

Comparative Analysis of Performance Testing Tools

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Available online at: www.ijcseonline.org

Accepted: 10/May/2018, Published: 30/Jun/2018

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.

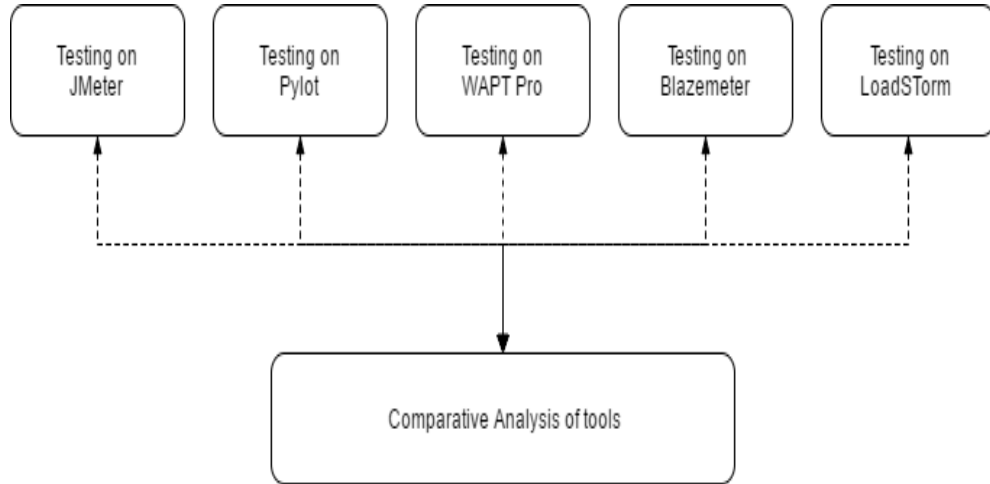


Figure 1: Comparative Analysis

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.

