Experiment - 6

Quadratic Equation Testing Using J-Meter

By using Weather Modelling

Software Engineering

By

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1. Introduction

Performance testing is crucial to ensure that a web application can handle a high load without performance degradation. Apache JMeter is an open-source tool used for testing and analysing the performance of web applications. In this experiment, we use JMeter to simulate multiple concurrent users and analyse the response time, throughput, and error rates of a sample web application.

2. Objectives

- To analyse the performance of a web application under different user loads.
- To determine the response time and throughput of the application.
- To identify performance bottlenecks and optimize the system.
- To use JMeter for stress, load, and endurance testing.

3. Features

- Simulating multiple virtual users.
- HTTP request and response monitoring.
- Load testing using thread groups.
- Performance metrics like response time, error rate, and throughput.
- Visualization of test results using tables and graphs.

4. Technology Stack

- **Performance Testing Tool:** Apache JMeter
- **Operating System:** Windows

5. Project Plan in JIRA - Food Management System

1. Test Configuration

- **Tool:** Apache JMeter
- **Protocol:** HTTP/HTTPS
- **Number of Users:** 100-1000 concurrent users
- **Ramp-up Time:** 10 seconds
- **Loop Count**: 5 iterations
- **Assertions:** Response Time < 3 sec

2. JMeter Test Elements

Test Element	Description
Thread Group	Simulates multiple concurrent users
HTTP Request	Sends requests to the server
Listeners	Collects and displays results in graphs and tables
Assertions	Validates response time and correctness

3. Performance Testing Scenarios

- **Load Testing:** Simulating 100, 500, and 1000 users.
- **Stress Testing:** Evaluating system behavior under extreme conditions.
- **Endurance Testing:** Running tests over an extended period to check stability.

