

Web Service Performance Testing: Comparison between JMeter and SoapUI

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Abstract - Web service is a method of communication between two electronic devices over a network. It is a self-contained and self-describing application that can run universally across the Internet. Performance testing is an important activity in any web application testing plan. It is performed to determine if a system performs in terms of responsiveness and stability under a specific workload. It is to ensure that the application meets specified requirements under normal conditions. Therefore, different tools have been developed and designed to use in different types of web services. This paper will focus on comparison between two type of web service performance testing tools which is JMeter and SoapUI in terms of performance (load test) and throughput.

Keywords: performance testing, web service, load test, throughput, JMeter, SoapUI

I. INTRODUCTION

Web service is a method of communication between two electronic devices over a network. A web service provides a standard means of interoperating between different software applications, running on a variety of platforms and frameworks. It is a self-contained and self-describing application that can run universally across the Internet [1]. [2] It defines a web service as a software system used to support machine-to-machine interaction over a network. It has an interface described in a machine-processable format. It is also describes as a standardized way of integrating web-based application using Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description Discovery and Integration (UDDI) open standards over an Internet. XML is used to tag the data, SOAP is used to transfer the data, WSDL is used for describing the services available and UDDI is used for listing what services are available. Web service does not require the use of browser and HTML since it do not provide the user with GUI.

A good-performing application is the one that lets the end user carry out a given task without

undergo irritation of bad impression. Performance testing is usually performed at system testing level. Performance testing is the process of determining the speed or effectiveness of a computer, network, software program or device. It is an important activity in any web application testing plan. Ignoring performance test means that the system is not fully tested, especially in terms of risks and operational perspectives. Early identification of limitation helps to configure the system appropriately to avoid unexpected crashes. In performance testing, there are several indicators such as performance, throughput, availability and response time.

Performance also known as load can be measured in how many users are currently connected to it and how much stress a system is under. Examples include how much network bandwidth is being consumed by application traffic and the amount of memory used on a server when a thousand visitors are active. Load also can be defined as high load performance testing. Throughput is how much stuff the tool can handle in a given amount of time [3]. Throughput also can be defined as the rate at which application-oriented events occur. A good example would be the number of hits on a web page within a given period of time. Availability is the amount of time an application is available to the end user. The response time is the amount of time it takes for the application to respond to a user request [4].

By doing a performance testing on various type of software like web service, standalone, web application, mobile application and cloud application, tester need to know the suitable and correct approach so that the performance defects can be fixed and the test result is accurate. Thus, the suitable and right performance testing tool is important to achieve this target. Therefore, different tools have been developed and designed to use different types of web services. On this research, it will focus on a comparison between two different tools for testing web service using performance (load test) and throughput indicators. The tools which used are JMeter and SoapUI.

In this paper, there is a question that needs to be answered which is - "Which is the best tool for testing web service?"

There are some proposed processes to answer this research question such as:

- Testing each web service using different tools
- Analyzing the testing result

II. OVERVIEW OF PERFORMANCE TESTING TOOLS

There are many performance tools used to perform testing web service. Most tools are capable to do this either it is an open source tool or proprietary tool. This research will focus on two types of open source tools. The tools are JMeter and SoapUI.

A. JMeter

Based on [5] JMeter is a 100% pure java desktop. JMeter can load and perform on many different server types such as Web (HTTP, HTTPS), SOAP, Database via JDBC, LDAP, JMS, Mail (SMTP, POP3 and IMAP) and native commands or shell scripts. It can be used to simulate a heavy load on a server, network or object to test its strength or to analyze overall performance under different load types. It also has a simple GUI design to allow faster operation and more precise timings. Besides that, it is catching and offline analysis of test result.

B. SoapUI

SoapUI is a Java based open source tool. This tool is not only concentrates on the functionality but it is also considered performance, interoperability and regression testing [6]. It has a GUI design that is very easy and simple to use and it includes advanced features like creation and immediate execution of practical mechanization, security, regressions and load testing. SoapUI can work under any platform provided with Java Virtual Machine (JVM). This tool is usually used to test web service such as SOAP, REST, HTTP, JMS and other based services.

III. RELATED WORKS

Several researches have been conducted and below are the results.

Based on [7], both JMeter and SoapUI are powerful and have similar functionalities. JMeter is more useful because it allows for extendibility and testing of others besides web service. In other words, it can be concluded that both tools have their own strength and weaknesses in terms of web service testing.

[8] stated that different performing testing tools will give the different response time. Based on the experiment, the method of calculating metrics gathered by each tool, the language to develop the tools and the architecture of the tools are the main reason to the result. This research did not mention the tools used but it only described as Tool A, Tool B and Tool C.