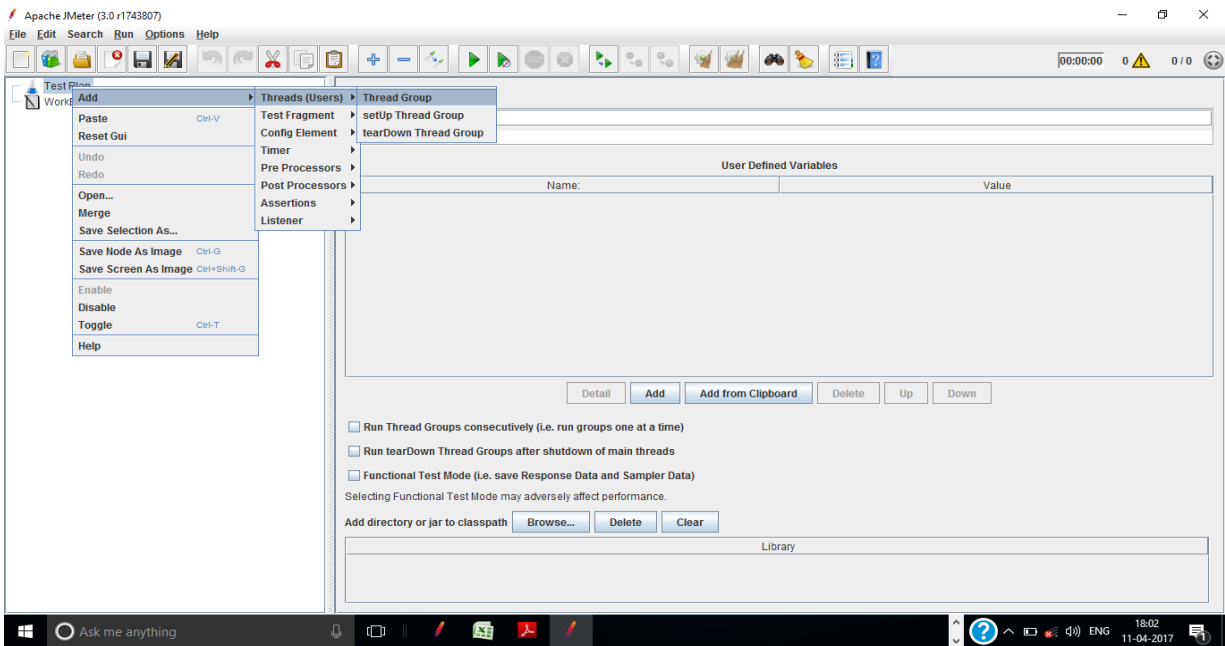


Figure 2: JMeter Thread Creation

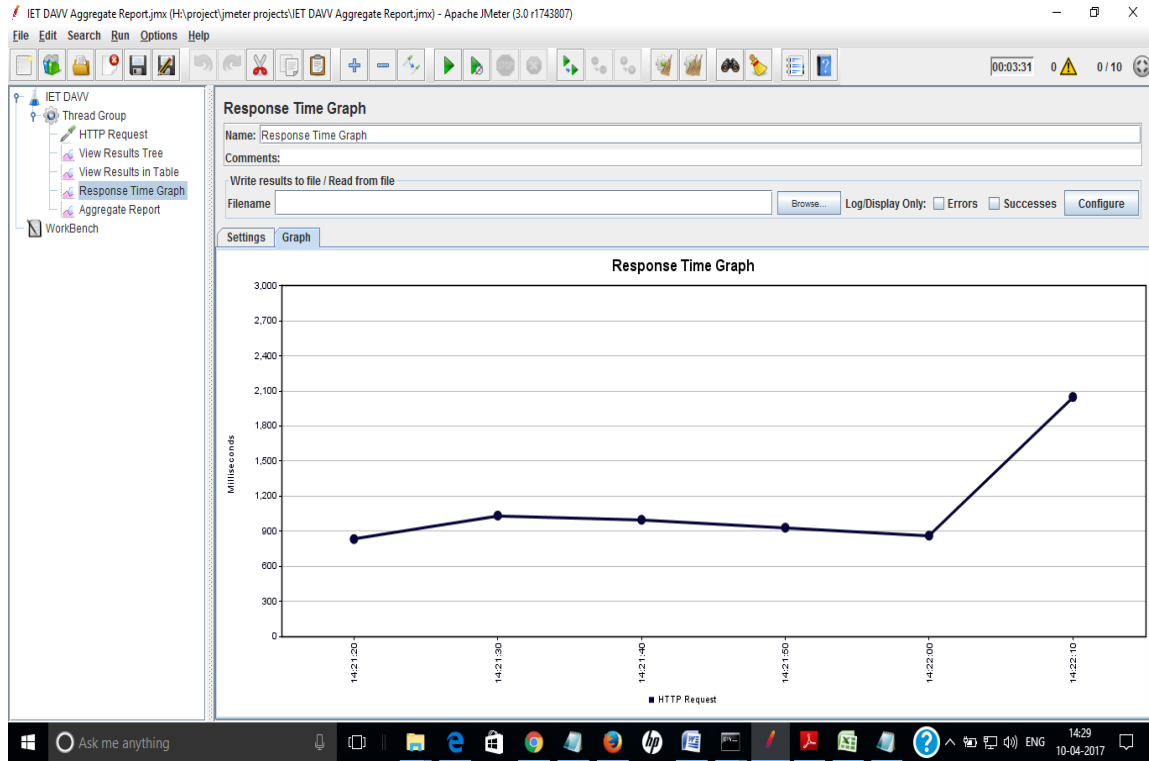


Figure 3: JMeter HTTP Request

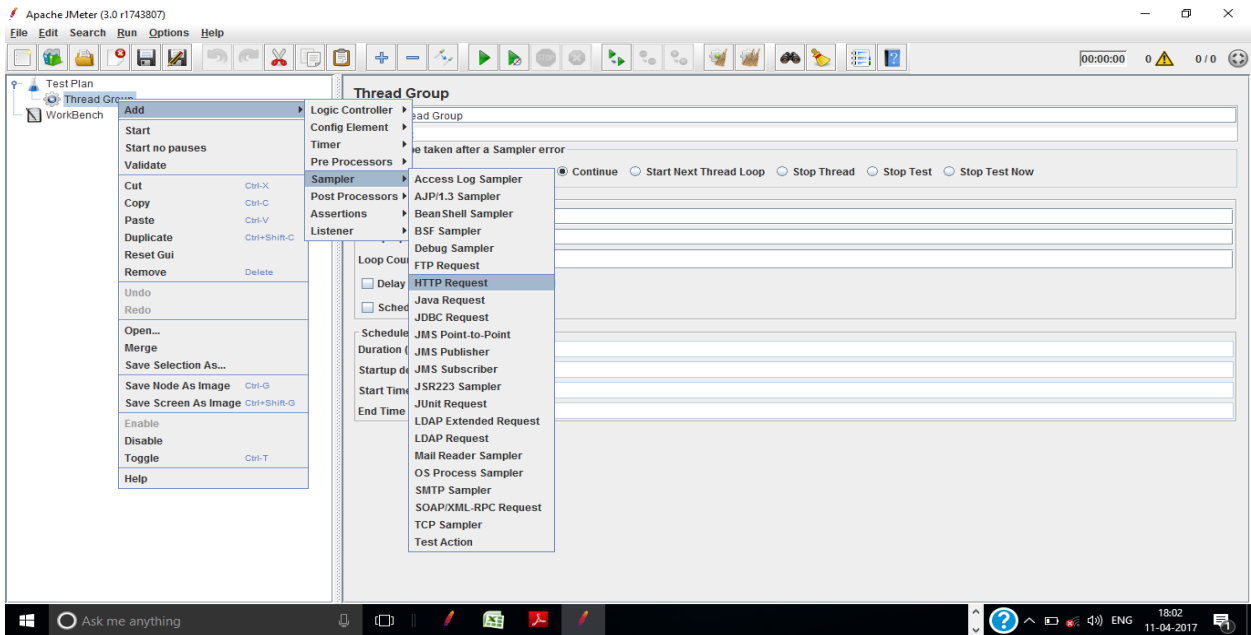


Figure 4: JMeter Response Time Graph

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. No.	Name of Websites	Throughput(KB/s)	Errorpercentage
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

