover over the **Sampler** and select the **JDBC Requests**

JDBC Request Window

The JDBC request output window will look like this:



JDBC Request Setting

The next step is to set up a JDBC request and write SQL queries to access the database.

JDBC Request

Name:

Comments:

Variable Name Bound to Pool:

Variable Name of Pool declared in JDBC Connection Configuration:

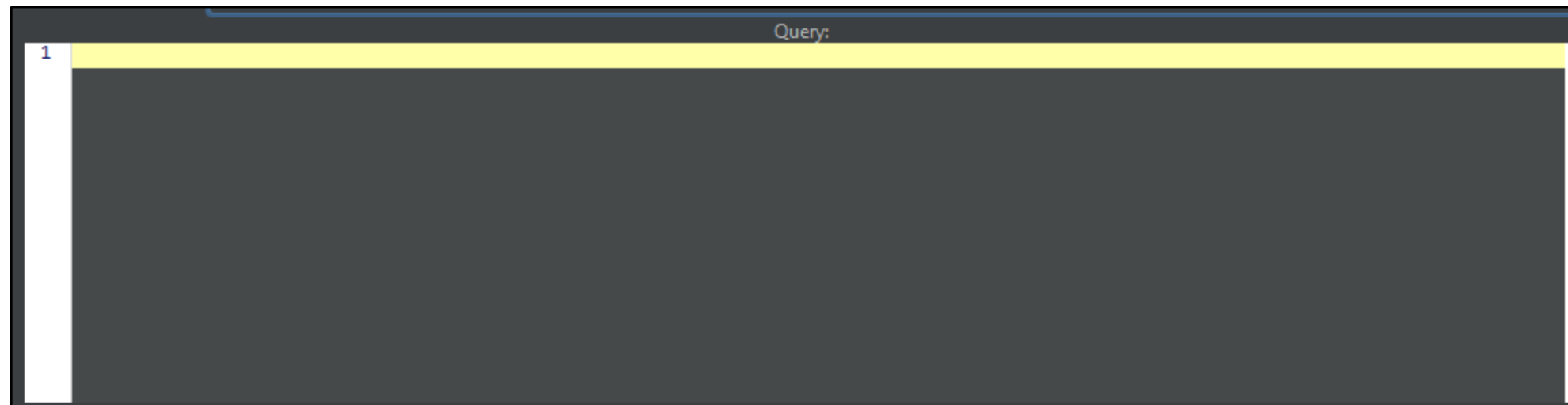
SQL Query

Query Type:



SQL Query

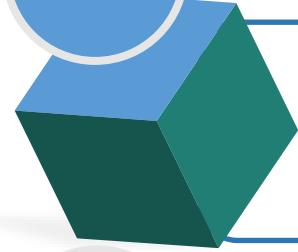
A query panel is present in the JDBC request window. Here, the user can write SQL queries for testing purposes.



Add Listeners

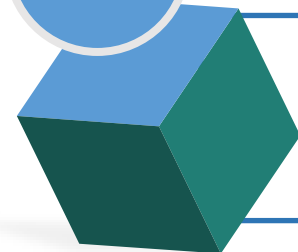
To add listeners, the user must follow below steps:

01



Right-click on the **Thread Group** under the **Test Plan**

02



Select **Add** from the menu

03

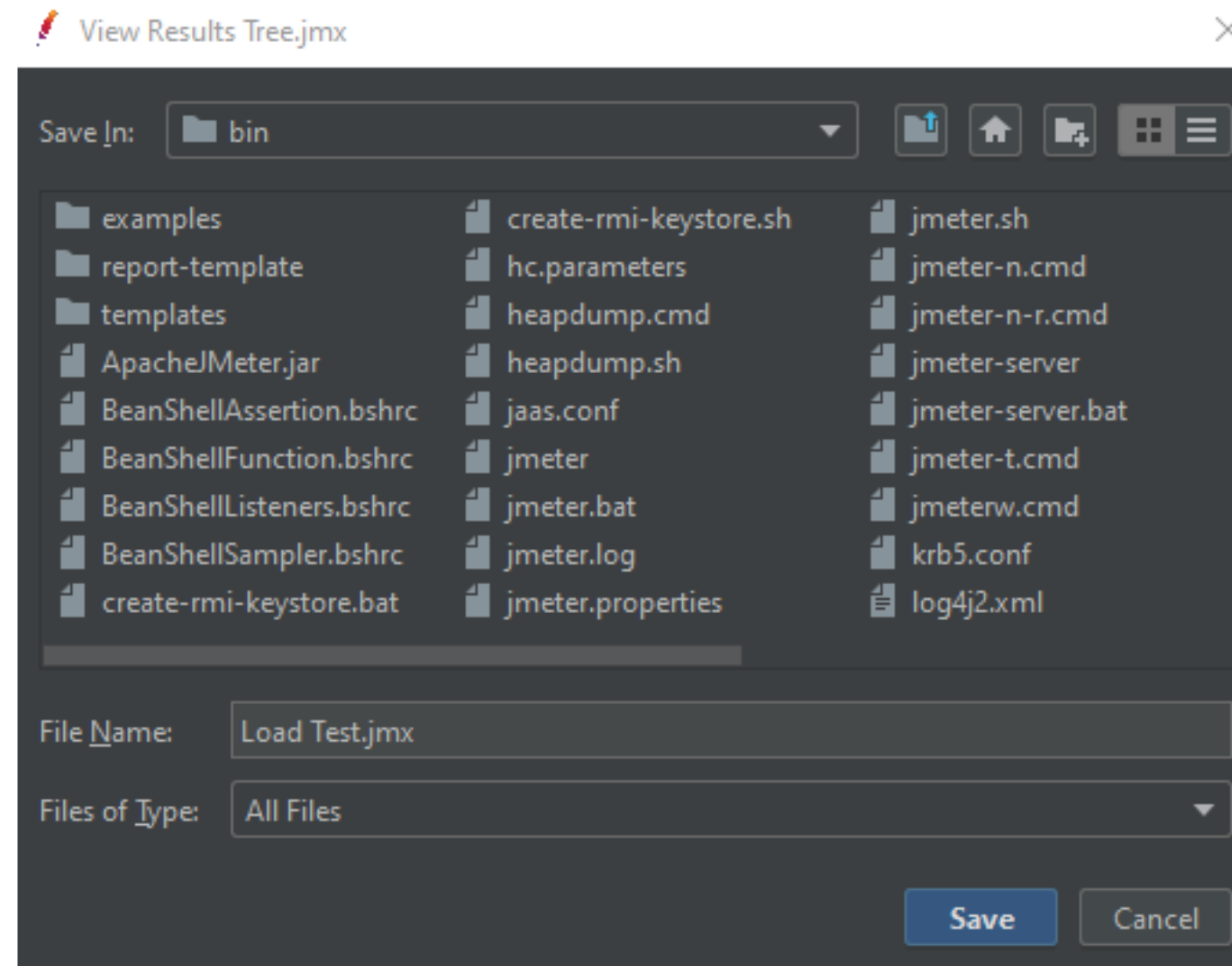
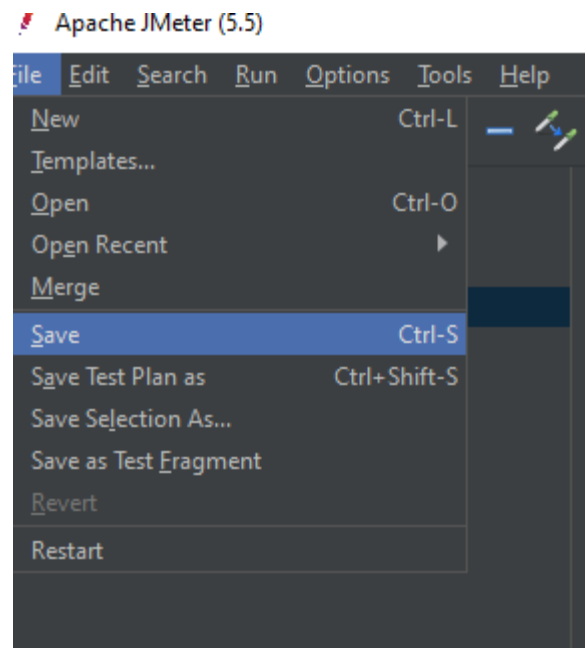


