Enhacement of JMeter

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Our Guides

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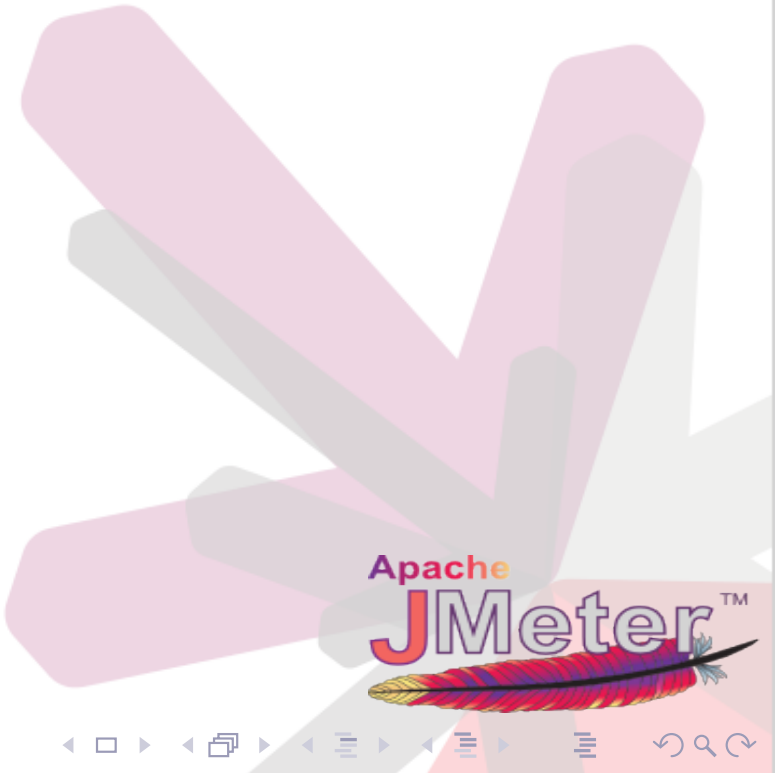
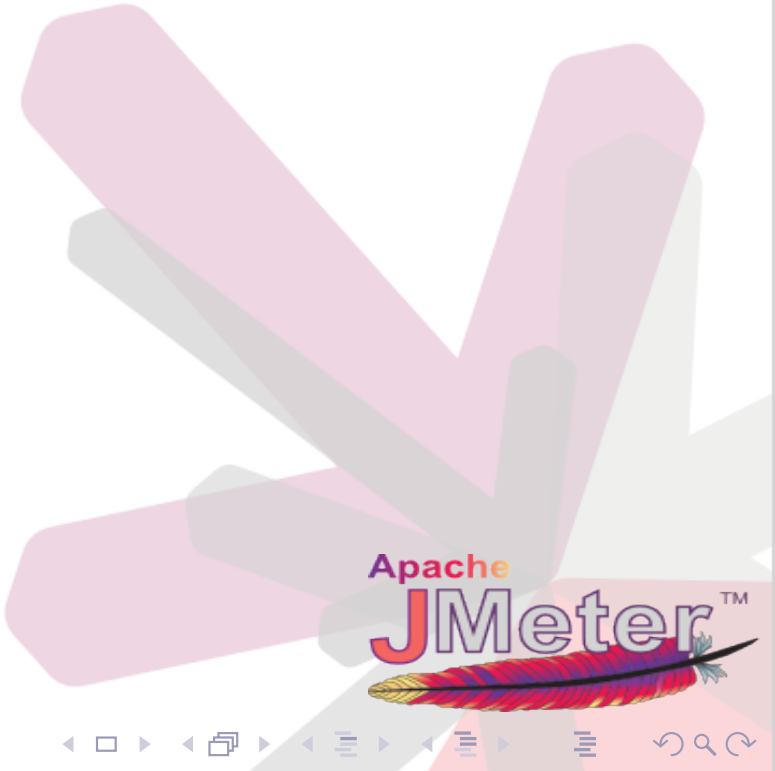
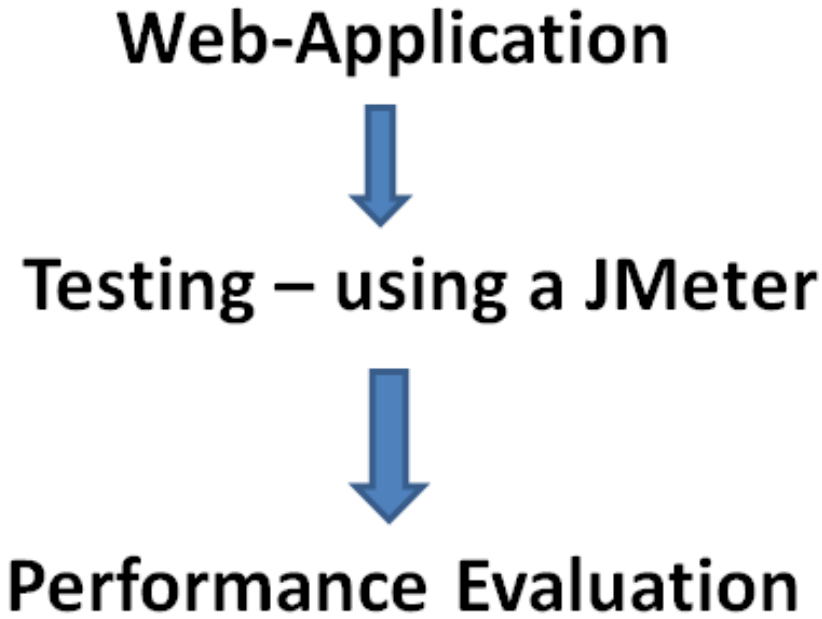


INTRODUCTION



Why do we use JMeter?

Considering a typical web-application, we could have 1000s of users trying to access it concurrently. We may not choose to employee 1000 testers for every such user for performance evaluation of the application.



More on Testing

Testing Parameters:

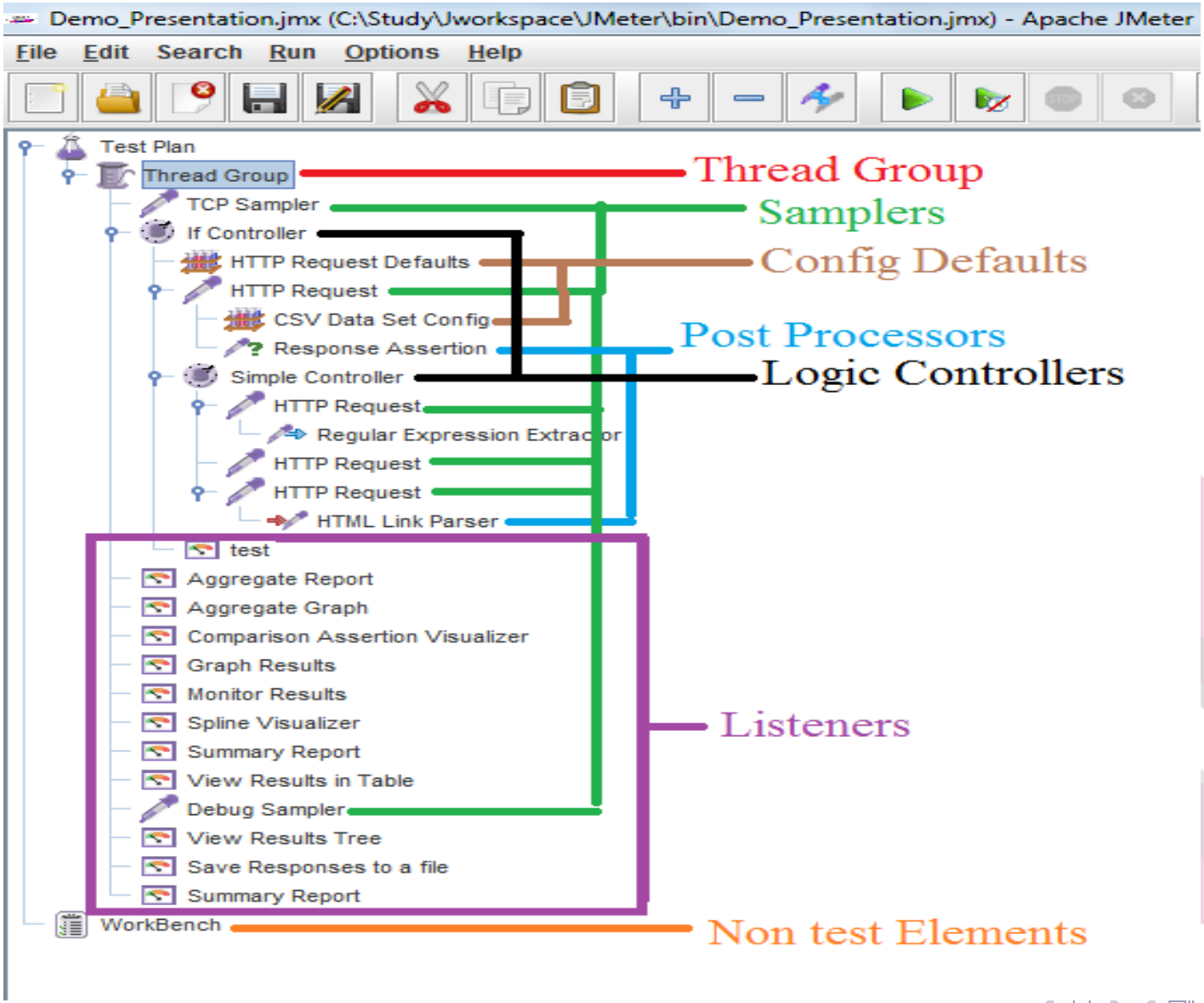
- User
- Data
- Time

Performance testing Comprises of:

1. Load Testing
2. Stress Testing
3. Scalability Testing

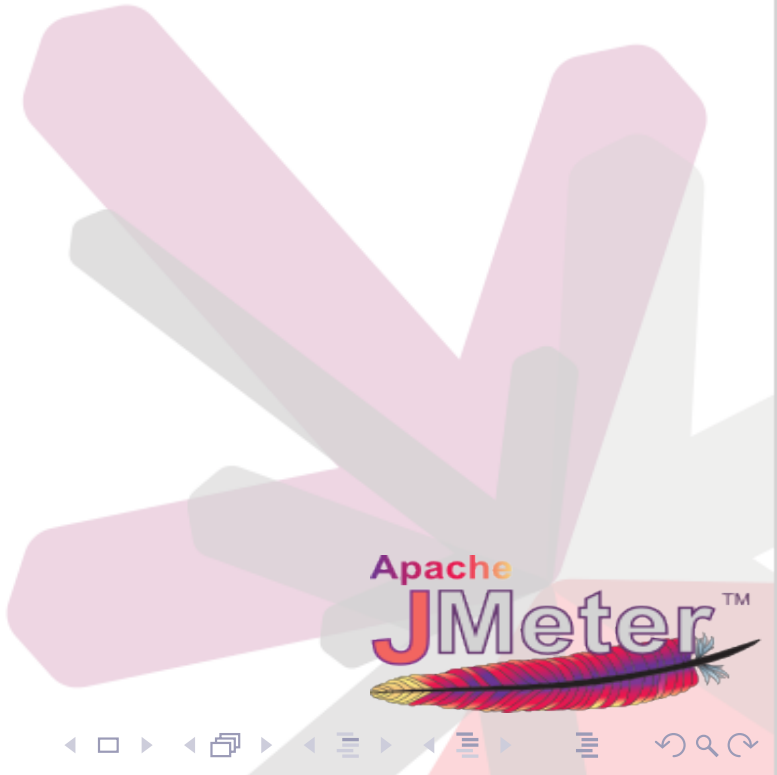
and calculating Response Time, Latency, Throughput and other such Metrics.