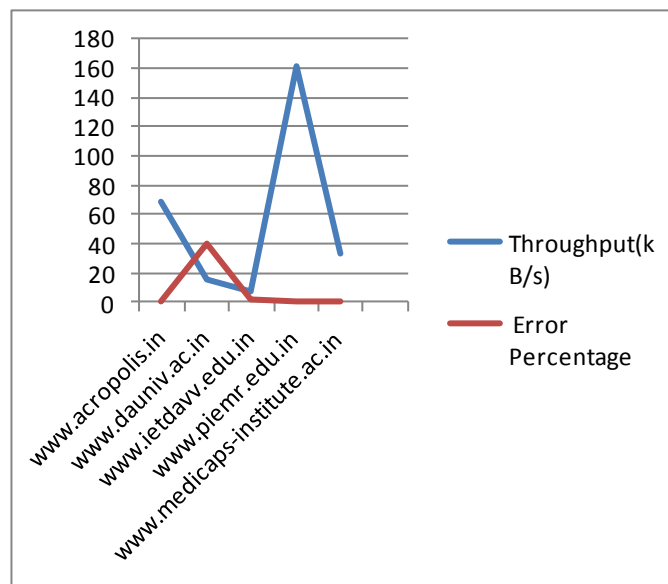


Figure 5: Graph showing result of JMeter

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

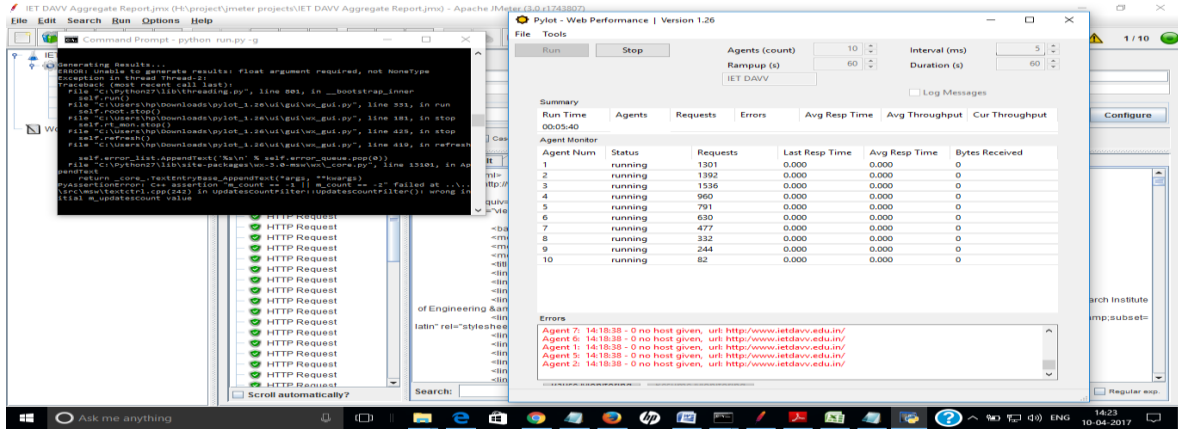


Figure 6: Interface of Pylot

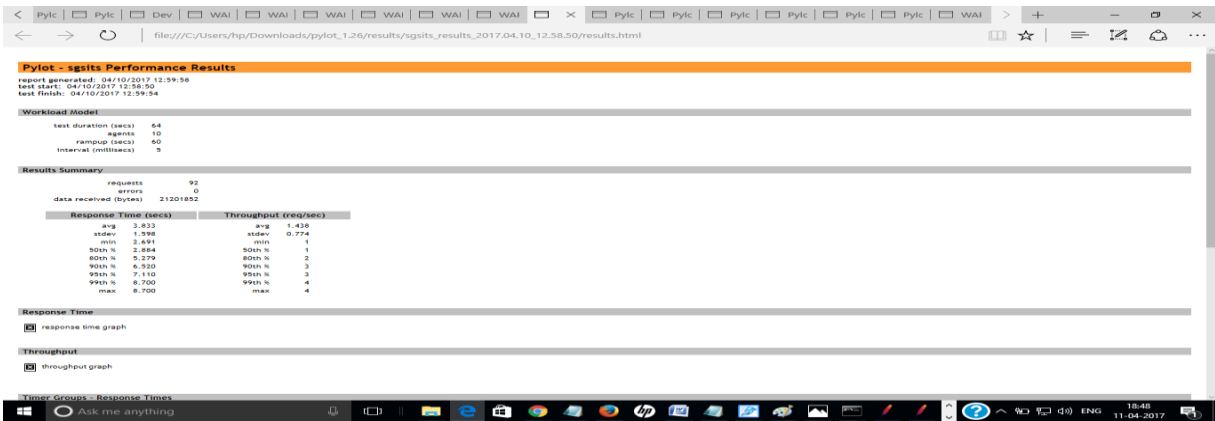


Figure 7: Result of Pylot

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. No.	Name of Websites	Response time (in ms)	Throughput (in KB/s)	Number of Errors
1	www.sgsts.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

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

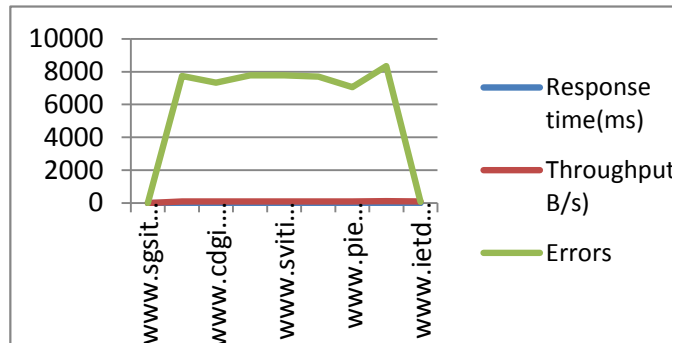


Figure8: Graph showing result of Pylot

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.