The [9] was suggested to use SoapUI instead of other testing tools such as PushToTest and WebInject. This is because based on their experiment, the result of SoapUI is better than the other tools tested in terms of performance, reliability, security and throughput. In other words, the research proposed using SoapUI to test web service because of its good performance and high quality.

IV. TESTING AND RESULT

There are some web services that have been used in conducting this research such as currencyConvertor, country, weather and stockQuote web services. The different web services are used to find the performance (load test) and throughput between the different testing tools.

A different tool which is used to test web services is giving different results in terms of performance and throughput. In other words, some tools take some time than others to test web services. By doing the evaluation of the different testing tools, the performance and throughput of tools for each web service is calculated.

A. Performance Comparison

It is important to make the performance (loading test) in testing web service. Table 1 shows the result of performance of each tool for testing web service. The results showed that the SoapUI testing tool has better performance compared to JMeter. Figure 1 shows the average performance of each tool for selected web services.

TABLE 1: Performance (Load test) result

| Web service | Performance (Load Test) in (ms) | |
|--------------------|---------------------------------|--------|
| | JMeter | SoapUI |
| Weather | 1314 | 570 |
| Currency Convertor | 1119 | 676 |
| Stock Quote | 1153 | 792 |
| Country | 830 | 308.33 |
| Average | 1104 | 586.58 |

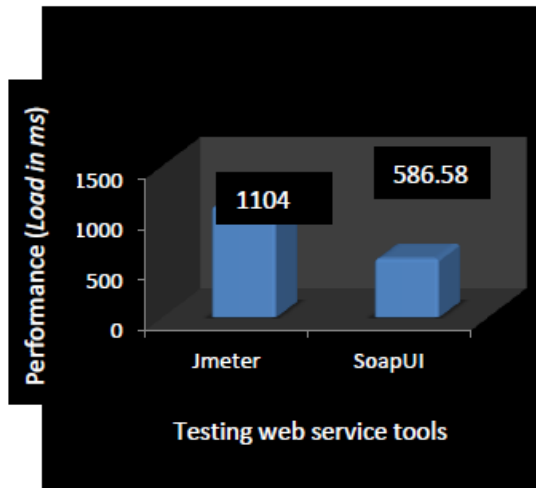


Figure 1: The average of Performance (Load test)

B. Throughput Comparison

Throughput is how much stuff the tool can handle in a given amount of time and also can be defined as the number of request per second. High performance is the high number of request with low load leads. Not all testing tools can support this testing. Table 2 shows the throughput of each tool for testing web service. Based on the result, SoapUI has better throughput than JMeter. This is because the average of SoapUI is higher than JMeter. Figure 2 shows the average performance of each tool for selected web services.

TABLE 2: Throughput result

| Web service | Throughput (sec) | |
|--------------------|------------------|--------|
| | JMeter | SoapUI |
| Weather | 1.7 | 0.64 |
| Currency Convertor | 1.5 | 1.18 |
| Stock Quote | 1.3 | 2.27 |
| Country | 1.2 | 2.32 |
| Average | 1.42 | 1.60 |

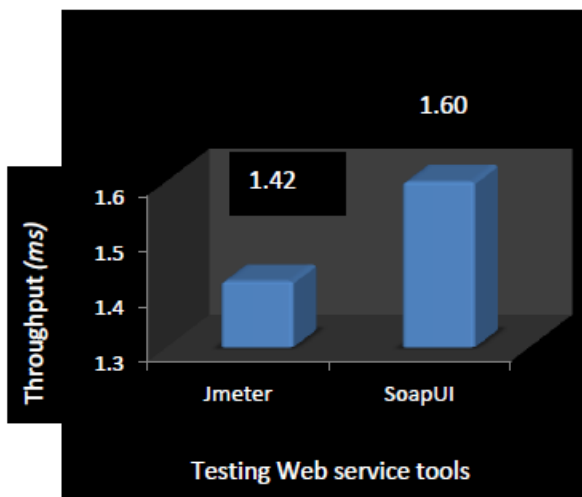


Figure 2: The average of throughput

V. CONCLUSION

The results have showed that different testing tools will lead to different results in terms of performance (load test) and throughput. The selected web services that used in this research are based on several known important quality such as performance, throughput, reliability, security, etc. Based on the evaluation, it showed that SoapUI is the best tool in testing web service compared to JMeter. In other words, it is recommended that SoapUI is the best tool because of its good performance and high quality test of web service. For future work, it is advisable if we can use more than two different testing tools and can test more function.

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