Hover over the **Listener** and select the **View Results Tree**



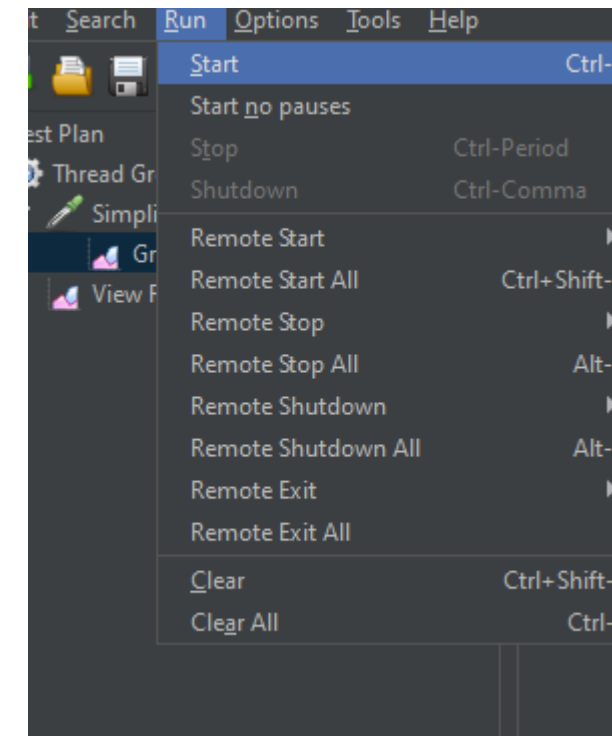
Save the Test

Ensure to save the test after completing all the steps.



Run the Test

It is now time to run the test after completing all the steps. The user can either select **Run** or press the green triangle button in the menu bar.



TECHNOLOGY

JUnit Sampler

JUnit Sampler

The JUnit sampler is used to perform load testing on Java methods.

JUnit Sampler

Testing

Java Methods

Test RoadMap

Testing can be performed by following the steps listed below one by one:



Create Test Plan



Create JUnit Case



JUnit Request



Analysis and Result

JUnit Test Case

To perform JUnit testing, the user needs to create or use pre-built Java test cases.



JUnit Environment

Following are the steps to install JUnit Jar files:

- 01 Download the **Java Test Case Jar file**
- 02 Add it to the **JUnit directory** under the **lib folder**
- 03 Restart the **JMeter**



Add JUnit Request

Add a JUnit sampler by following these steps:

01

Add a new **Thread Group under** and set the **Thread** properties

02

Right-click on **Thread Group** and select **Add**

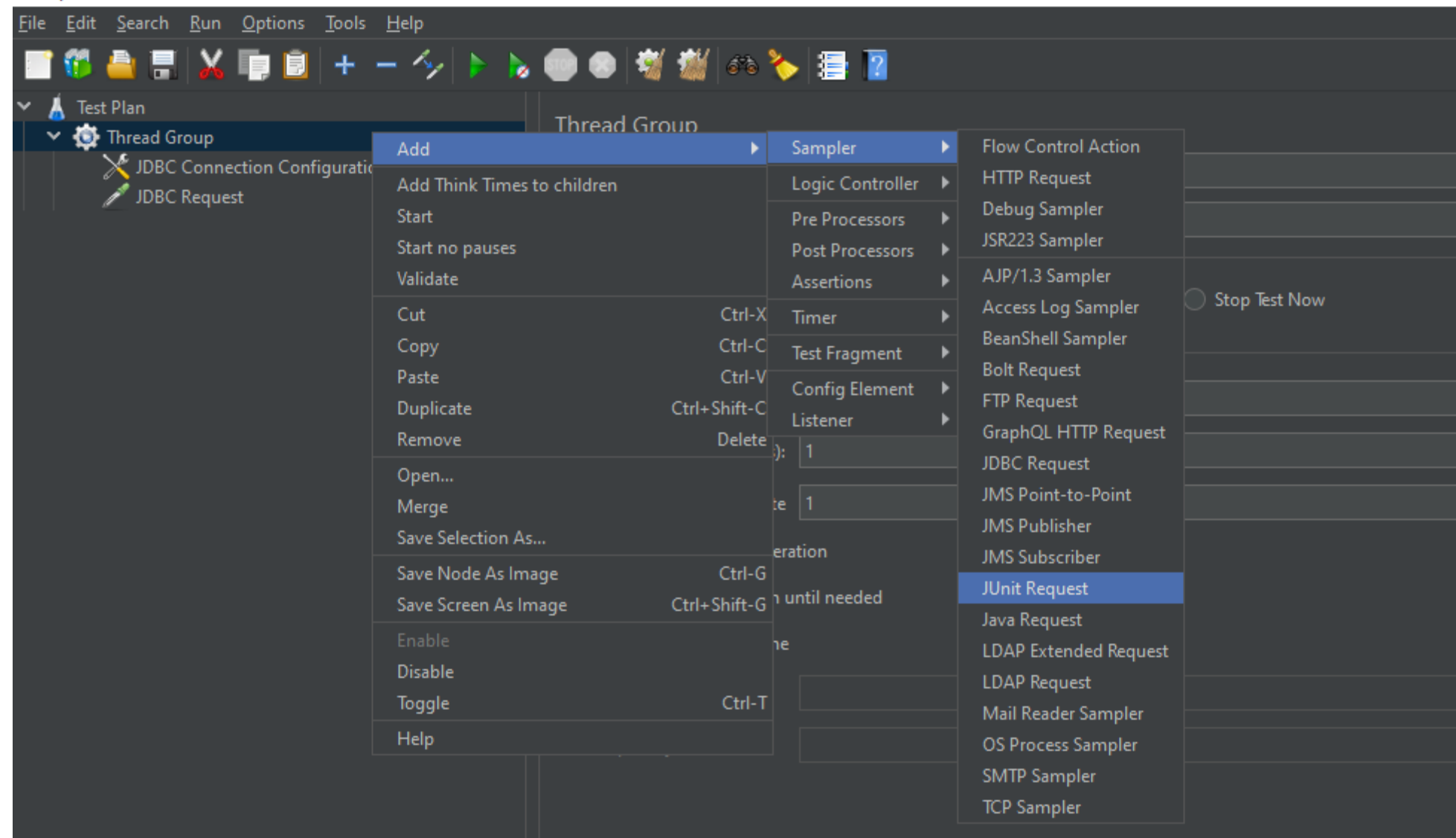
03

Hover over the **Sampler** and select the **JUnit Request**



JUnit Request Window

Here is the screenshot of the JUnit settings window:



JUnit Settings Window

Here is the screenshot of JUnit setting window:

JUnit Request

Name:

Comments:

☐ Search for JUnit 4 annotations (instead of JUnit 3)

Package Filter

Classname:

Constructor String Label

Test Method

Success Message

Success Code

Failure Message

Failure Code

Error Message

Error Code

☐ Do not call setUp and tearDown

☐ Append assertion errors

☐ Append runtime exceptions

☐ Create a new instance per sample



Error Message

JMeter provides several default success/failure codes and messages. For all tests, users should define unique success and failure codes.

| | |
|-----------------|------------------------------|
| Success Message | Test successful |
| Success Code | 1000 |
| Failure Message | Test failed |
| Failure Code | 0001 |
| Error Message | An unexpected error occurred |
| Error Code | 9999 |



Add Listeners

To add listeners, the user must follow the below steps:

01

Right-click on the **Thread Group** under the **Test Plan**

02

Select **Add** from the menu

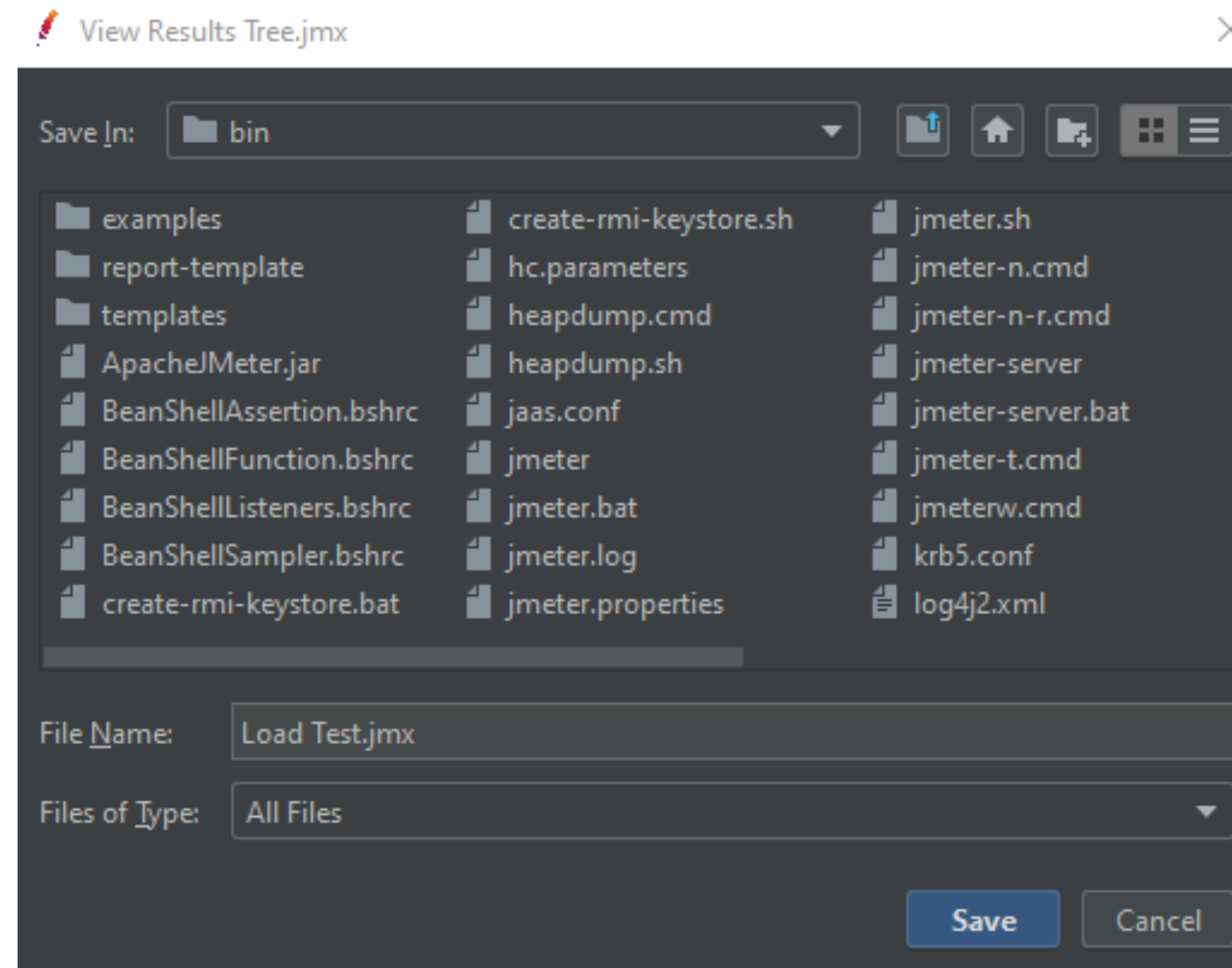
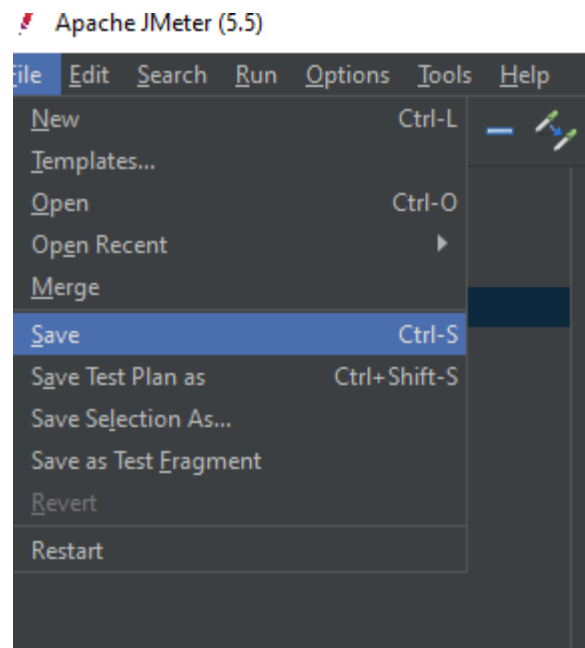
03