6. JMeter Execution and Results

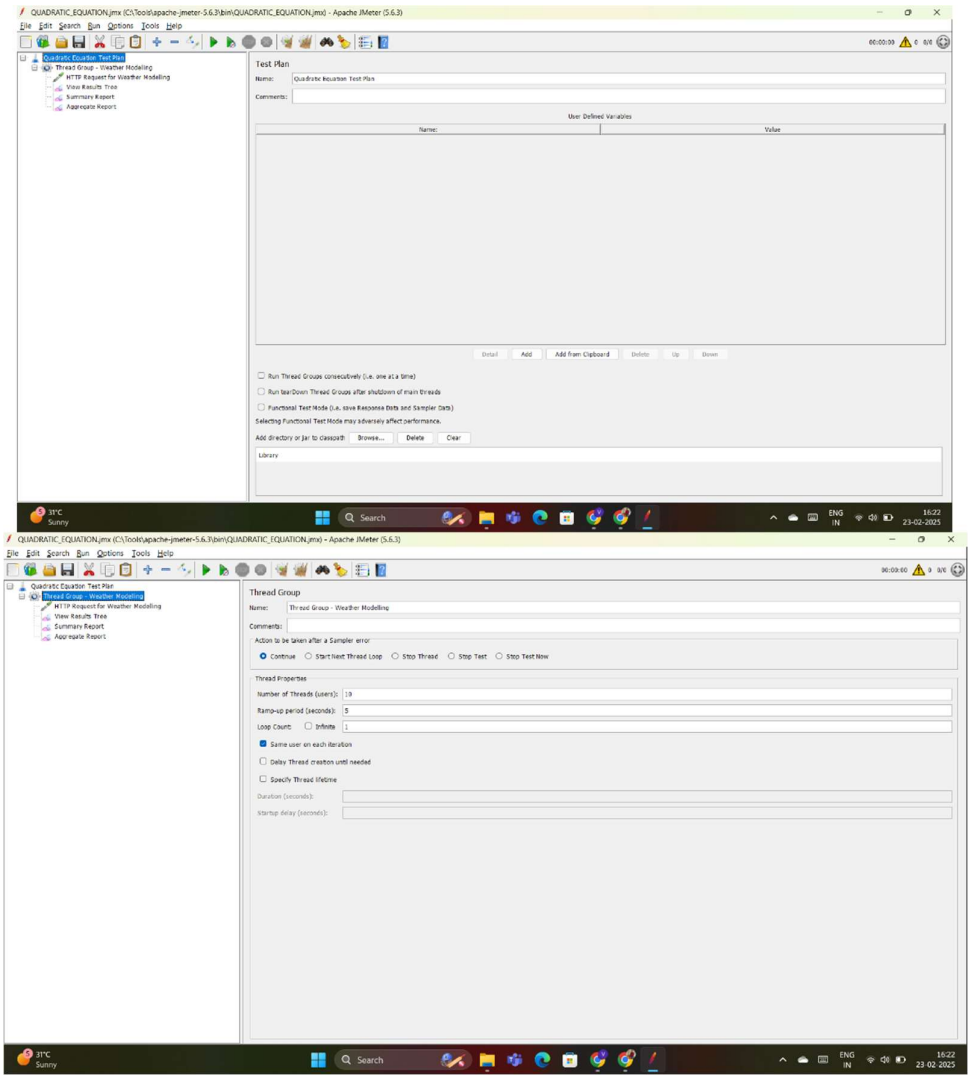
1. Configuring JMeter

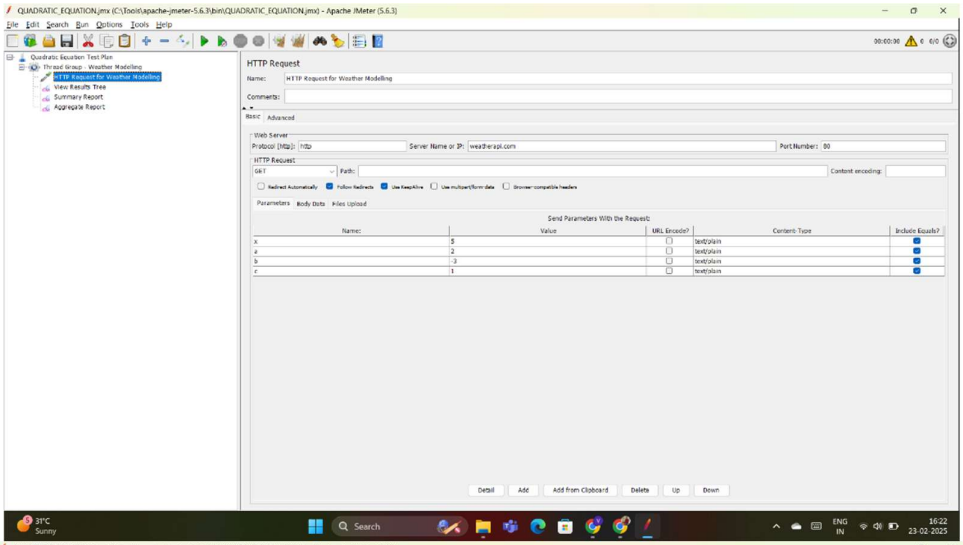
- Set up a **Thread Group** with the required number of users and ramp-up time.
- Configure **HTTP Requests** with the target server and API endpoints.

- Add **Listeners** such as View Results Tree, Aggregate Report, and Summary Report.

2. Results Analysis

- **View Results in Table**: Displays the response time for each request.
- **View Results Tree**: Provides a detailed request and response log.
- **Aggregate Report**: Shows overall performance metrics like average response time, median, and throughput.
- **Summary Report**: Consolidates key performance indicators.

