Paper Review: An Efficient Performance Testing of Web Services

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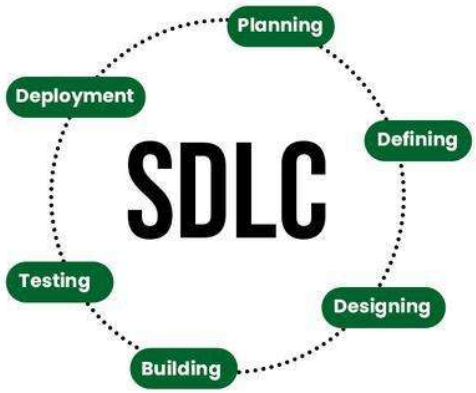
Overview

- This paper proposes an equation for assessing the strength of load testing approaches using data gathered from open-source testing software (Apache JMeter).
- The authors used 5 different Web Service data sets to evaluate their approach using this method.
- "We use these metrics to propose the APM metric for assessing the strength of our proposed load testing approach."

$$APM = 1 - (\frac{P_t}{RT_t} + \frac{TP_m}{n.f})x100$$

Introduction

- Performance engineering is an essential part of the software development lifecycle (SDLC).
- Performance problems for web applications commonly occur when users encounter high response times and latency rates when under significant load.

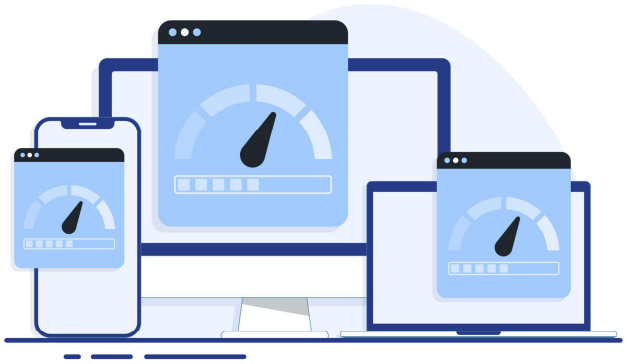


Apache JMeter

- Apache JMeter is an open-source software tool designed to test functional behavior and to measure the performance of web applications.
- In this paper, the authors use JMeter to gather test data that they will eventually use when calculating final APM scores.

Load Testing

- Load Testing is the method by which Apache JMeter evaluates web services and their performance.
- How well can the service handle aggressive increases in user count and transactions?