A sample JMeter 'TESTPLAN'



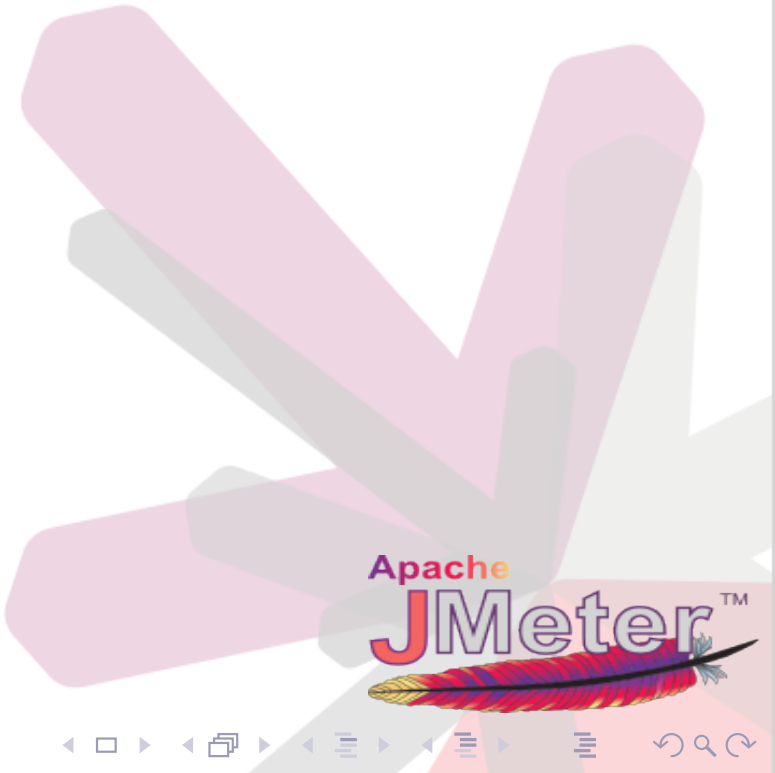
Some JMeter Plugins

- **Thread group Plugins**
  - Stepping Thread Group
  - Ultimate Thread Group
- **Timeline Graph Plugins**
  - Active Threads Over Time
  - Response Times Over Time
  - Response Latency Over Time
  - Transactions per Second
  - Server Hits per Seconds
  - Bytes Throughput Over Time



JMeter Enhancements Implemented

- **Dynamic Bandwidth Throttling**
  for the requests being sent, based on response error percentage



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  distinct IP addresses for each virtual user
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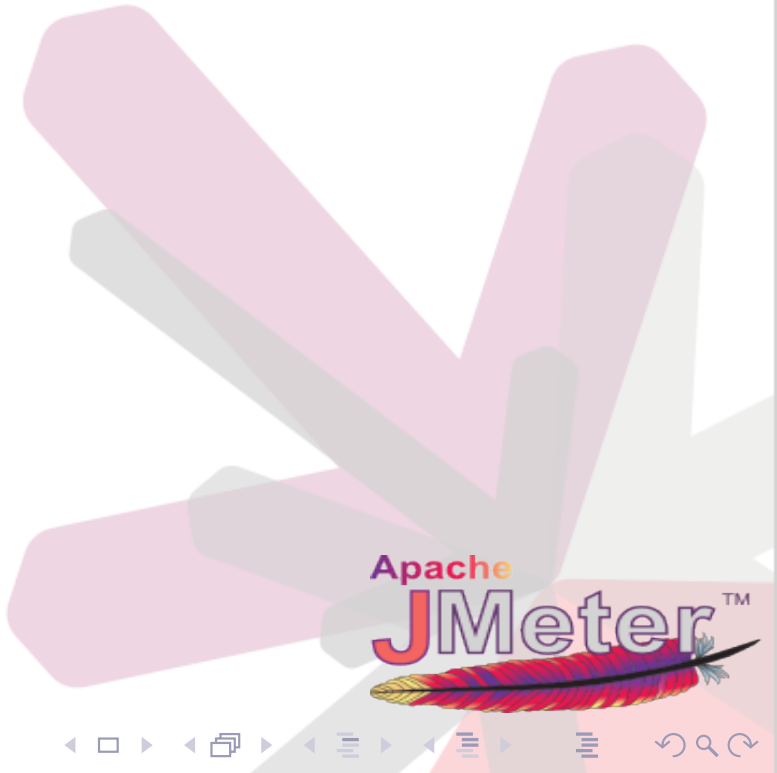
  creating A .csv file directly from the database table mentioned
- **Automating TPC-C Testing**
  Test script for Oracle and MySQL that enables a tester to carry out preliminary TPCC testing

- **Filtered Results Table**
  Filters the sampler results, based on user specified parameters



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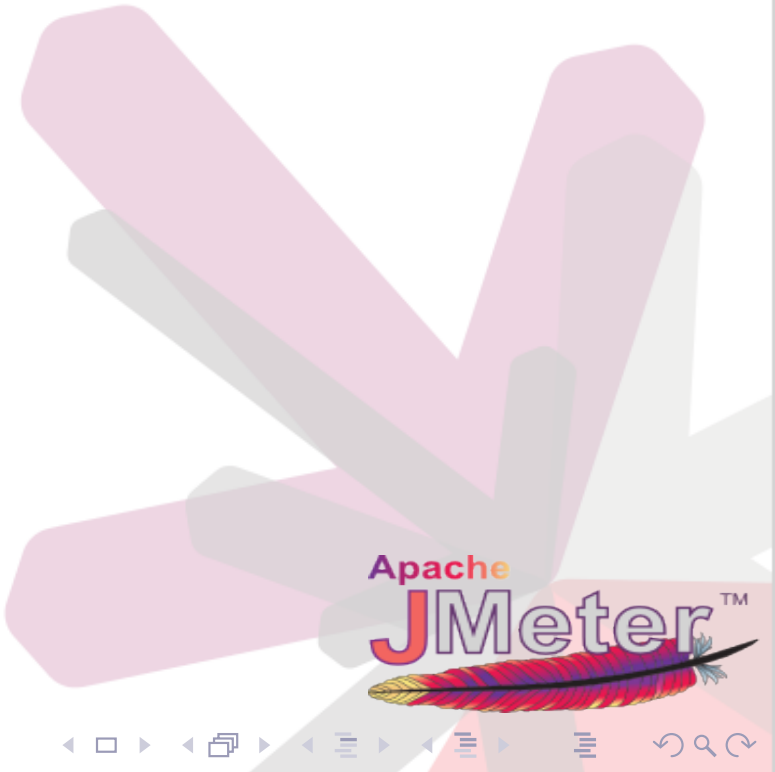
- **Constant Increasing Timer**
  Stepping Up time interval between Samples requested



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- **Enhanced Assertion results**
  Details of the Sampler passing or failing the test

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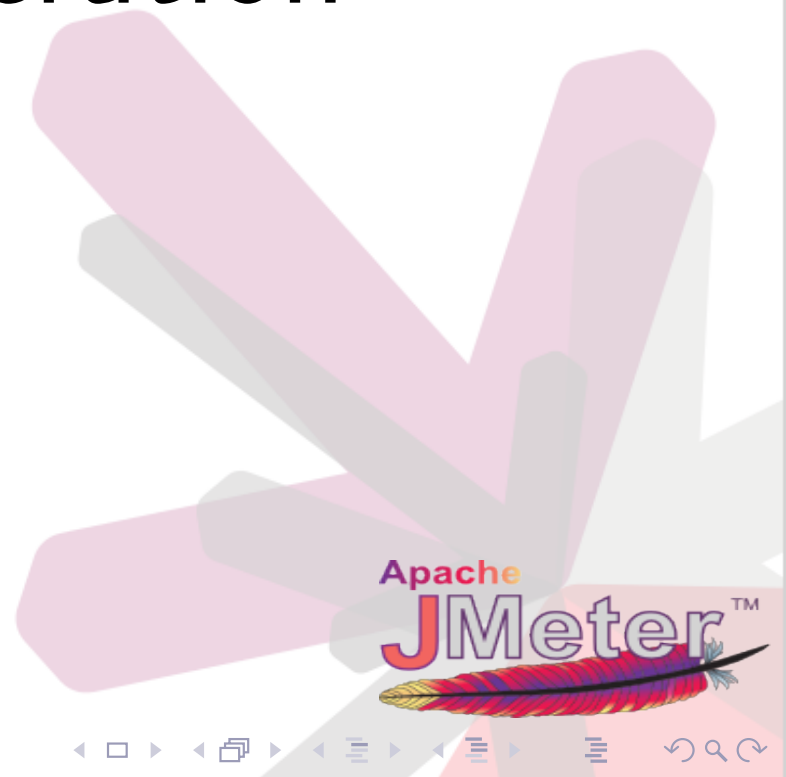
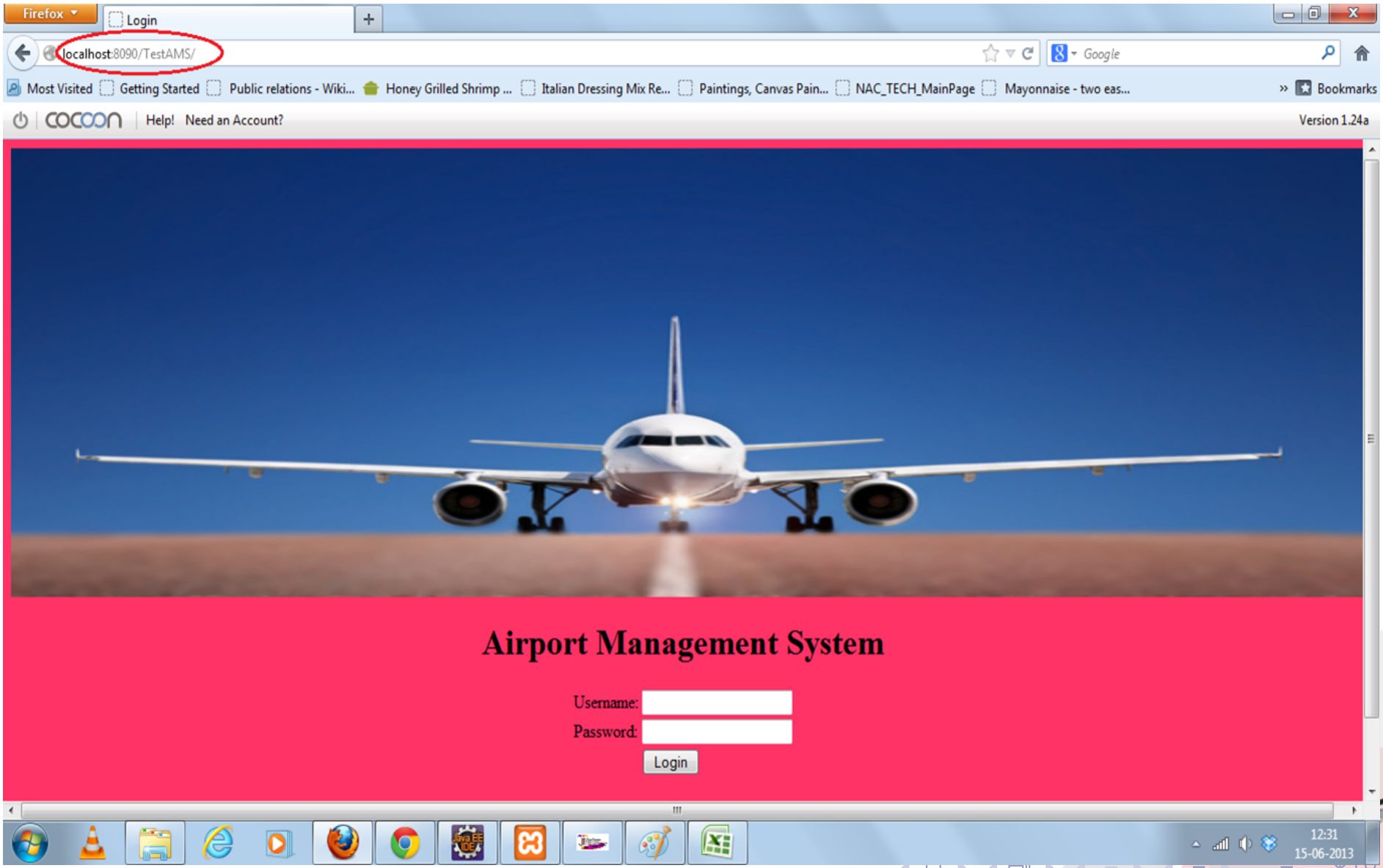
  Details of the Sampler passing or failing the test
- **SMTP Defaults**
  A configuration element for setting data for SMTP Samplers under it