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File Edit Search Run Options Tools Help
Quadratic Equation Test Plan
Thread Group - Weather Modelling
HTTP Request for Weather Modelling
View Results Tree
Summary Report
Aggregate Report
HTTP Request
Name: HTTP Request for Weather Modelling
Comments:
Basic Advanced
Web Server
Protocol [http]: http
Server Name or IP: weatherapi.com
Port Number: 80
HTTP Request
GET
Path:
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?
x
5
text/plain
a
2
text/plain
b
-3
text/plain
c
1
text/plain
Detail
Add
Add from Clipboard
Delete
Up
Down
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Sunny
Search
ENG
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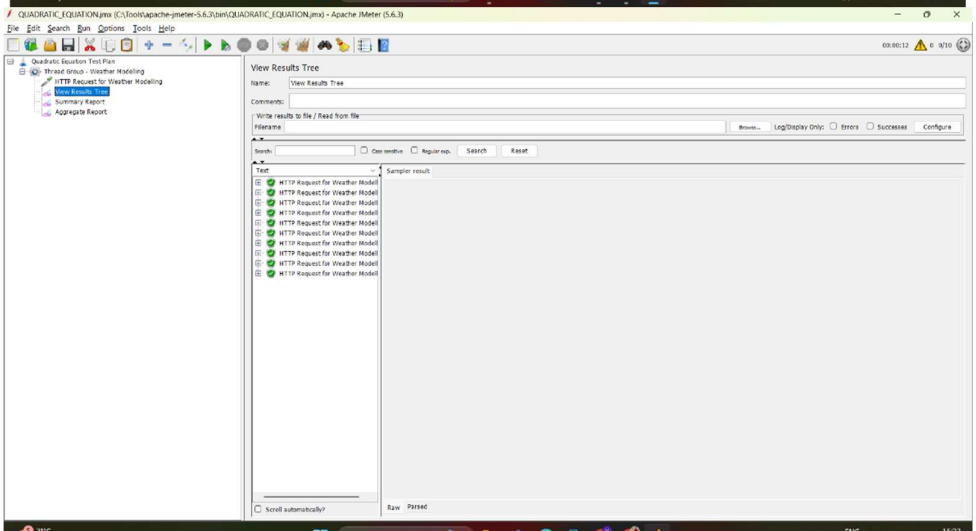
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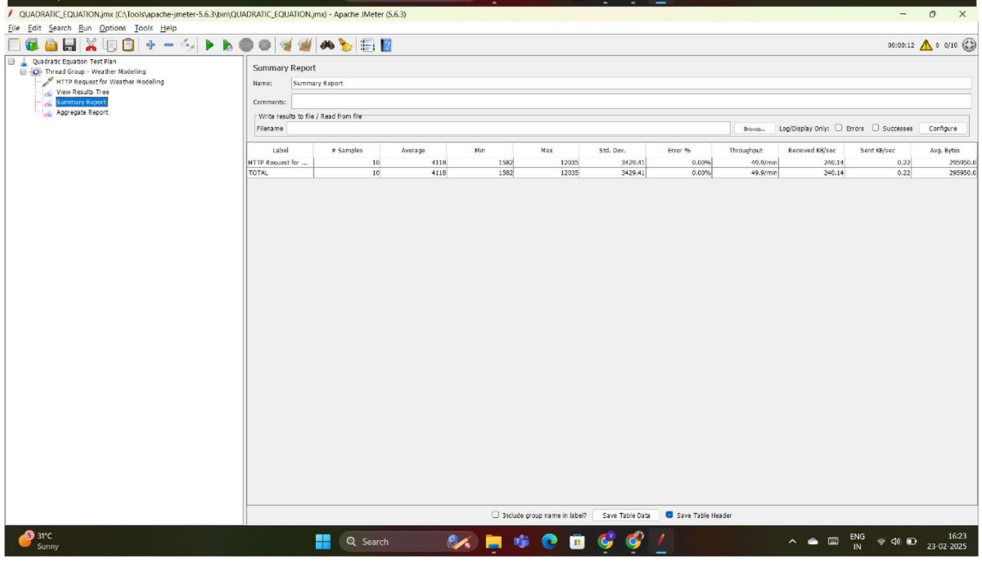
Quadratic Equation Test Plan
Thread Group - Weather Modelling
HTTP Request for Weather Modelling
View Results Tree
Summary Report
Aggregate Report
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse...
Log/Display Only:
Errors
Successes
Configure
Search:
Case sensitive
Regular exp.
Search
Reset
Text
Sampler result
HTTP Request for Weather Modell
Scroll automatically?
Raw
Parsed
31°C
Sunny
Search
ENG
IN
16:23
23-02-2025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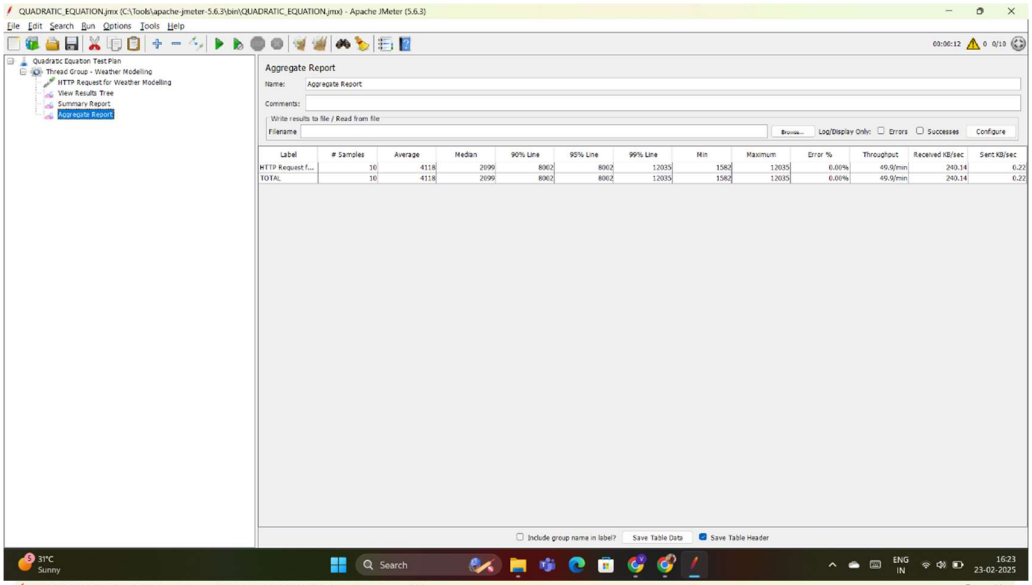
