Comparative Analysis of Performance Testing Tools

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Abstract- In Software Engineering, testing a website/web application has become a basic necessity for proper working of the software. Testing can be performed manually as well as with the help of automation testing tools to meet functional and non-functional requirements. Performance testing is one of the non-functional testing in Software Engineering which is necessary to check the high scalability, speed and stability of the system and to discover the number of concurrent users that can access the application without a heavy degradation of the user experience, to find application's behavior under load, to check the time it takes to respond and understand if your website loads in a decent amount of time. The comparative analysis of testing tools is done to provide tester an easy selection of tool thereby saving the time in checking and installing each and every tool. Comparison is done based on installation process, complexity of usage, throughput generated of website, response time, report generation techniques, external library requirements, etc.

Keywords- Testing tools, Types of tools

I. INTRODUCTION

Software testing is the checking of software at different levels in order to ensure quality, correctness and completeness of developed software. It also involves checking of bugs in the software before being released to the end users. This paper focuses on performance testing and involves testing of websites on different tools by using the following parameters:

- 1. Ramp up period
- 2. Time interval of test
- 3. Total number of Virtual users (load)

Following are the terms that are important in context of testing:

A. Performance Testing

Performance Testing is a non functional testing technique used to provide quality assurance on the basis of parameters Involving speed, scalability, stability and reliability of software under different kinds of workloads [13].

B. Performance Testing Automated tools

Following are the Performance Testing tools and their description used in this research.

1) Apache Jmeter

JMeter is an open source software based on java specially designed to perform load testing on websites [15]. JMeter is well known for its extensive and robust reporting in different report formats. JMeter achieves this with the help of listeners.

2) Pylot

Pylot is an open source performance testing tool designed to do scalability of web services. Execution and monitoring of test suites is done in GUI or console mode. It runs HTTP load tests.generates concurrent load, verifies server responses and produces reports [19].

3) Blazemeter

BlazeMeter is a cloud based performance testing tool for websites. It provides Software as a Service (SaaS) service on license basis. BlazeMeter can be extended with a series of custom plug-ins such as a free plugin for JMeter, Drupal module and Jenkins CI plugin to perform load testing [17].

4) WAPT Pro

WAPT Pro is a licensed load and stress testing tool for websites that lets you easily analyze the performance of your website. A trial version is available to be used for 30 days [16].

5) LoadStorm

LoadStorm is a load testing tool based on cloud based service (SaaS) for websites. It provides extensive drill down reporting by server, by page, by script, or by type of request for every performance metric which facilitates finding the problem areas of your site. It lets you manage the performance of your entire online cloud infrastructure and produce real-time graphs based on the results [18].

2. COMPARATIVE ANALYSIS

In order to compare the performance testing tools, the research includes testing the following websites through the above mentioned tools.

S.No.	Name of Websites	S. No.	Name of Websites
1	www.ietdavv.edu	16	www.acropolis.in
2	www.iima.ac.in	17	www.svitindore
3	www.iimcal.ac.in	18	www.piemr.edu.in
4	www.iimraipur.ac.in	19	www.dauniv.ac.in
5	www.iimb.ernet.in	20	www.inctindore
6	www.iimk.ac.in	21	www.cdgi.edu.in
7	www.iimidr.ac.in	22	www.iitbbs.ac.in
8	www.iimshillong.ac.in	23	www.iitg.ernet.in
9	www.iimrohtak.ac.in	24	www.iitj.ac.in
10	www.iimranchi.ac.in	25	www.iitkgp.ac.in
11	www.iitb.ac.in	26	www.iitr.ernet.in
12	www.iitk.ac.in	27	www.iimahd.ernet.in
13	www.iitm.ac.in	28	www.iitd.ac.in
14	www.iiti.ac.in	29	www.iimahd.ernet.in
15	www.sgsits.ac.in	30	www.medicaps- institute.ac.in

Table 1: List of Websites for testing.

The research is basically about testing the websites on different tools and analyzing the corresponding report obtained.

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3. IMPLEMENTATION & WORKING

1. JMeter:

- Following are the steps to run JMeter:
- a) Name the test plan.
- b) Create new thread.
- c) Specify no. of users, rampup and loop count.
- d) Add Sampler involving HTTP request.
- e) Specify the url and HTTP client type in the interface.
- f) Result: Add listener and then select report type.
- g) Run the test.

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Redo	Post Processors > Name: Value	
Open	Assertions >	
Merge	Listener	
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Save Node As Image Ctrl-G		
Save Screen As Image Ctrl+Shift-G		
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	Run Thread Groups consecutively (i.e. run groups one at a time)	
	Run tearDown Thread Groups after shutdown of main threads	
	Eunctional Test Mode (i.e. save Response Data and Sampler Data)	
	Selecting Europany Test Mode may adversely affect performance	
	Serecurity i ancuora rest mode may aversely aneu performance.	
	Add directory or jar to classpath Browse Delete Clear	
	Library	
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Figure 3: JMeter HTTP Request

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				SOAP/XML-RPC Request				
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Figure 4: JMeter Response Time Graph

1.1 Jmeter Report :

On Analysing the report generated through JMeter, the result was that it generates report through a variety of listeners. Although average response time can't be generated directly but it gives the graph of response time.