Before You Go

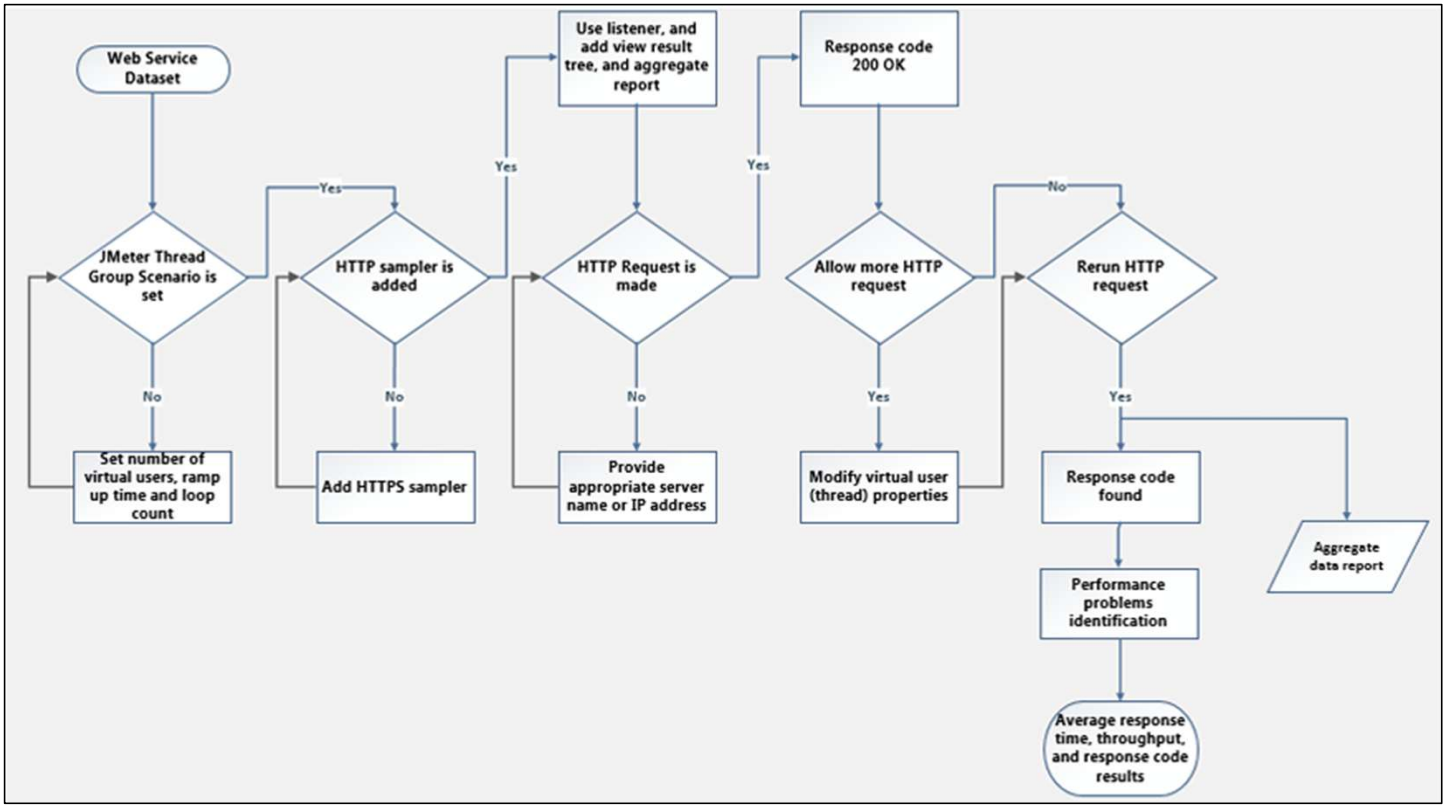
- An essential step in preparing for Load Testing using Apache JMeter, determine the hardware and software specifications that all tests will be run on.
- If hardware and software varies, performance evaluations will vary.
- The authors of the paper used this setup:

Hardware Environment	Software Environment
Processor: Intel (R) Core (TM) i7-2600 CPU @ 3.40 GHz	Windows 7 Enterprise
RAM: 8.00 GB	Service Pack 1
System Type: 64-bit operating system	Apache JMeter 5.0

Experimental Setup

Scenario No.	Scenario Statement
1	We have 1 user with a ramp up period time (1 second) and loop count 1.
2	We increase from 1 user to 10 users with a ramp up period (1 second) and loop count 5.
3	We increase from 10 users to 100 users with a ramp up period (1 second) and loop count 5.
4	We increase from users 100 to 200 users with a ramp up period (1 second) and loop count 5.
5	We increase users from 200 to 500 with a ramp up period (1 second) and loop count 5.
6	We increase users from 500 to 1000 with a ramp up period (1 second) and loop count 5.