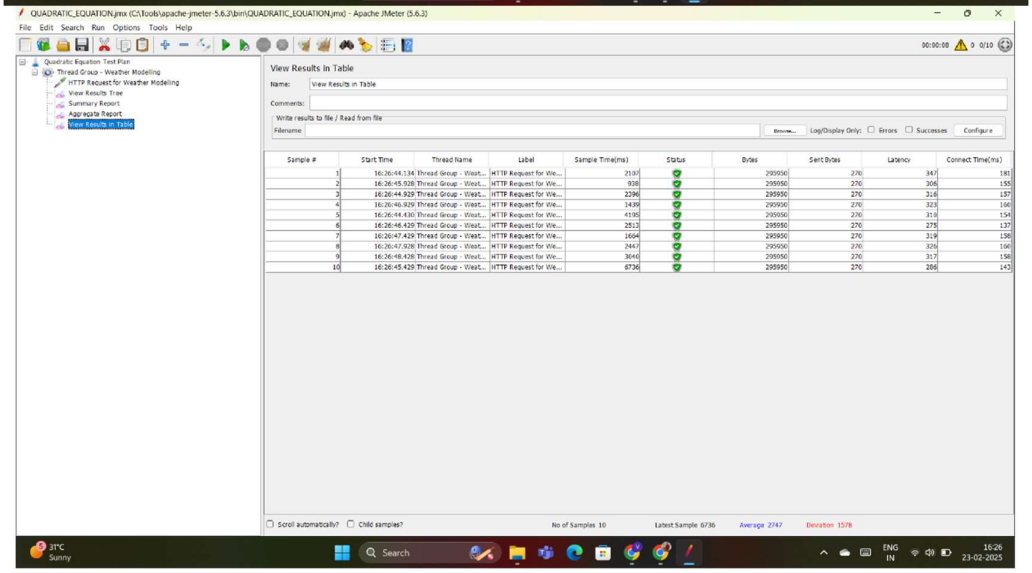
File Edit Search Run Options Tools Help
Quadratic Equation Test Plan
Thread Group - Weather Modelling
HTTP Request for Weather Modelling
View Results Tree
Summary Report
Aggregate Report
Summary Report
Name: Summary Report
Comments:
Write results to file / Read from file
Filename
Browse...
Log/Display Only:
Errors
Successes
Configure
Label
Samples
Average
Min
Max
Std. Dev.
Error %
Throughput
Received KB/sec
Sent KB/sec
Avg. Bytes
HTTP Request for ...
10
4118
1582
12035
3429.41
0.00%
49.6/min
240.14
0.22
295950.0
TOTAL
10
4118
1582
12035
3429.41
0.00%
49.6/min
240.14
0.22
295950.0
Include group name in label?
Save Table Data
Save Table Header
31°C
Sunny
Search
ENG
IN
16:23
23-02-2025





3. Performance Metrics

- **Response Time**: The time taken by the server to respond.
- **Throughput**: Number of requests handled per second.
- **Error Rate**: Percentage of failed requests.
- **CPU & Memory Usage**: Server resource utilization.

7.CONCLUSION

Performance testing using Apache JMeter provides valuable insights into web application scalability and

efficiency. By analysing response time, error rates, and throughput, we can optimize system performance and ensure smooth user experiences. Future enhancements include integrating JMeter with CI/CD pipelines for automated testing.