S.	Name of Websites	Throughput(KB/s)	Errorpercentage
No.			
1	www.acropolis.in	68.7	0
2	www.dauniv.ac.in	16.1	40
3	www.ietdavv.edu.in	7.3	2
4	www.piemr.edu.in	161.5	0
5	www.medicaps-institute.ac.in	32.9	0

Table 2:Result of some websites tested by JMeter



Figure 5: Graph showing result of JMeter

2 .Pylot:

First install python and wxpython in order to use Pylot.

- Following are the steps to run Pylot:
 - a). Open command Prompt
 - b) Command: cd Pylot 1.26
 - c) Command: python run.py -g
 - d) In GUI, enter the parameters
 - e) Run test

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Edit Search Run Options Help	🗘 Pylot - Web Pe	erformance	Version 1.26			>	<
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<pre>solf.refresh() File "Ci\Users\hp\Downloads\pylot_i.26\ui\gui\wx_gui.py", line di9, in refresh</pre> Ces	Agent Monitor						
<pre>self.error_list.AppendText('%s\n' % self.error_queue.pop(0))</pre>	Agent Num	Status	Requests	Last Resp Time	Avg Resp Time	Bytes Received	
<pre>File "C:\Python27\lib\site-packages\wx-3.0-msw\wx_core.py", line 13101, in Ap pendText</pre>	1	running	1301	0.000	0.000	0	-
return _coretextEntryBase_Appendtext("args, "*kwargs) PyAssertionproor: Eak assertion "m count == =11 m count == =?" failed at	2	running	1526	0.000	0.000	0	
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Figure 6: Interface pf Pylot

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Workload Model				
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rampup (secs) 60				
interval (millisecs) 5				
Results Summary				
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Response Time (secs) Throughput (reg/sec)				
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90th % 6,520 90th % 3				
99th 8 8.700 99th 8 4				
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Figure 7: Result of Pylot

2.1. Pylot Report:

Pylot directly gives average response time and throughput. But if we want graph of response time and throughput we need to use matplotlib or numpy .

S.	Name of Websites	Response time (in ms)	Throughput (in KB/s)	Number of Errors
No.				
1	www.sgsits.ac.in	3.83	1.438	0
2	www.dauniv.ac.in		92.16	7748
3	www.cdgi.edu.in		96.094	7331
4	www.lnct.ac.in		89.875	7771
5	www.svitindore		88.50	7774
6	www.medicaps-institute.ac.in		92.60	7694

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7	www.piemr.edu.in	 91.077	7066
8	www.acropolis.in	 101.696	8350
9	www.ietdavv.edu.in	 95.917	7745

Table 3: Result of websites tested by Pylot



Figure8: Graph showing result of Pylot

3. WAPT Pro:

Following are the steps to run WAPT Pro:

- a) Create new test.
- b) Select rampup and then specify the required parameters.
- c) Record the test by entering the url.
- d) Verify test.
- e) Run test.

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Figure 9: WAPT Pro Interface

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Untitled - WAPT Pro 4.3 Unregistered version will expire in 11 days, 2 hours (2 Load Agents Available)



Figure 10: WAPT Recording



Figure 11: Report of WAPT

3.1 WAPT Report:

WAPT gives detailed report with many types of errors, bytes per second, CPU utilization, etc. It does not directly gives the throughput. The HTML report generated by WAPT Pro does not contain any graph but it can be viewed in the software itself.

S.No.	Name of Websites	Avg Response time(in second)
1	www.piemr.edu.in	1.68
2	www.dauniv.ac.in	1.40
3	www.ietdavv.edu	0.43
4	www.acropolis.in	2.48
5	www.lnctindore.com	0.98
6	www.medicaps-institute.ac.in	0.96
7	www.sdbc.ac.in	0.56

Table 4: Websites tested by WAPT Pro



Figure 12: Graph showing Results of WAPT Pro

4. Blazemeter:

Following are the steps to run BlazeMeter:

a) Login to blazemeter site

b) Create test, enter project name, and test name and required parameters.

c) Run the test.

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		ietdavv	www.ietdavv.edu,in	GET 🔻		×	Sandbox Mode - free low-scale test for debugging purposes			
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	New	v Relic Insights				h-	Rampup (sec)			
	Dyn	aTrace APM				h-	V Iterations			
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Figure 13: Test Plan of BlazeMeter

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DESCRIPTIVE SUMMARY / COI	NCLUSIONS				
Average Throughput 2.9 Hits/s	Avg. Response Time 843 Milliseconds	90% Resp 845 Milliseco	ponse Time ands	© Error Rate O %	
TOP 5 SLOW RESPONSES					6
Request iet davv	% of executions	Avg Time 843.451 ms	90% Time 845 ms	Max Time 5330 ms	

Figure 14: Report of BlazeMeter

4.1. BlazeMeter Report

BlazeMeter gives efficient reports containing Response time (ms), Throughput (hits/sec) and errors along with graphical analysis. The report can be downloaded in pdf format.