Hover over the **Listener** and select the **View Results Tree**



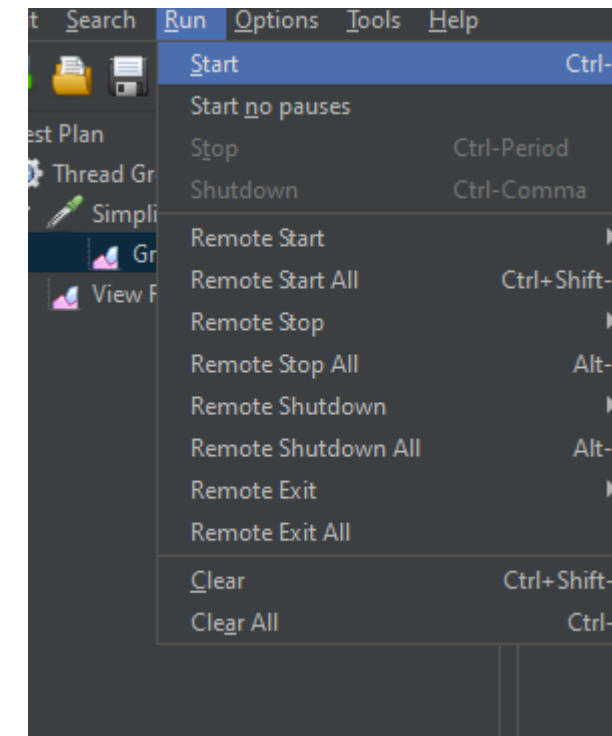
Save the Test

Ensure to save the test after completing all the steps.



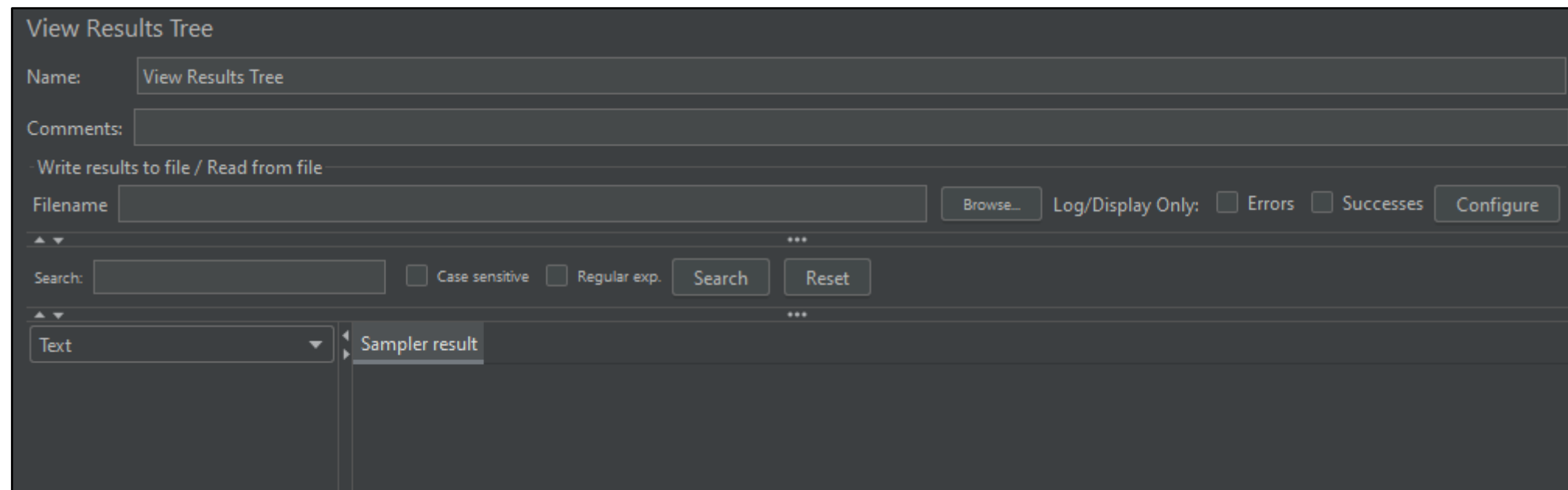
Run the Test

It is now time to run the test after completing all the steps. The user can either select **Run** or press the green triangle button in the menu bar.



JMeter Output

The output window will look like this:



Key Takeaways

- The SMTP sampler is used to send and receive emails. An SMTP email server has an address that can be specified by an email client or application, usually in the format `smtp.serveraddress.com`.
- The JDBC sampler is used to test the load on the database. It allows users to create SQL queries. Database professionals use these tests to identify and fix performance problems before releasing the database into production.
- The JUnit sampler is used to test Java methods. The user must create or use Java test cases to conduct JUnit testing.