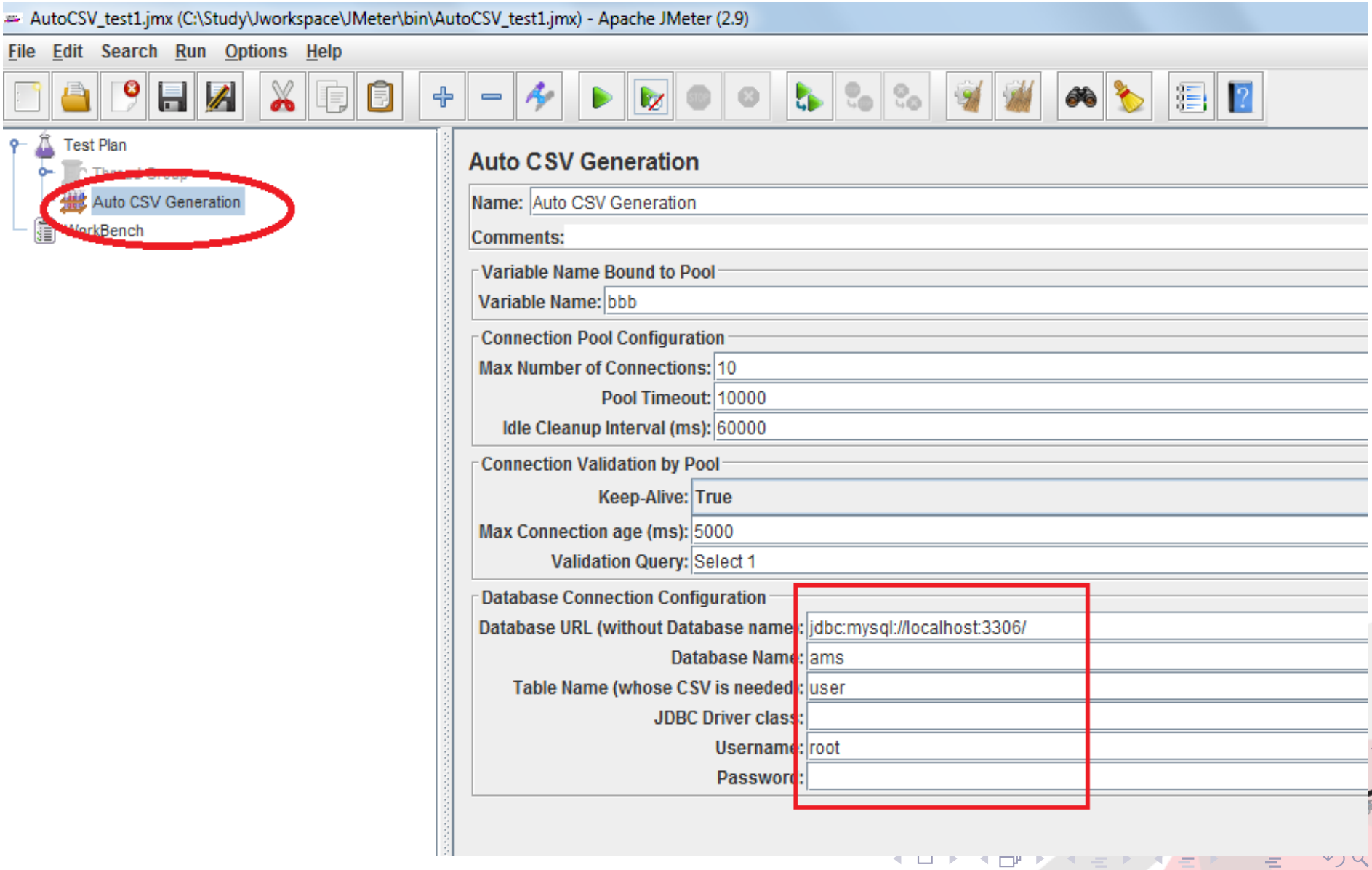
AutoCSV Generation



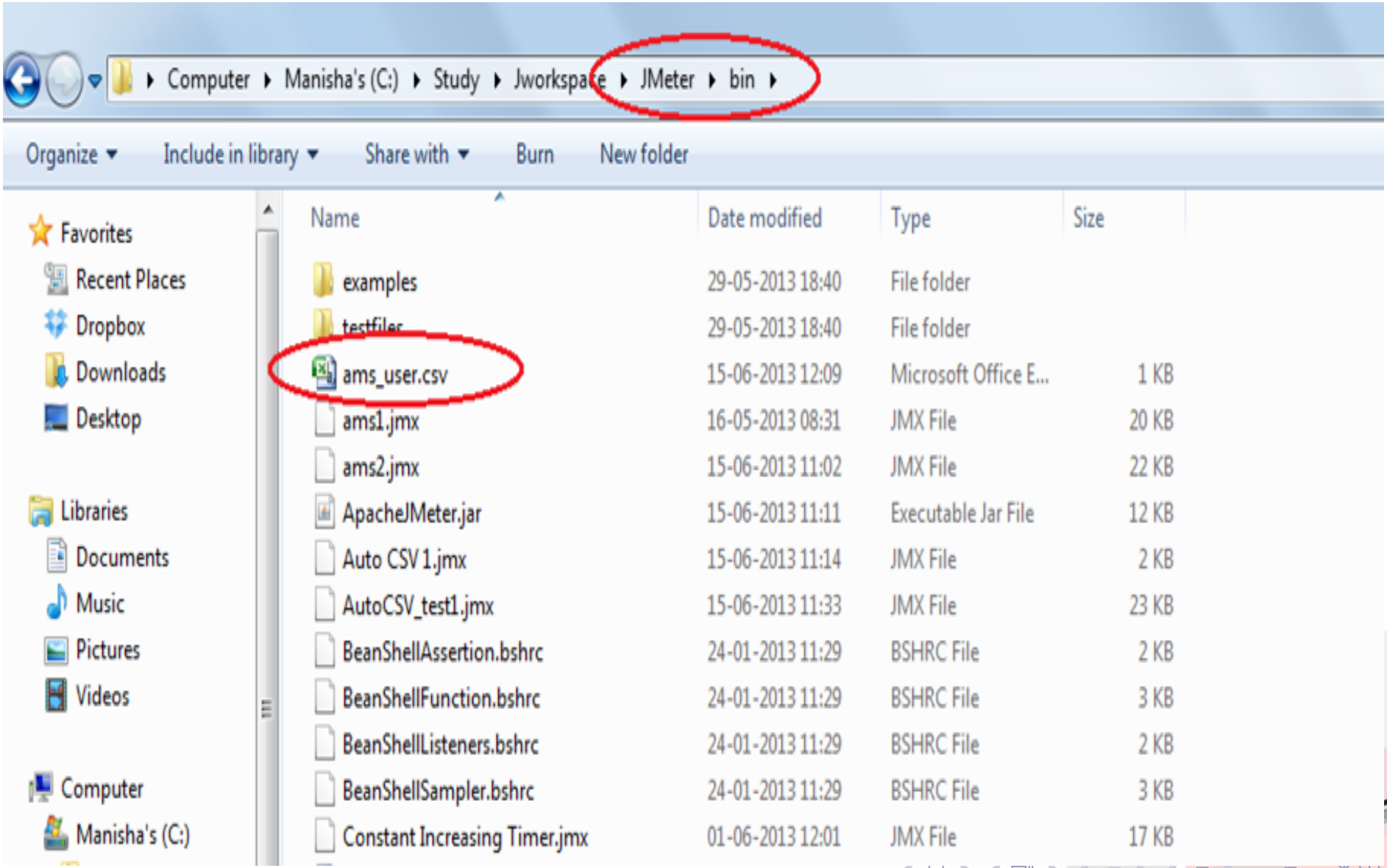
Application to be tested



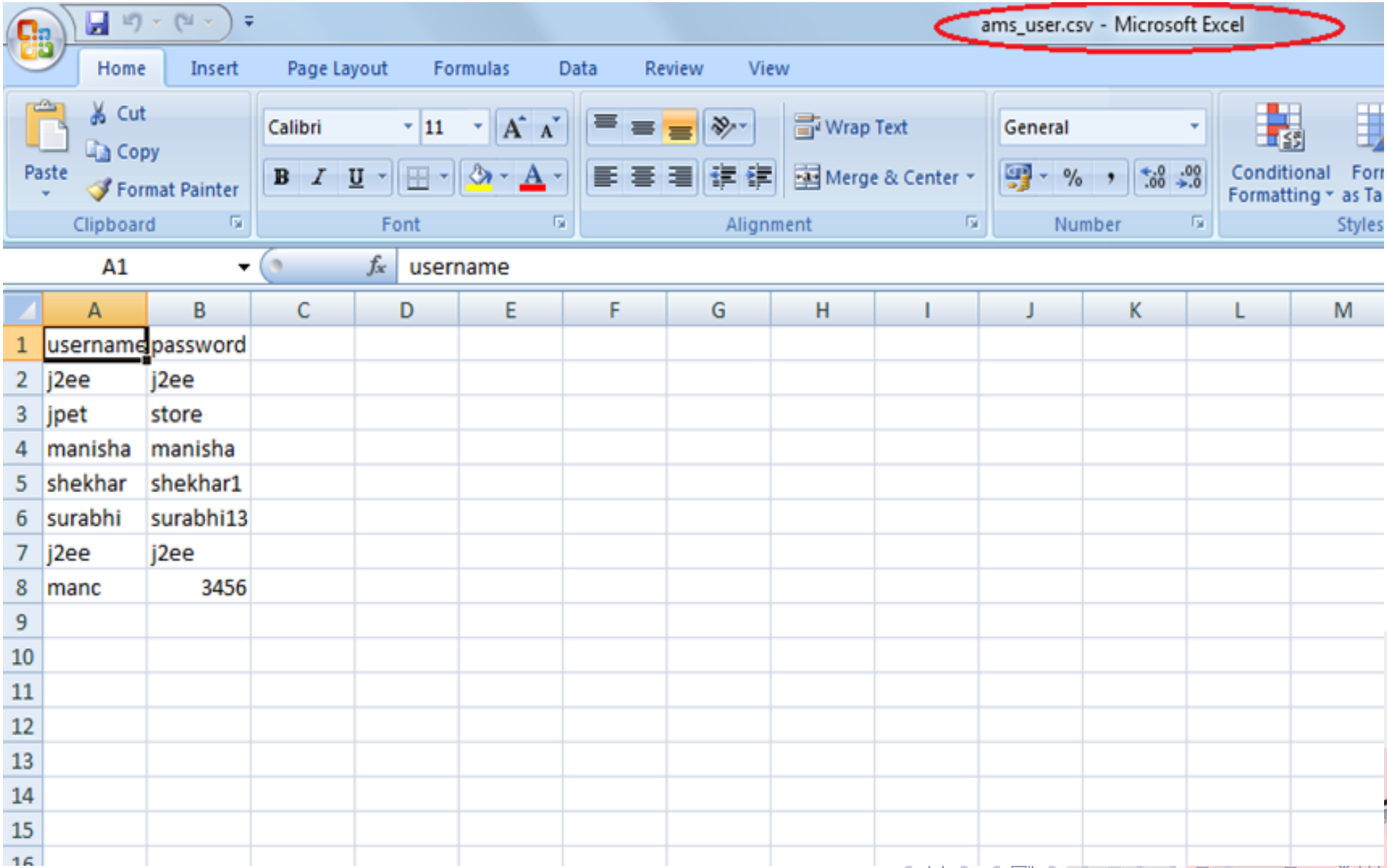
The Auto CSV Generation GUI



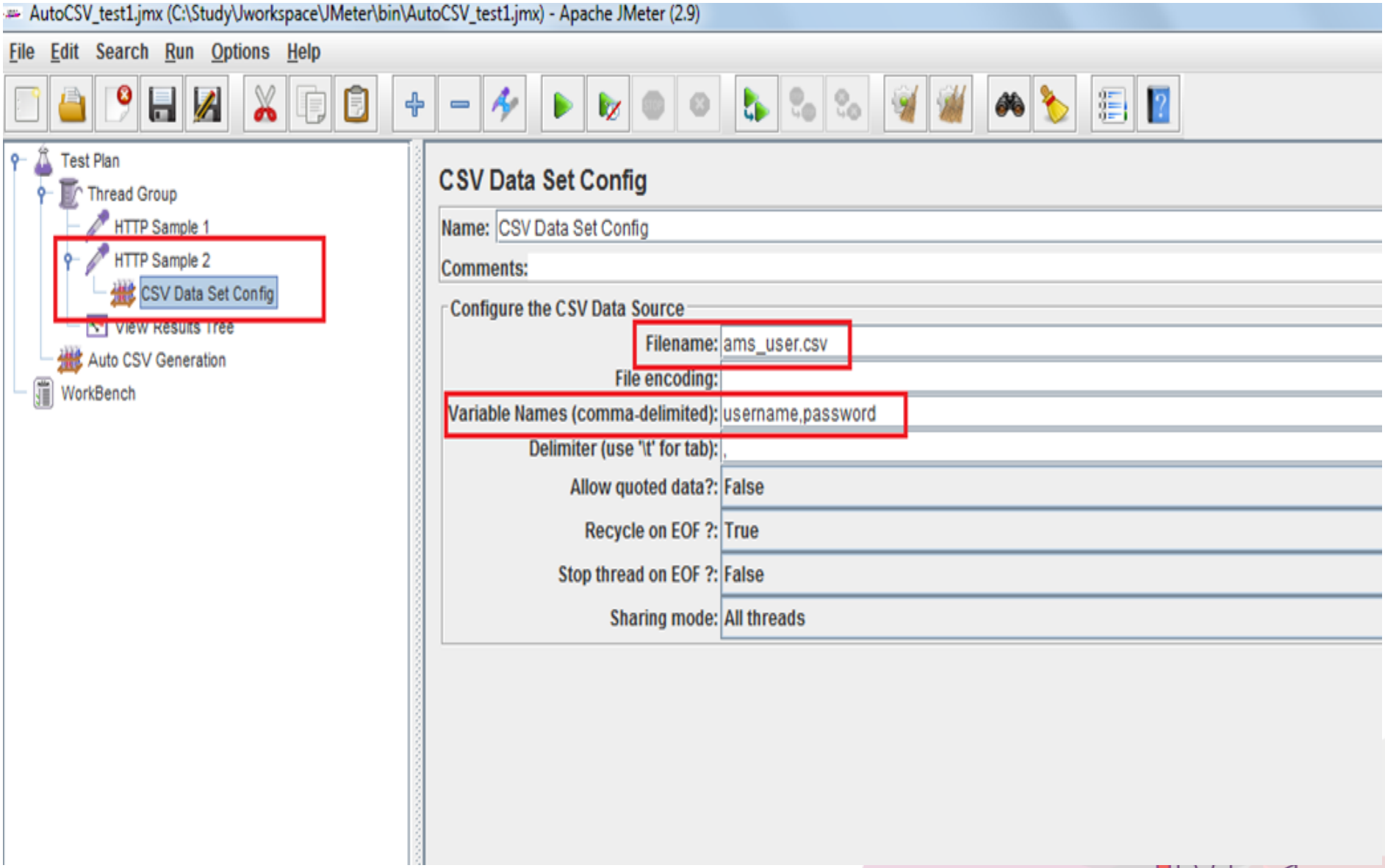
The .csv file generated in /bin folder



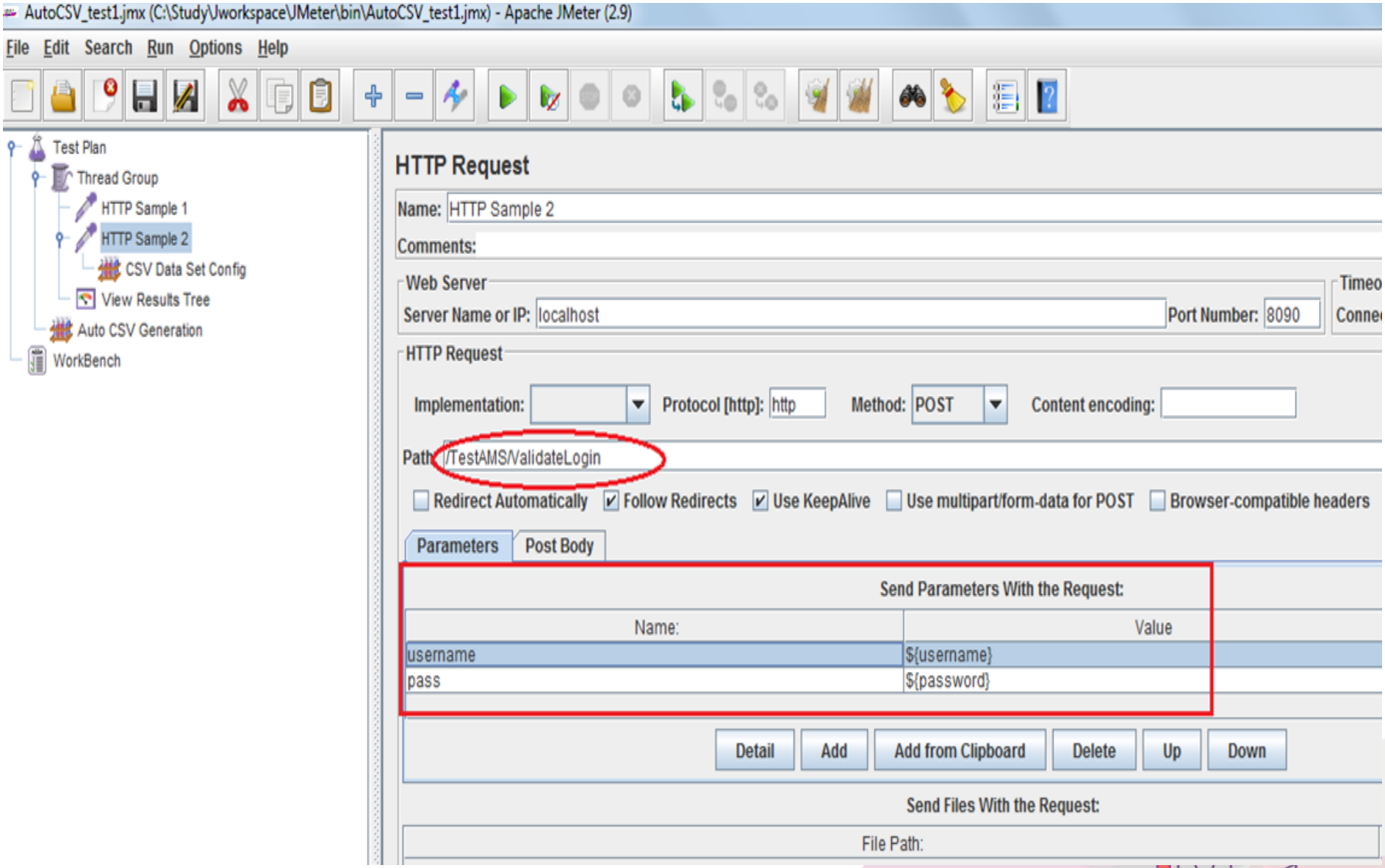
The ams_user.csv generated



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	username	password											
2	j2ee	j2ee											
3	jpet	store											
4	manisha	manisha											
5	shekhar	shekhar1											
6	surabhi	surabhi13											
7	j2ee	j2ee											
8	manc	3456											
9													
10													
11													
12													
13													
14													
15													
16													

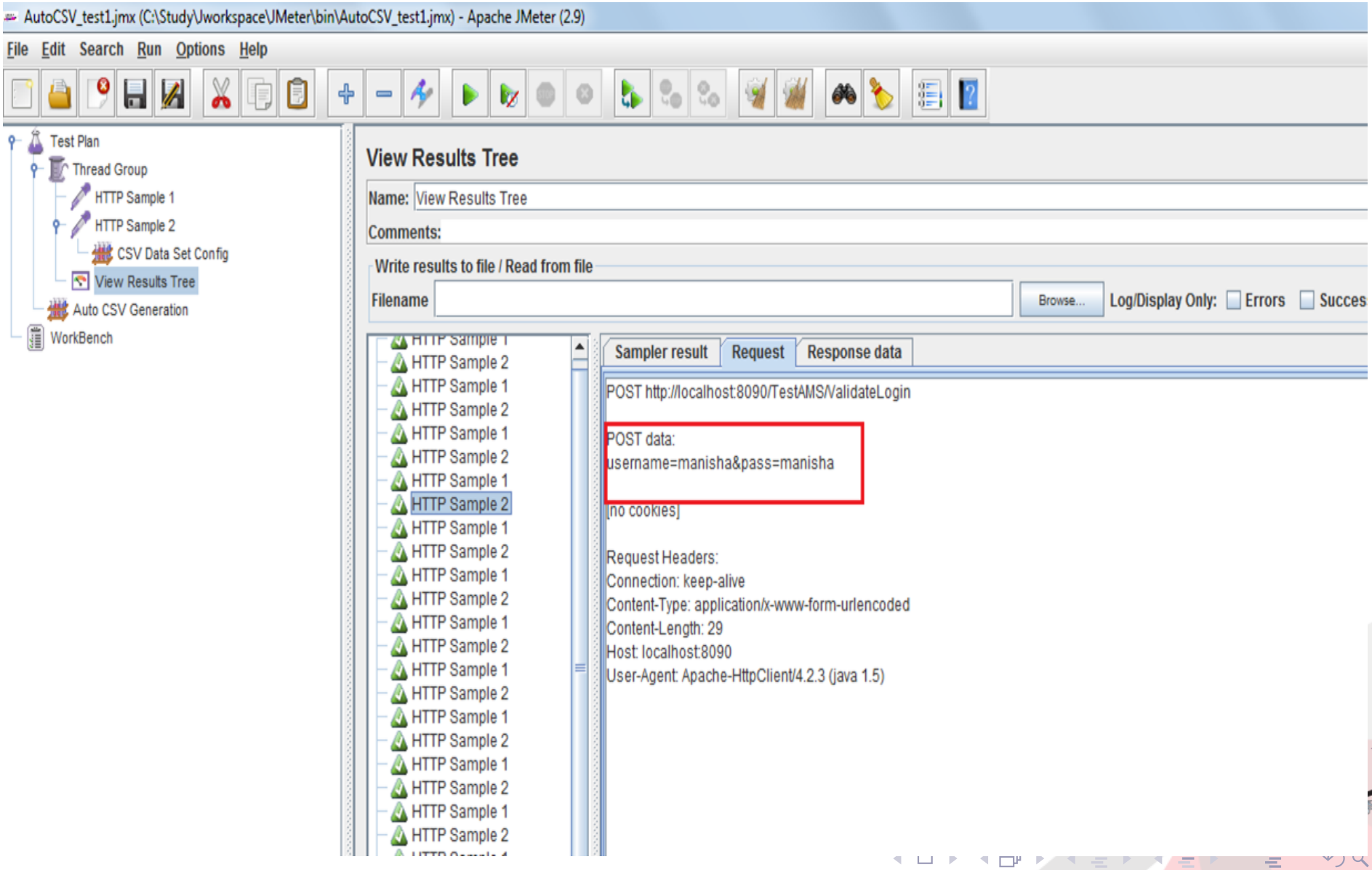