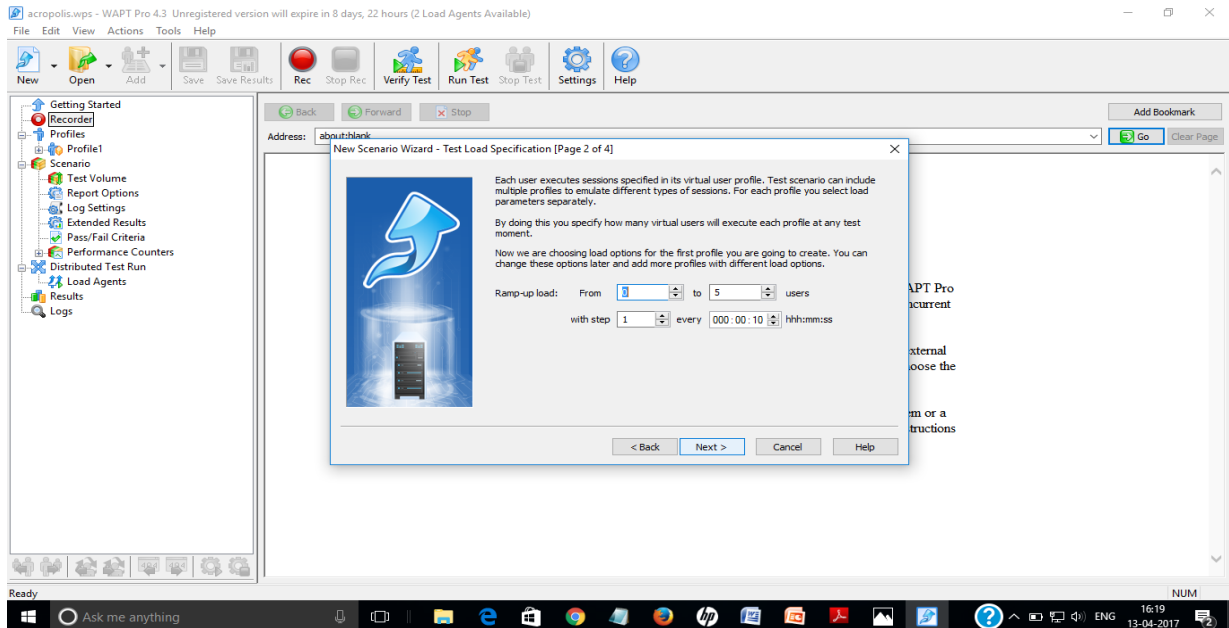


Figure 9: WAPT Pro Interface



Figure 10: WAPT Recording

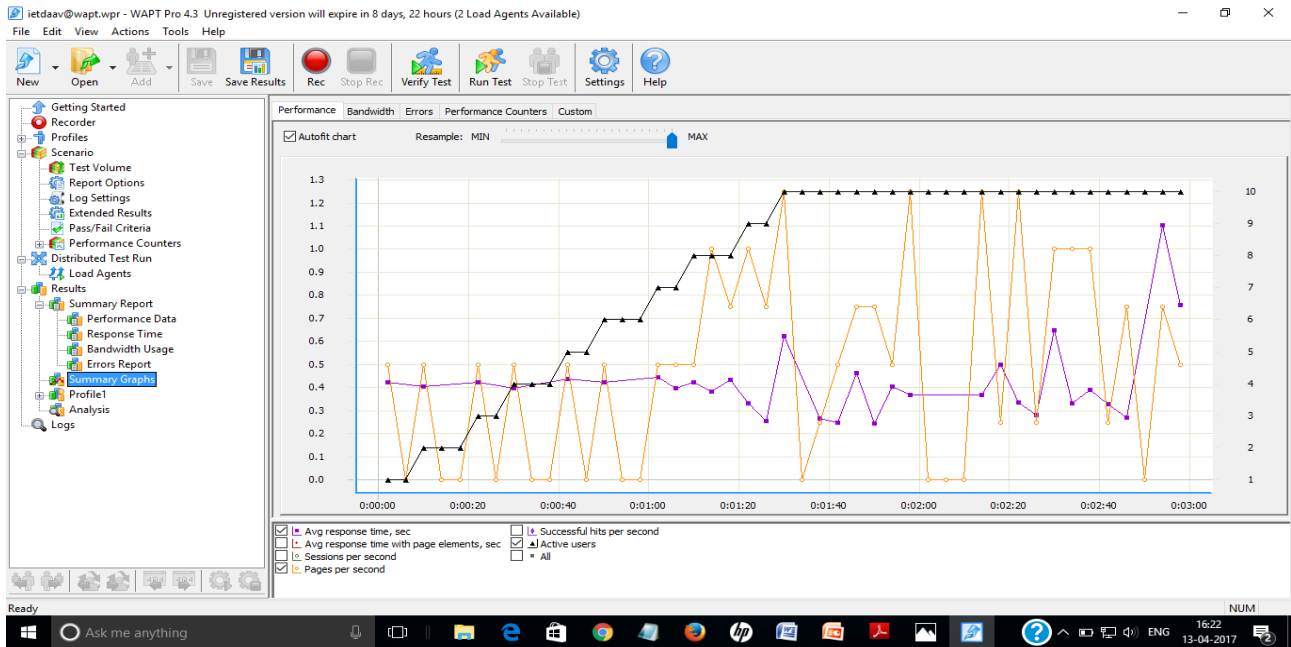


Figure 11: Report of WAPT

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

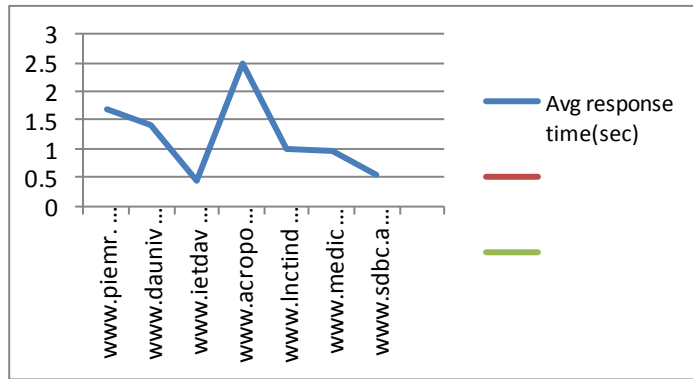


Figure 12: Graph showing Results of WAPT Pro

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.