JMeter Test Approach



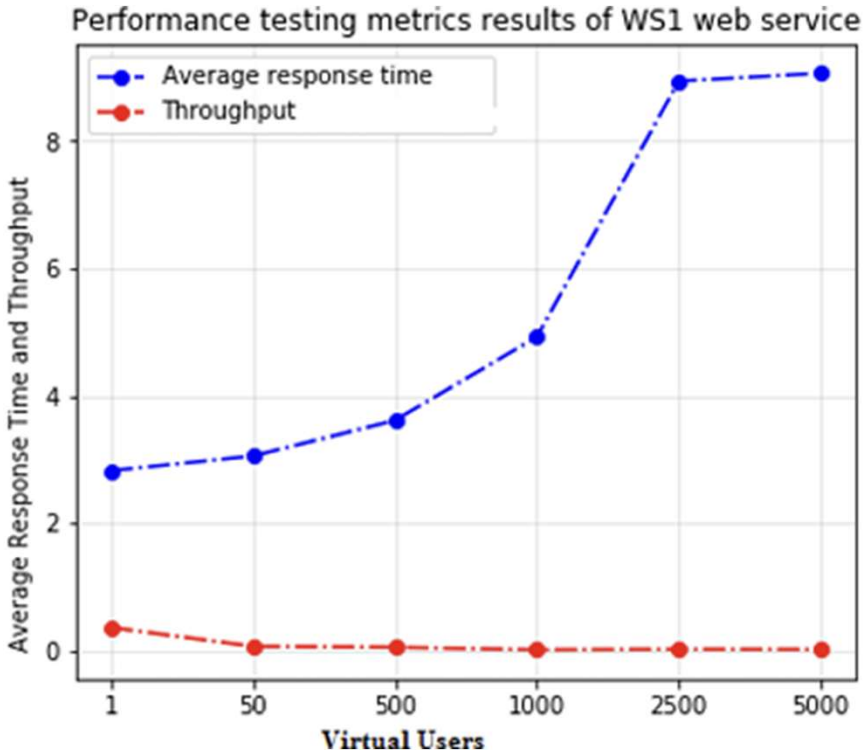
Test Results

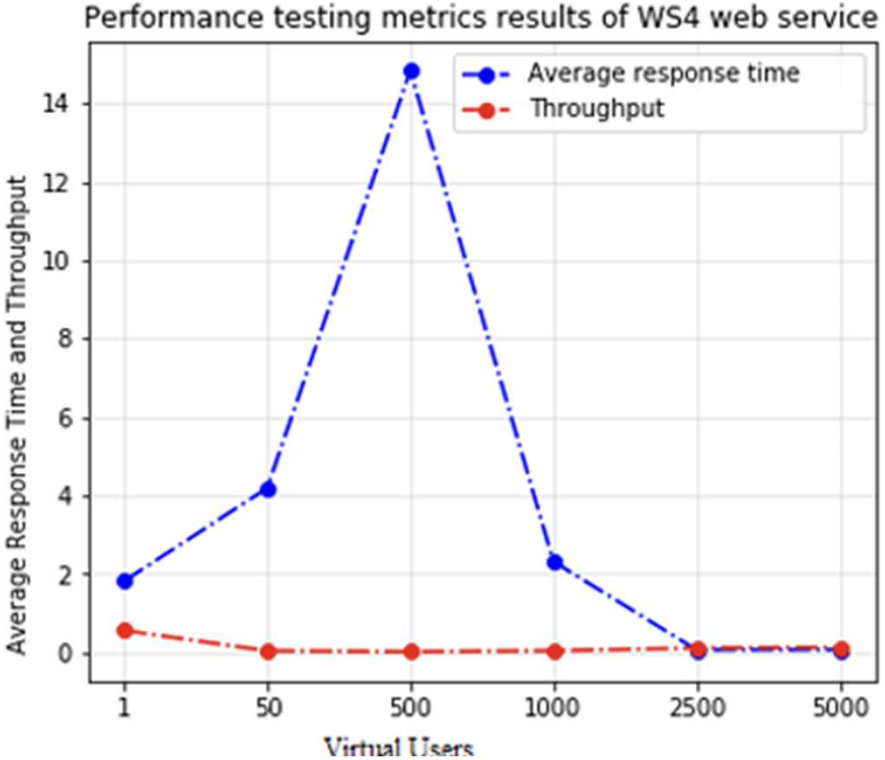
- The metrics that resulted from these tests included sample count, response time, error %, throughput, and received and sent data.
- Fault messages from JMeter were also recorded for later use in APM calculations.

LOAD TESTING RESULTS OF WS1 DATASET

Parameters	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Method	Get	Get	Get	Get	Get	Get
Virtual Users (Threads)	1	10	100	200	500	1000
Ramp up period (sec.)	1	1	1	1	1	1
Loop count	1	5	5	5	5	5
Avg. Response Time (ms.)	2819	3050	3609	4922	8943	9068
Total Throughput (Kb/sec)	0.3547	2.9054	21.7665	34.6392	29.4609	42.4053
Throughput per virtual user (Kb/sec)	0.3547	0.0581	0.0435	0.0346	0.0117	0.0084
Error %	100.00	100.00	100.00	100.00	100.00	100.00
Response Code	404	301, 404	301, 404	301, 404	301, 404, Non HTTP	301, 404, 502, Non HTTP

Test Results (cont.)