The CSV data config element is added as child of HTTP Sampler



The HTTP sampler where the parameters of .csv file are set

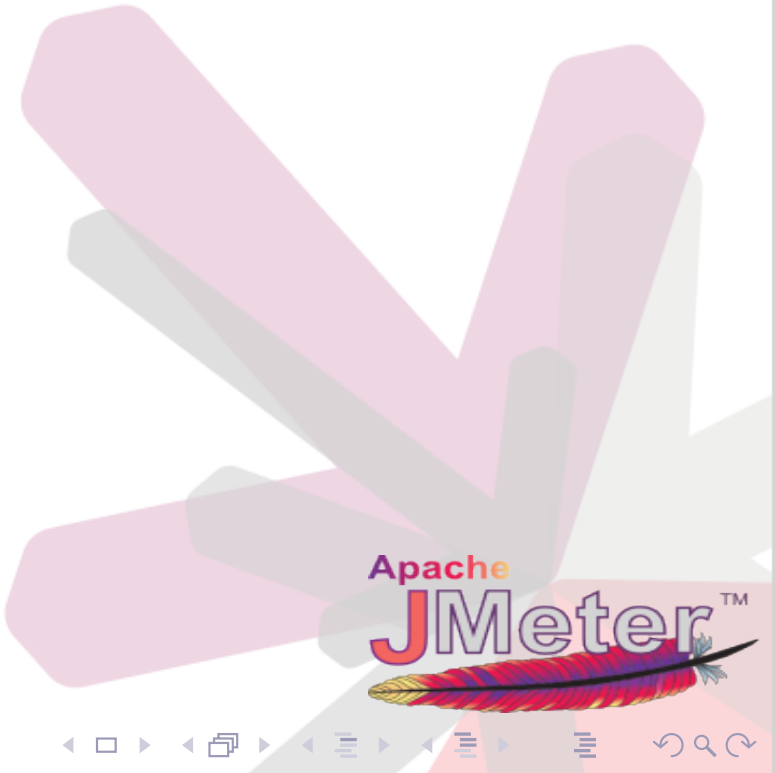
Output - CSV data verification



Bandwidth Throttling

Bandwidth Throttling

- Bandwidth throttling is the intentional slowing of Internet service.



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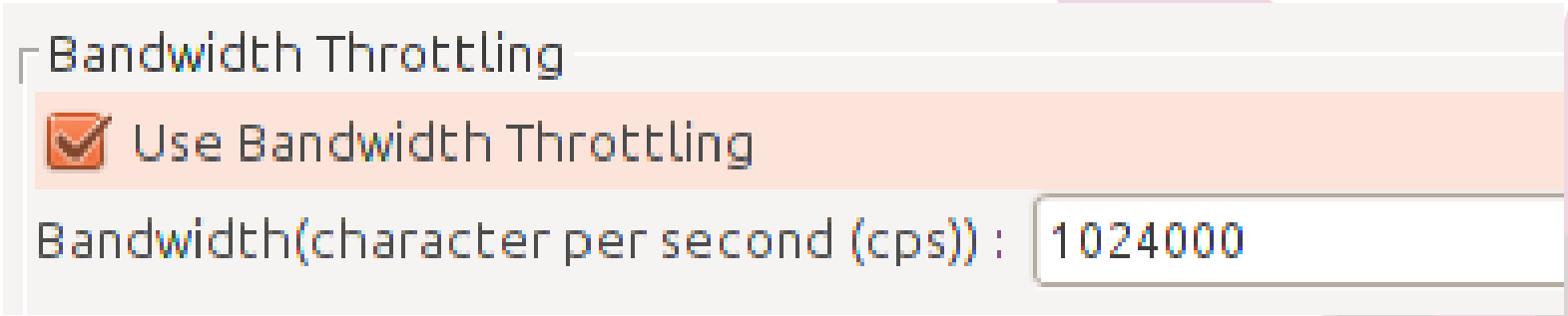
- In real world scenario, people use different web services at different bandwidths.
- Using Bandwidth Throttling, JMeter can be used to create test plans to simulate slower connections.

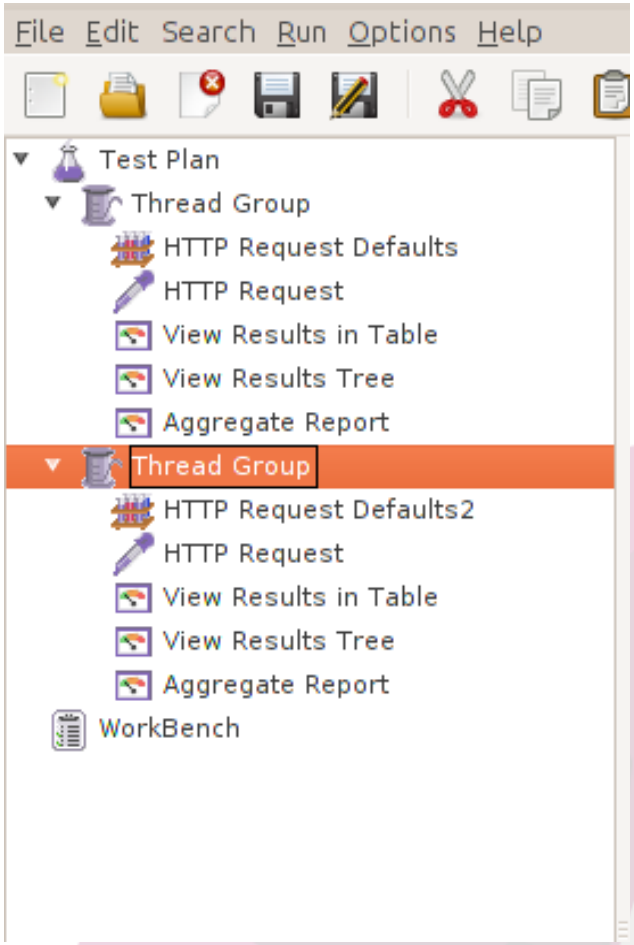
User Interface

- To use bandwidth throttling in JMeter, a gui component has been added to HTTP Request Defaults Config Element.