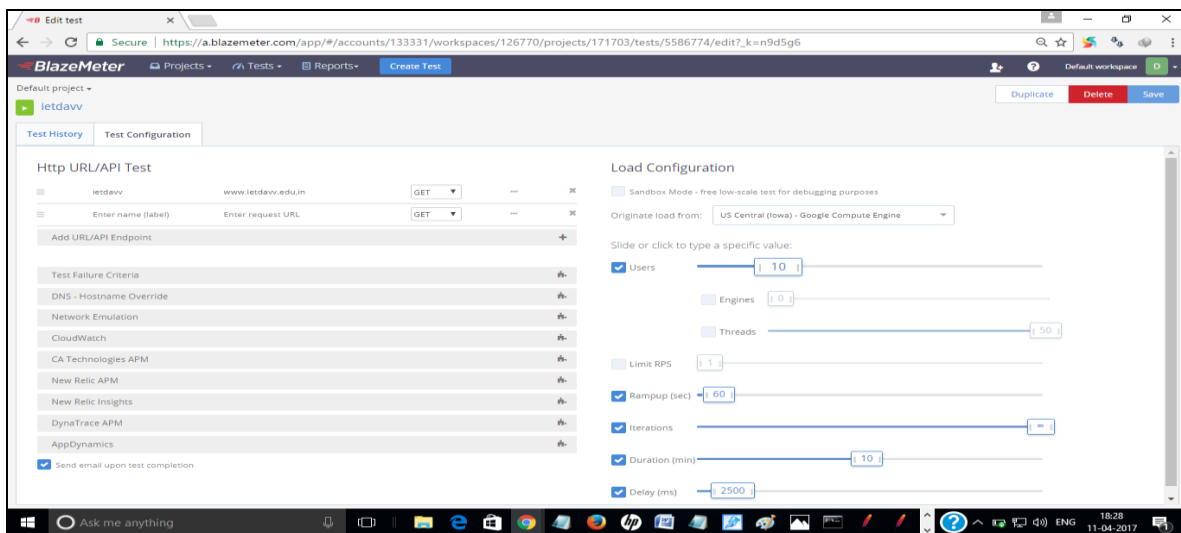


Figure 13: Test Plan of Blazemeter

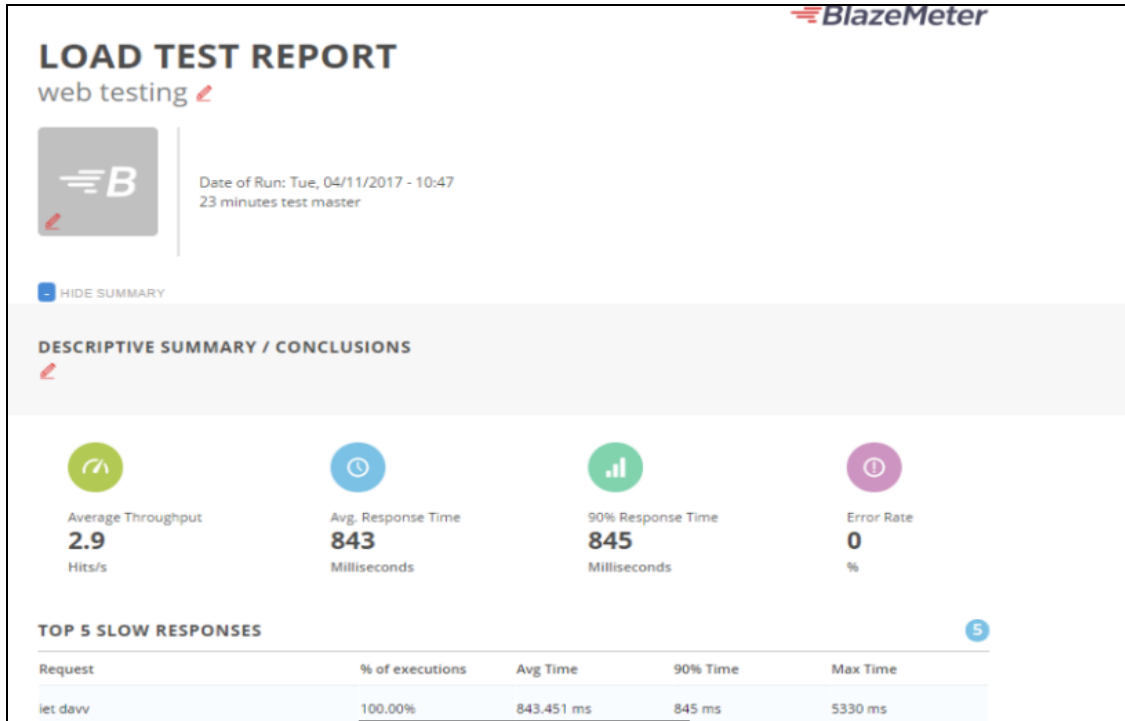


Figure 14: Report of BlazeMeter

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. No.	Name of Websites	Response time (in ms)	Throughput (in hits/sec)	Number of Errors
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

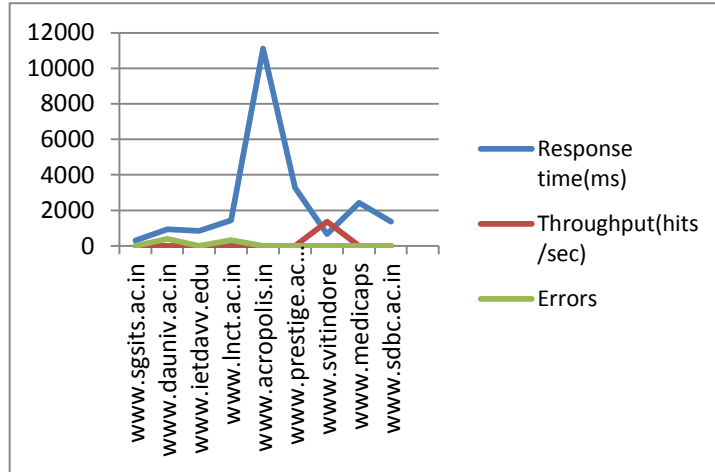


Figure 15: Graph showing Result of BlazeMeter

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.