S.	Name of Websites	Response time (in ms)	Throughput (in hits/sec)	Number of Errors
No.				
1	www.sgsits.ac.in	304	3.5	0
2	www.dauniv.ac.in	926	2.7	403
3	www.ietdavv.edu	843	2.9	0
4	www.lnct.ac.in	1432	2.5	317
5	www.acropolis.in	11102	0.7	0
6	www.prestige.ac.in	3274	1.6	0
7	www.svitindore	662	1359	0
8	www.medicaps	2431	1.8	0
9	www.sdbc.ac.in	1359	2.4	0

Table 5:Result of websites tested by BlazeMeter





5. LoadStorm

Following are the steps to run LoadStorm

- a) Login to LoadStorm
- b) Go to run and give the requires parameters
- c) Go to Analyse and specify the url.
- d) Run the test plan.

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Figure 16: Test Plan of LoadStorm

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Figure 17: Report of LoadStorm

5.1. LoadStorm Report

LoadStorm provides extensive reporting including Response time (ms), Throughput (hits/sec), errors along with graphical analysis. It also provides detailed analysis of each parameter specially error analysis. The report can be generated in pdf and csv file format.

S.	Name of Websites	Response time(in ms)	Throughput (KB/s)	Number of Errors
N0.				
1	www.sgsits.ac.in	92	367.42	120
2	www.dauniv.ac.in	2061	167.89	94
3	www.cdgi.edu.in	4649	131.06	171
4	www.lnct.ac.in	3369	331.9	0
5	www.svitindore	2319	127.75	592
6	www.medicaps	5086	210.5	683
7	www.acropolis.in	250	648.45	59
8	www.piemr.edu.in	655	764.74	75
9	www.ietdavv.edu	1260	460.42	124
10	www.acropolis.in	250	648.45	659

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11	www.iima.ac.in	431	1048	44
12	www.iimcal.ac.in	351	458.27	4323
13	www.iimraipur.ac.in	696	104.43	378
14	www.iimb.ernet.in	91	1492	544
15	www.iimk.ac.in	946	202.54	0

Table 6:Result of websites tested by LoadStorm



Figure 18: Graph showing Results of LoadStorm

4. COMPARATIVE ANALYSIS:

PARAMETERS	Jmeter	Pylot	BlazeMeter	WAPT Pro	Load Storm
Availability	Open source	Open source	Licensed	Licensed	Licensed
Туре	Desktop	Through command prompt	Cloud	Desktop	Cloud
External support for	Not necessary but	Requires external libraries for	Not required	Not required	Not required
report generation and	can be added	graphical view of report			
GUI					
External libraries or	SMTP support,	Wxpython,matplotlib/numpy	Supported	Not allowed	Not allowed
plugins	Merge result,				
	Percentile graph				
	etc.				
Report generation	Result tree,	Result table and graph as HTML	Result table	Result table and	Result table
	response time	page.	and graph	graph	and graph
	graph, result table				

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Report Format	Csv file, jmx	HTML page	Pdf file, wpr	HTML page	Csv as well
	file,etc.		file, etc		as pdf file.
Response time	Satisfied	Failure if less time given for test	Satisfied	Failure if time	Satisfied
				period is less i.e	
				less than 10 min	
Response time graph	Generated	Requires matplotlib or numpy	generated	generated	generated
Errors	Generated	Many if less time given for test	generated	generated	generated
Throughput	Per min	Per sec	Per ms	Not directly	Per sec
				generated	
Graph of Throughput	Generated	Many if less time given for test	generated	generated	generated

Table 7: Comparison Table

5. CONCLUSION

Automation Testing is one of the most important technique which provides quick evaluation of tests and their result analysis. Open Source Automation Testing tools are also becoming popular and competitive with the licensed testing tools. Here in this paper after evaluating the five most popular Performance Testing Tools namely Jmeter, Pylot, BlazeMeter, WAPT and LoadStorm we conclude that:

JMeter scores best among open source performance testing tools with user friendly interface, extensive report generation, and graphical analysis as well as enriching its features through extension of external libraries. JMeter gives good competition to licensed performance testing tools.

Pylot, however provides throughput and response time but fails to provide proper report if time period is as compared to number of virtual users. To get graphical report we require the use of external library support i.e. matplotlib or numpy.

BlazeMeter is a licensed tool which provides free trial which includes 10 tests involving 50 concurrent users on one load generator. It provides extensive report generation along with graphical analysis of throughput and response time.

WAPT Pro is also a licensed tool which provides 30 day free trial. It provides tabular report in the form of HTML page. Graphical analysis is also be done as wpr file. The report provides extensive error analysis along with generation of response time. However it doesn't directly give throughput.

LoadStorm also a licensed tool which provides free usage till we use limited number of virtual users. For Virtual Users greater than 5000, we need to use paid version. LoadStorm provides best user friendliness, easy to run procedure and effective analysis of result. It enables best reporting which involves summary report, response time and throughput report, detailed error description, pages details, transaction details, etc. The detailed report can be downloaded in csv as well as pdf file. It retains the results of previous undergone tests.

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