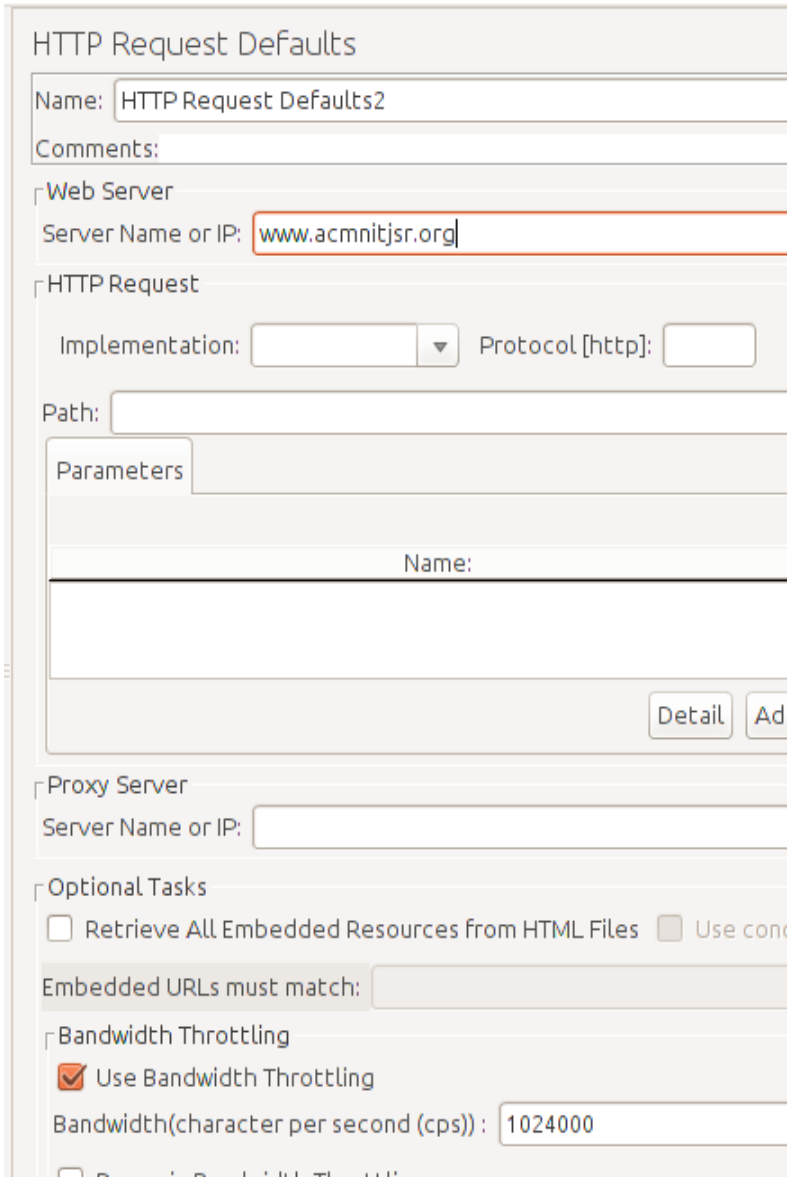


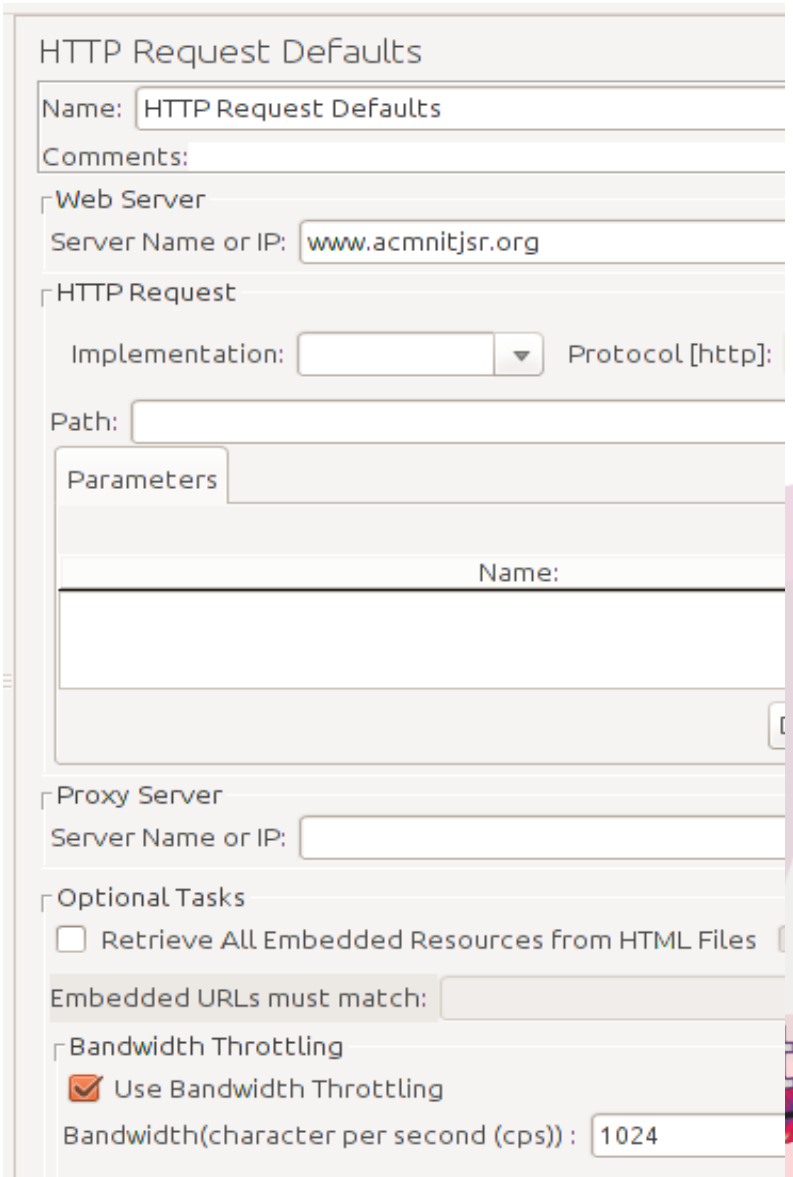
Test Plan

- Thread groups : 2
- Thread count : 5
- Loop count : 5
- HTTP Samplers : 1

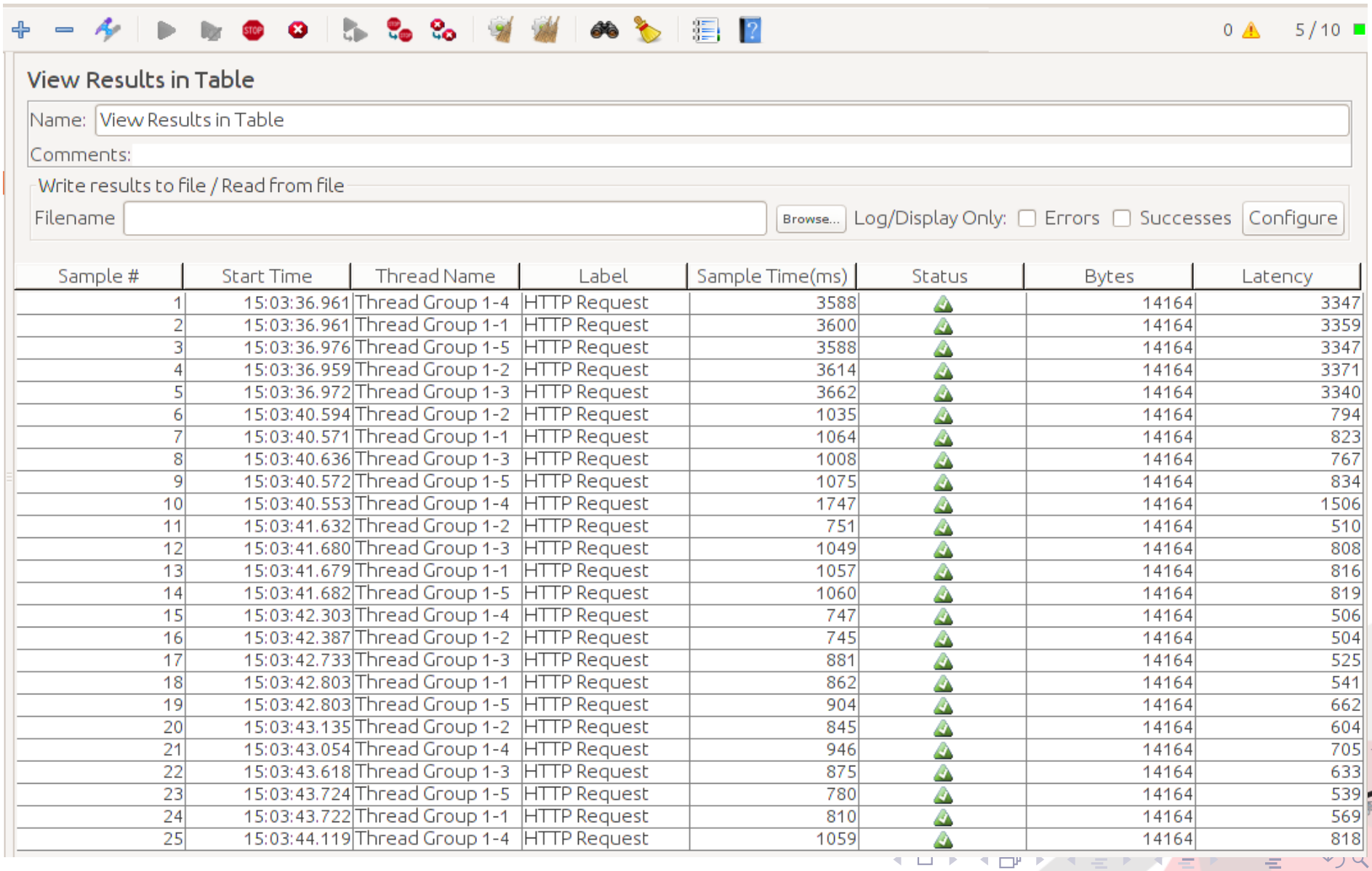


HTTP Default Settings for Samplers





Result Table for Thread group 1



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View Results in Table

Name: View Results in Table

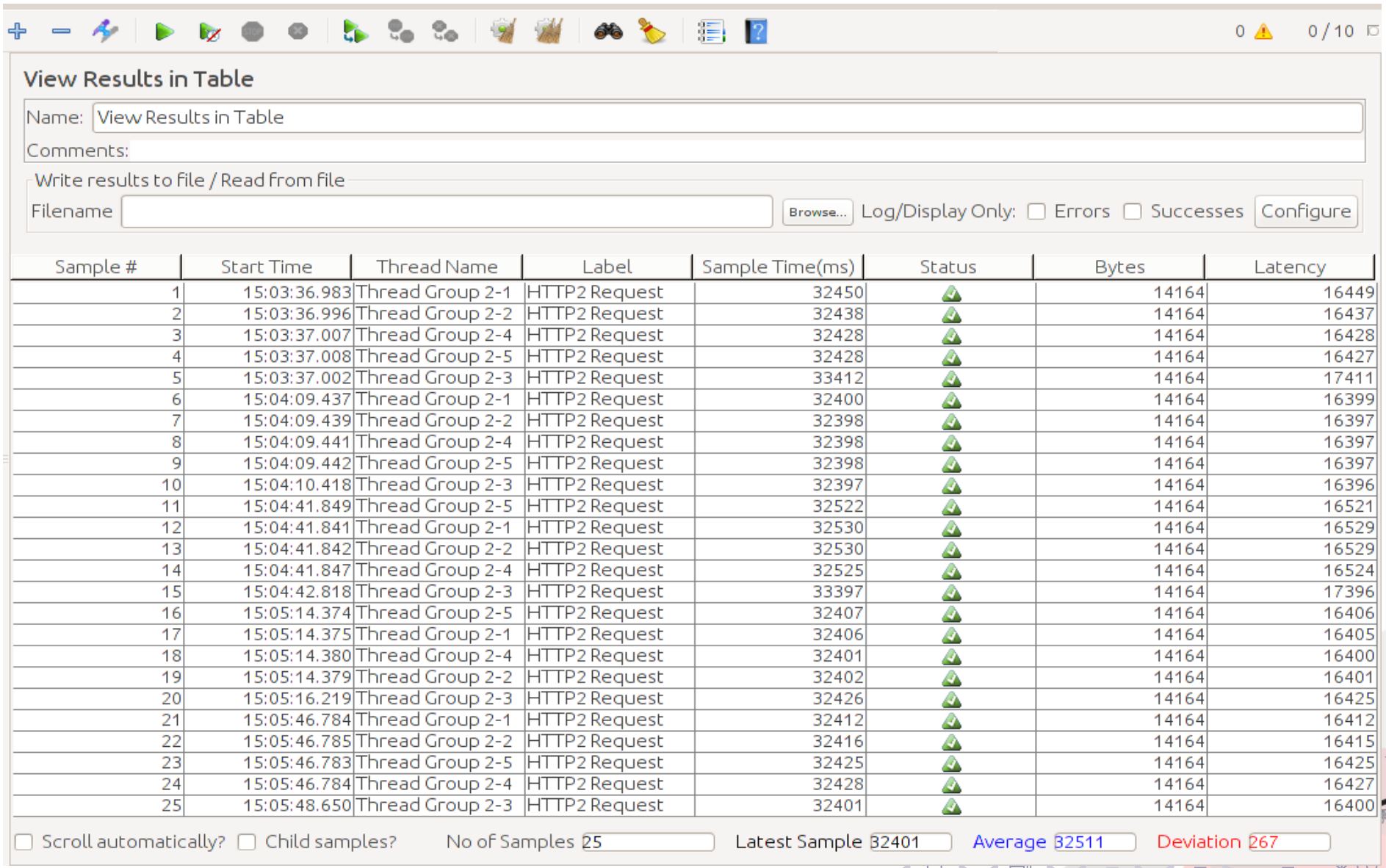
Comments:

Write results to file / Read from file

Filename | Browse... | Log/Display Only: ☐ Errors ☐ Successes | Configure

Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Latency
1	15:03:36.961	Thread Group 1-4	HTTP Request	3588		14164	3347
2	15:03:36.961	Thread Group 1-1	HTTP Request	3600		14164	3359
3	15:03:36.976	Thread Group 1-5	HTTP Request	3588		14164	3347
4	15:03:36.959	Thread Group 1-2	HTTP Request	3614		14164	3371
5	15:03:36.972	Thread Group 1-3	HTTP Request	3662		14164	3340
6	15:03:40.594	Thread Group 1-2	HTTP Request	1035		14164	794
7	15:03:40.571	Thread Group 1-1	HTTP Request	1064		14164	823
8	15:03:40.636	Thread Group 1-3	HTTP Request	1008		14164	767
9	15:03:40.572	Thread Group 1-5	HTTP Request	1075		14164	834
10	15:03:40.553	Thread Group 1-4	HTTP Request	1747		14164	1506
11	15:03:41.632	Thread Group 1-2	HTTP Request	751		14164	510
12	15:03:41.680	Thread Group 1-3	HTTP Request	1049		14164	808
13	15:03:41.679	Thread Group 1-1	HTTP Request	1057		14164	816
14	15:03:41.682	Thread Group 1-5	HTTP Request	1060		14164	819
15	15:03:42.303	Thread Group 1-4	HTTP Request	747		14164	506
16	15:03:42.387	Thread Group 1-2	HTTP Request	745		14164	504
17	15:03:42.733	Thread Group 1-3	HTTP Request	881		14164	525
18	15:03:42.803	Thread Group 1-1	HTTP Request	862		14164	541
19	15:03:42.803	Thread Group 1-5	HTTP Request	904		14164	662
20	15:03:43.135	Thread Group 1-2	HTTP Request	845		14164	604
21	15:03:43.054	Thread Group 1-4	HTTP Request	946		14164	705
22	15:03:43.618	Thread Group 1-3	HTTP Request	875		14164	633
23	15:03:43.724	Thread Group 1-5	HTTP Request	780		14164	539
24	15:03:43.722	Thread Group 1-1	HTTP Request	810		14164	569
25	15:03:44.119	Thread Group 1-4	HTTP Request	1059		14164	818

Result Table for Thread group 2



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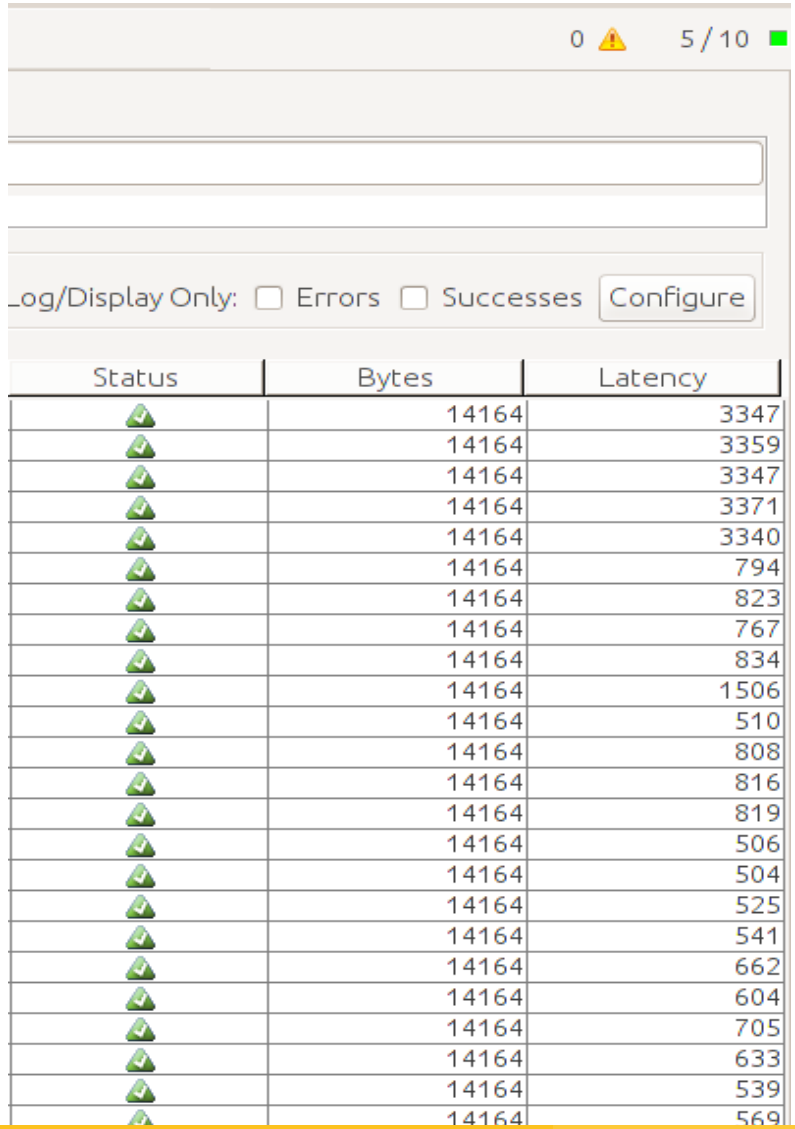
Sample #	Start Time	Thread Name	Label	Sample Time(ms)	Status	Bytes	Latency
1	15:03:36.983	Thread Group 2-1	HTTP2 Request	32450		14164	16449
2	15:03:36.996	Thread Group 2-2	HTTP2 Request	32438		14164	16437
3	15:03:37.007	Thread Group 2-4	HTTP2 Request	32428		14164	16428
4	15:03:37.008	Thread Group 2-5	HTTP2 Request	32428		14164	16427
5	15:03:37.002	Thread Group 2-3	HTTP2 Request	33412		14164	17411
6	15:04:09.437	Thread Group 2-1	HTTP2 Request	32400		14164	16399
7	15:04:09.439	Thread Group 2-2	HTTP2 Request	32398		14164	16397
8	15:04:09.441	Thread Group 2-4	HTTP2 Request	32398		14164	16397
9	15:04:09.442	Thread Group 2-5	HTTP2 Request	32398		14164	16397
10	15:04:10.418	Thread Group 2-3	HTTP2 Request	32397		14164	16396
11	15:04:41.849	Thread Group 2-5	HTTP2 Request	32522		14164	16521
12	15:04:41.841	Thread Group 2-1	HTTP2 Request	32530		14164	16529
13	15:04:41.842	Thread Group 2-2	HTTP2 Request	32530		14164	16529
14	15:04:41.847	Thread Group 2-4	HTTP2 Request	32525		14164	16524
15	15:04:42.818	Thread Group 2-3	HTTP2 Request	33397		14164	17396
16	15:05:14.374	Thread Group 2-5	HTTP2 Request	32407		14164	16406
17	15:05:14.375	Thread Group 2-1	HTTP2 Request	32406		14164	16405
18	15:05:14.380	Thread Group 2-4	HTTP2 Request	32401		14164	16400
19	15:05:14.379	Thread Group 2-2	HTTP2 Request	32402		14164	16401
20	15:05:16.219	Thread Group 2-3	HTTP2 Request	32426		14164	16425
21	15:05:46.784	Thread Group 2-1	HTTP2 Request	32412		14164	16412
22	15:05:46.785	Thread Group 2-2	HTTP2 Request	32416		14164	16415
23	15:05:46.783	Thread Group 2-5	HTTP2 Request	32425		14164	16425
24	15:05:46.784	Thread Group 2-4	HTTP2 Request	32428		14164	16427
25	15:05:48.650	Thread Group 2-3	HTTP2 Request	32401		14164	16400

Scroll automatically? Child samples? No of Samples 25 Latest Sample 32401 Average 32511 Deviation 267

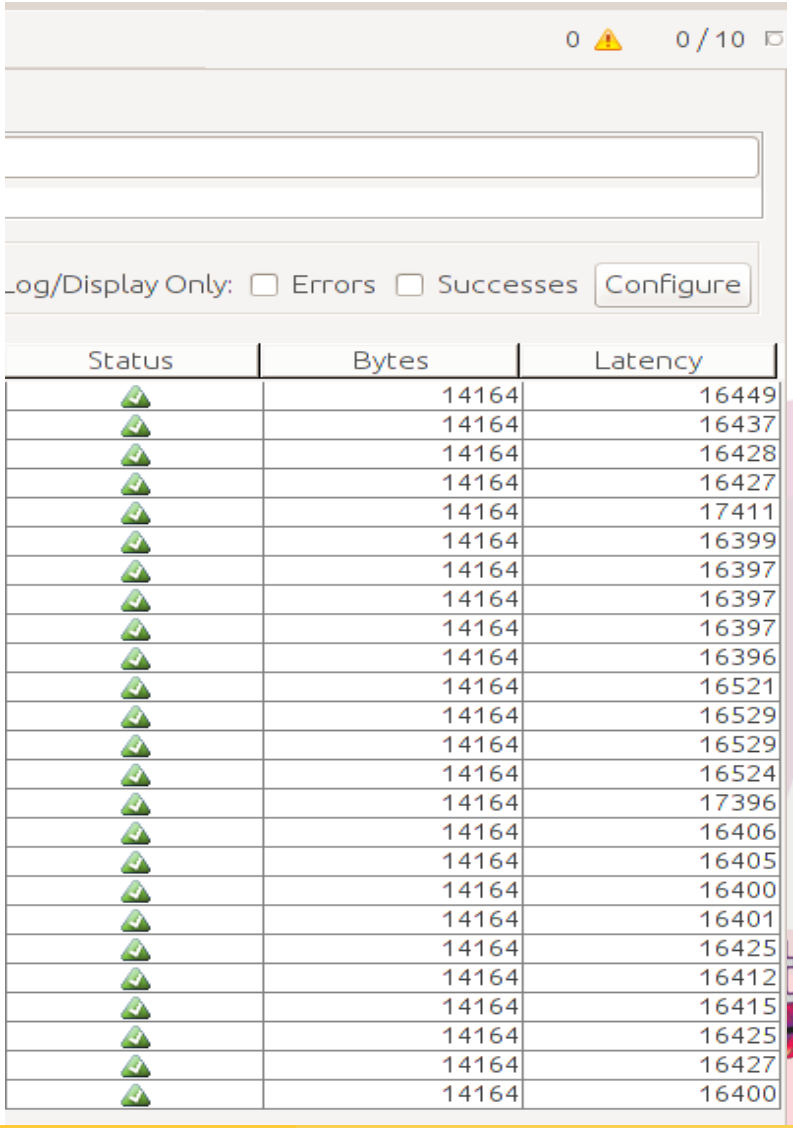
Results Comparison

Bandwidth: 1MBps



Status	Bytes	Latency
	14164	3347
	14164	3359
	14164	3347
	14164	3371
	14164	3340
	14164	794
	14164	823
	14164	767
	14164	834
	14164	1506
	14164	510
	14164	808
	14164	816
	14164	819
	14164	506
	14164	504
	14164	525
	14164	541
	14164	662
	14164	604
	14164	705
	14164	633
	14164	539
	14164	569

Bandwidth: 1KBps



Status	Bytes	Latency
	14164	16449
	14164	16437
	14164	16428
	14164	16427
	14164	17411
	14164	16399
	14164	16397
	14164	16397
	14164	16397
	14164	16396
	14164	16521
	14164	16529
	14164	16529
	14164	16524
	14164	17396
	14164	16406
	14164	16405
	14164	16400
	14164	16401
	14164	16425
	14164	16412
	14164	16415
	14164	16425
	14164	16427
	14164	16400