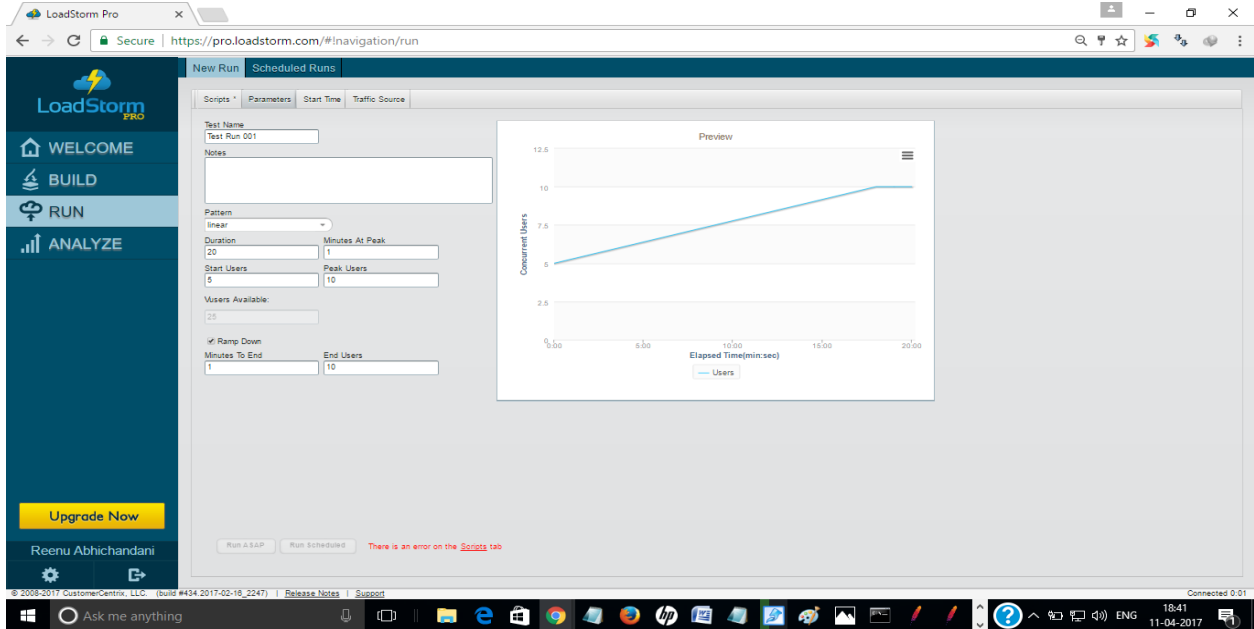


Figure 16: Test Plan of LoadStorm

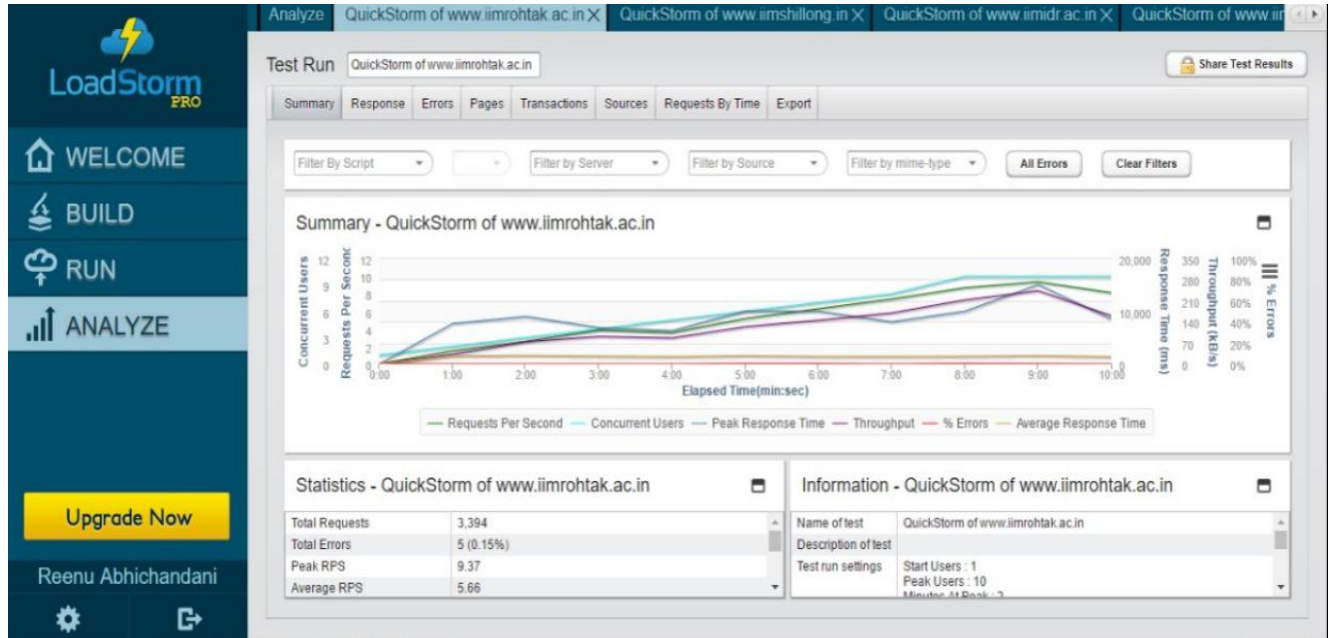


Figure 17: Report of LoadStorm

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. No.	Name of Websites	Response time(in ms)	Throughput (KB/s)	Number of Errors
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

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

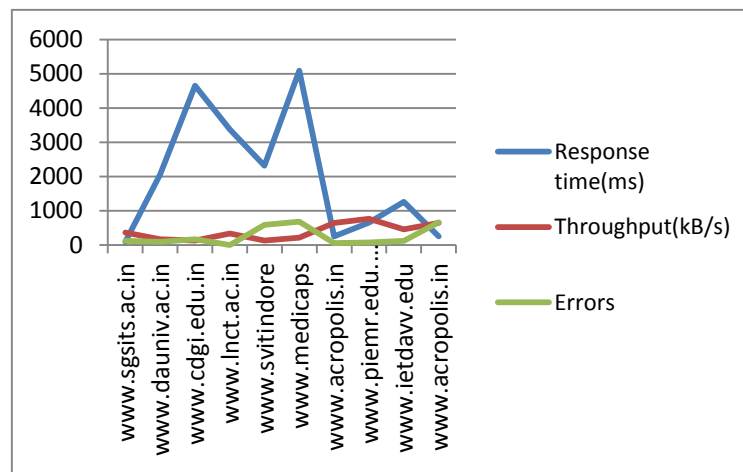


Figure 18: Graph showing Results of LoadStorm

4. COMPARATIVE ANALYSIS:

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

Report Format	Csv file, jmx file,etc.	HTML page	Pdf file, wpr file, etc	HTML page	Csv as well as pdf file.
Response time	Satisfied	Failure if less time given for test	Satisfied	Failure if time period is less i.e less than 10 min	Satisfied
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 generated	Per sec
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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