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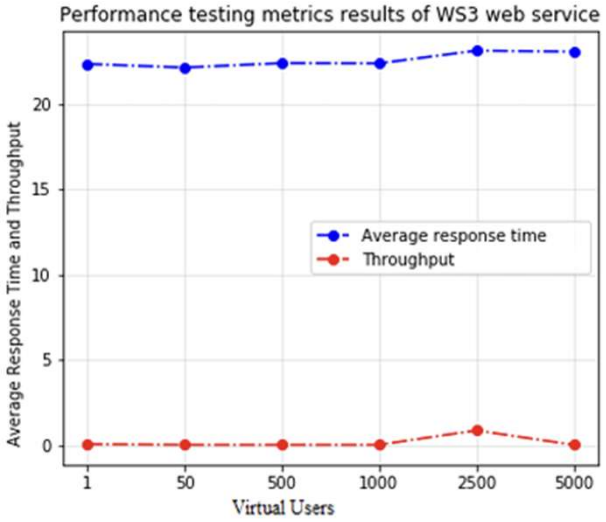

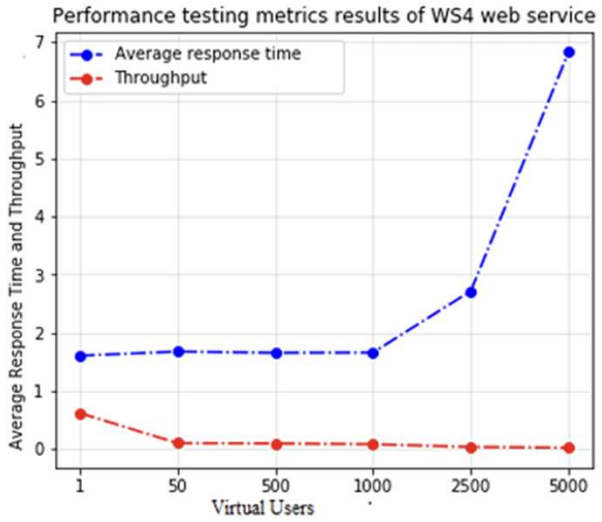

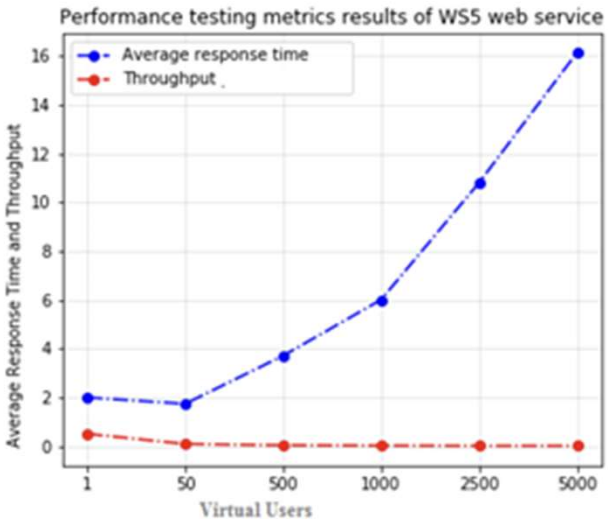

Calculating APM

$$APM = 1 - (\frac{P_t}{RT_t} + \frac{TP_m}{n.f})x100$$

- P_t – Sum of performance of each TP (throughput per user in Kb/sec)
- RT_t – Sum of response time of each TP (average response time in seconds)
- TP_m – Position of TP w/ max faults
- n – Number of TP's
- f – Sum of identified faults of each TP

Conclusions

- The authors concluded that the lower APM score for WS2 occurred due to the inconsistent changes in performance (P) which made the test plan less effective.
- The authors concluded that the APM calculations provided adequate insight into each web service and helped highlight performance faults as they presented themselves.

Dataset	APM value(%)
WS1	91.38
WS2	86.81
WS3	98.03
WS4	92.84
WS5	97.18

THANK YOU