Aggregate Reports

Bandwidth: 1MBps

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
HTTP Request	25	1494	1035	3588	745	3662	0.00%	3.0/sec	42.1
TOTAL	25	1494	1035	3588	745	3662	0.00%	3.0/sec	42.1

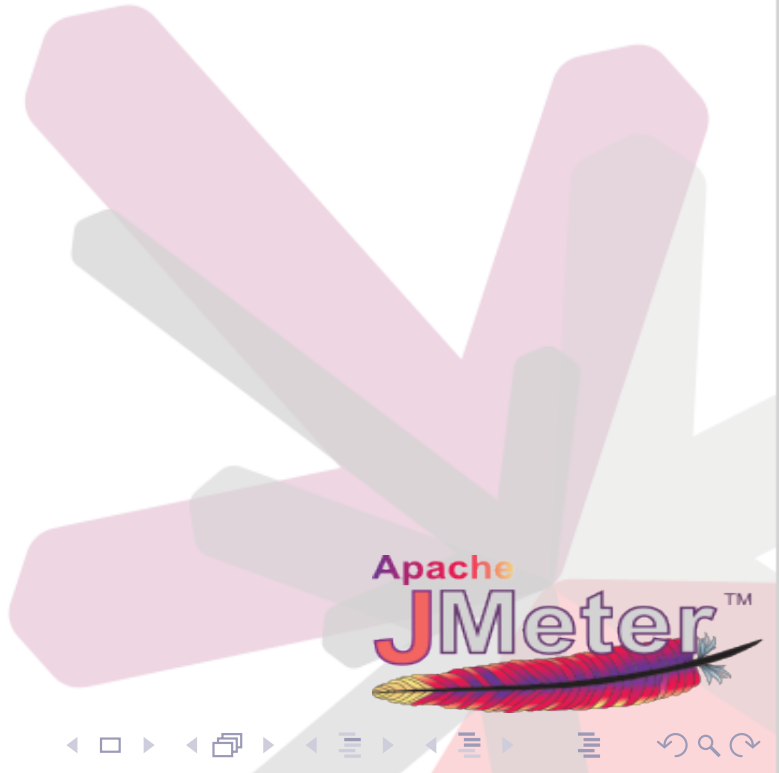
Bandwidth: 1KBps

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
HTTP2 Requ...	25	32511	32425	32530	32397	33412	0.00%	9.1/min	2.1
TOTAL	25	32511	32425	32530	32397	33412	0.00%	9.1/min	2.1

Dynamic Bandwidth Throttling

Dynamic Bandwidth Throttling

1. DBT deals with the variation of bandwidth at runtime.



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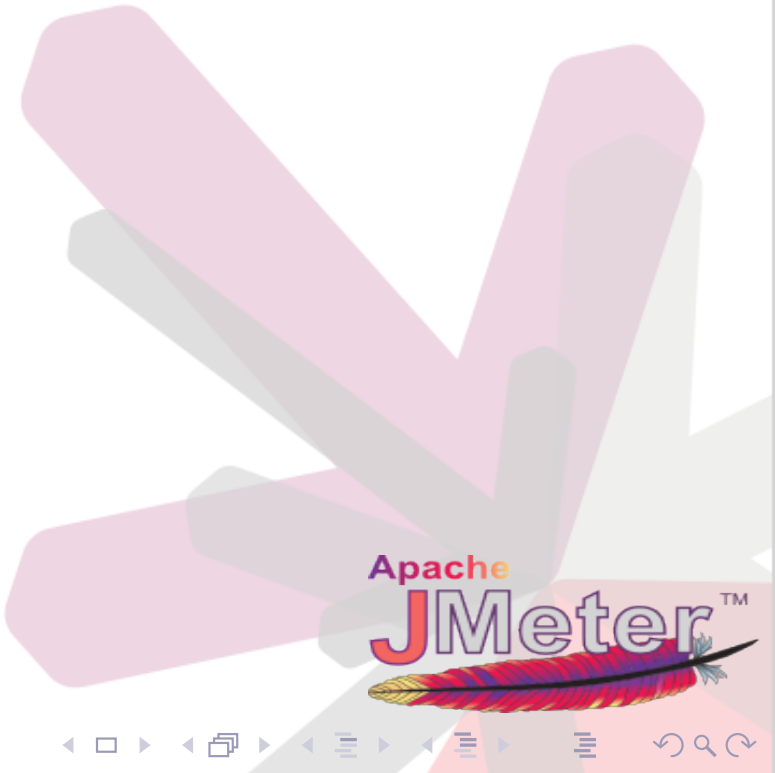
2. DBT can be used to test performance of web services under varying bandwidth (load).



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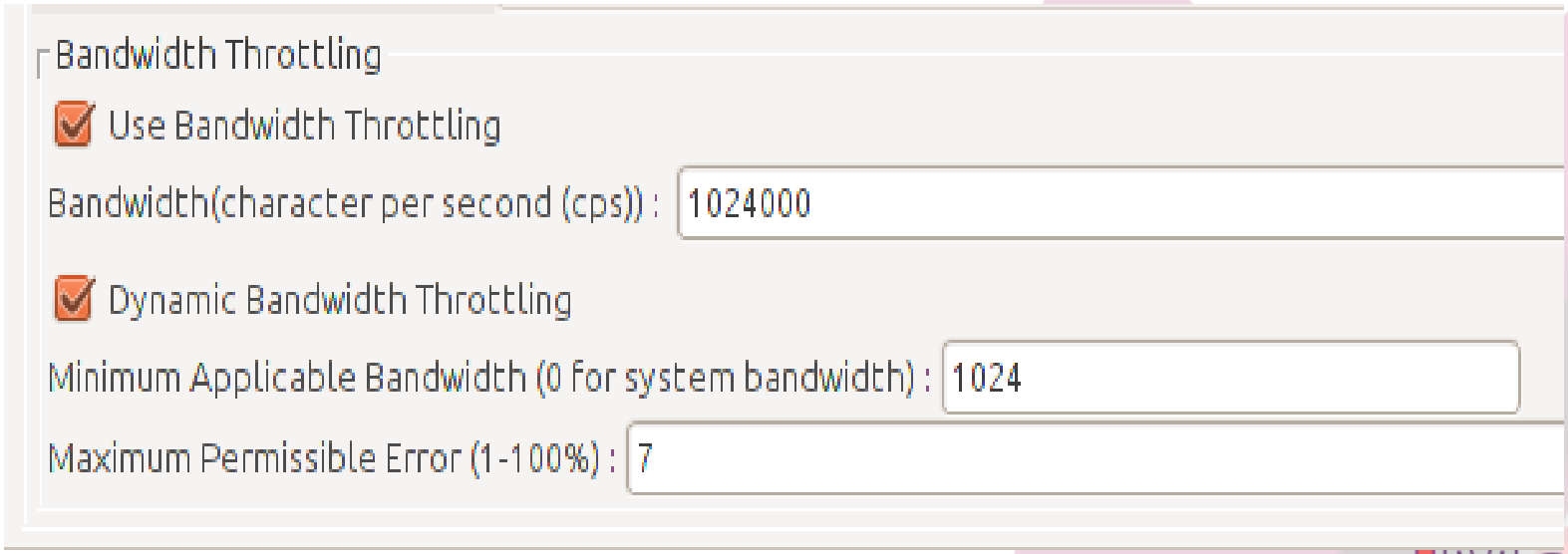
2. DBT can be used to test performance of web services under varying bandwidth (load).
3. DBT can be used to measure and manage errors during the test at runtime.
4. Based on error rate.
5. A distributed testing can be simulated using DBT and IP spoofing.

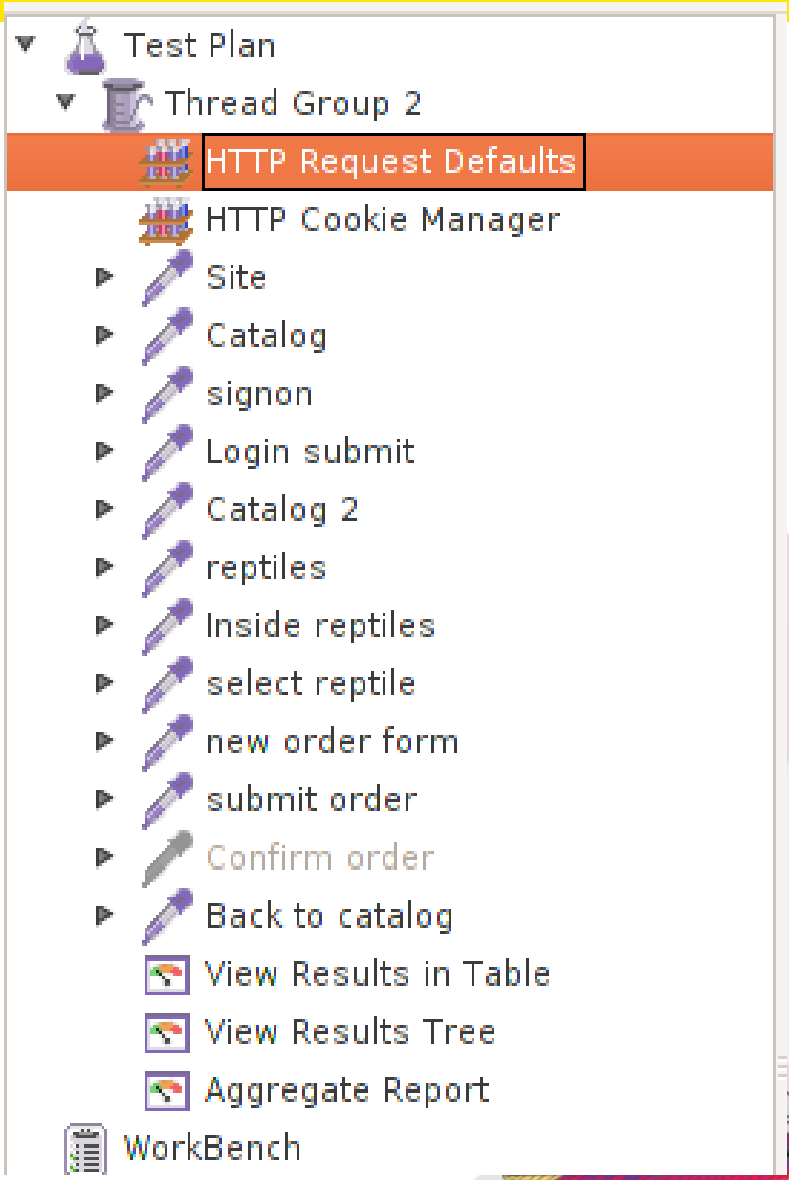
User Interface

To use Dynamic Bandwidth Throttling in JMeter, an extended GUI component has been added to Bandwidth Throttling in HTTP Request Defaults.



Test Plan

- Thread Group: 1
- Thread Count: 1000
- Ramp Up period: 0 sec
- Timeout period: 22 sec
- No. of Samplers: 11
- Permisibble error: 7%
- Applicable bandwidth: 1MBps
- Minimum applicable bandwidth: 1KBps



Aggregate Report

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

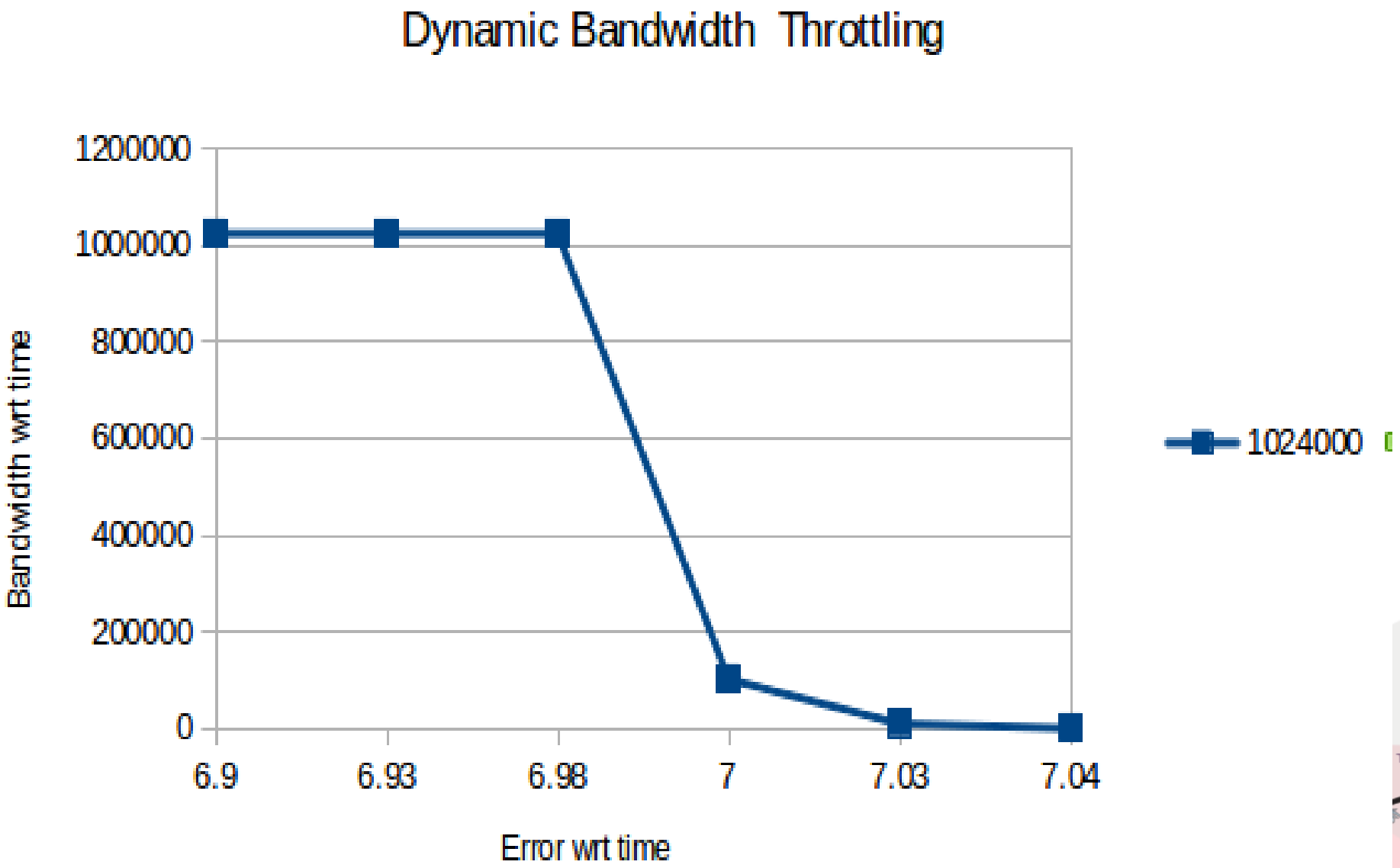
Filename | Browse... | Log/Display Only: Errors Successes | Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Site	1000	3431	3603	6341	8	8315	0.00%	82.9/sec	56.9
Catalog	1000	11100	10605	19757	44	35987	0.00%	22.5/sec	134.0
signon	1000	17621	21450	22039	549	33596	20.10%	12.9/sec	44.7
Login submit	1000	19773	20851	22037	1410	33216	9.00%	9.1/sec	33.0
Catalog 2	1000	21013	20961	21993	4290	36751	4.60%	6.9/sec	32.5
reptiles	1000	21312	20746	21841	10094	37571	2.90%	5.7/sec	26.8
Inside reptiles	1000	21670	21341	22020	18911	35739	5.80%	5.1/sec	23.5
select reptile	1000	21637	22030	22040	16554	27198	64.70%	5.2/sec	14.5
new order form	1000	21707	22028	22037	16557	23676	82.10%	5.3/sec	13.7
submit order	1000	21772	22028	22037	16605	23561	78.50%	5.4/sec	14.9
Back to catalog	1000	18737	19284	22030	11655	23560	28.40%	5.6/sec	22.9
TOTAL	11000	18161	21116	22037	8	37571	26.92%	39.2/sec	142.6

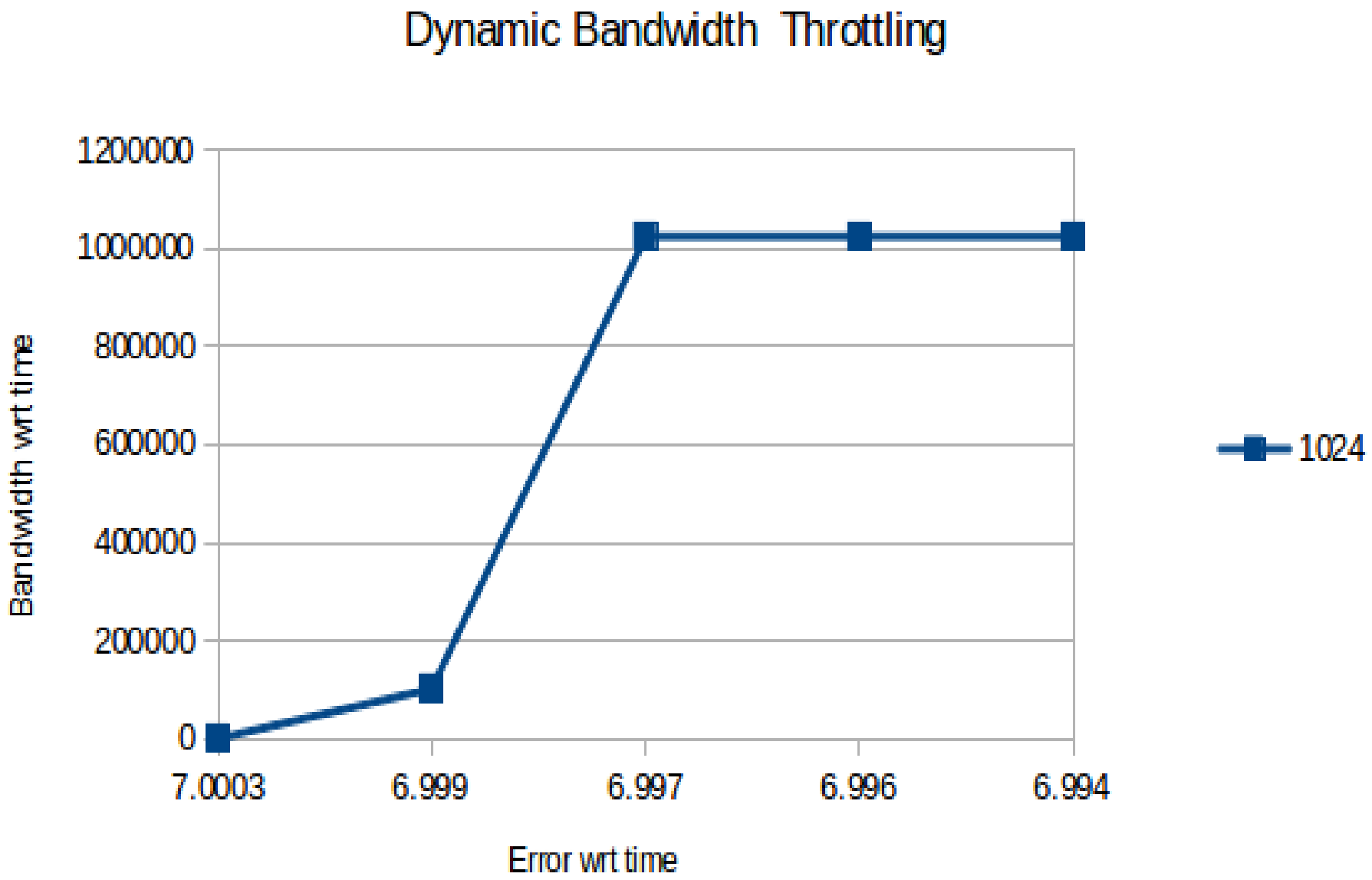
Aggregate Report

Error %	Throughput	KB/sec
0.00%	82.9/sec	56.9
0.00%	22.5/sec	134.0
20.10%	12.9/sec	44.7
9.00%	9.1/sec	33.0
4.60%	6.9/sec	32.5
2.90%	5.7/sec	26.8
5.80%	5.1/sec	23.5
64.70%	5.2/sec	14.5
82.10%	5.3/sec	13.7
78.50%	5.4/sec	14.9
28.40%	5.6/sec	22.9
26.92%	39.2/sec	142.6

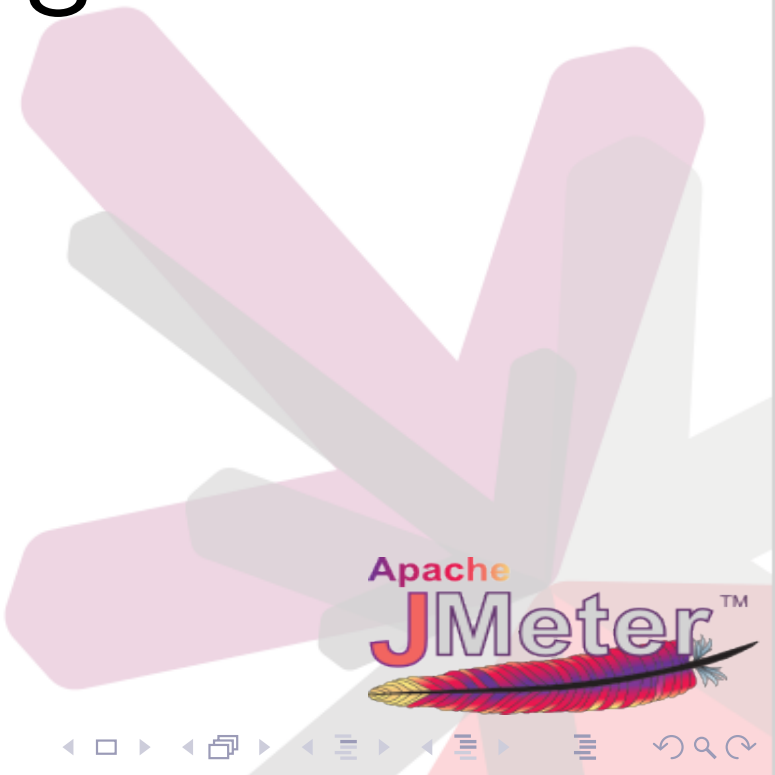
JMeter Log Report



JMeter Log Report



IP Spoofing



What is IP address Spoofing?

It is the creation of IP Packets with forged source IP address, with the purpose of concealing identity of the sender or for impersonating another computer system.

IP Spoofing in JMeter

1. JMeter is capable of generating thousands of threads that act as virtual users
2. On the server side, these requests appear from the same IP address on which JMeter resides
3. On servers which have IP dependent response, the testplan with a thousand virtual fails
4. To eliminate this drawback, we use IP Spoofing in JMeter

Without IP spoofing

Load balancing inactive

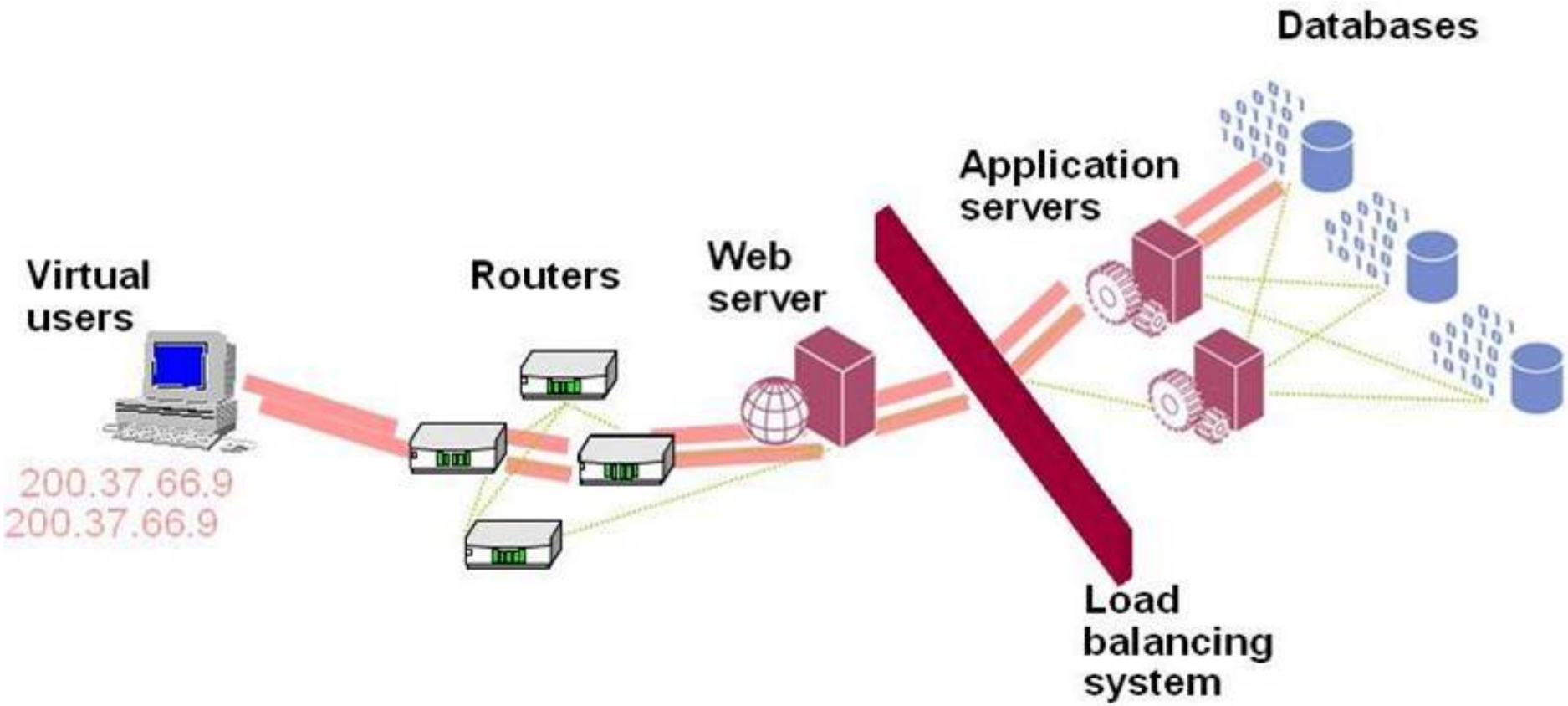
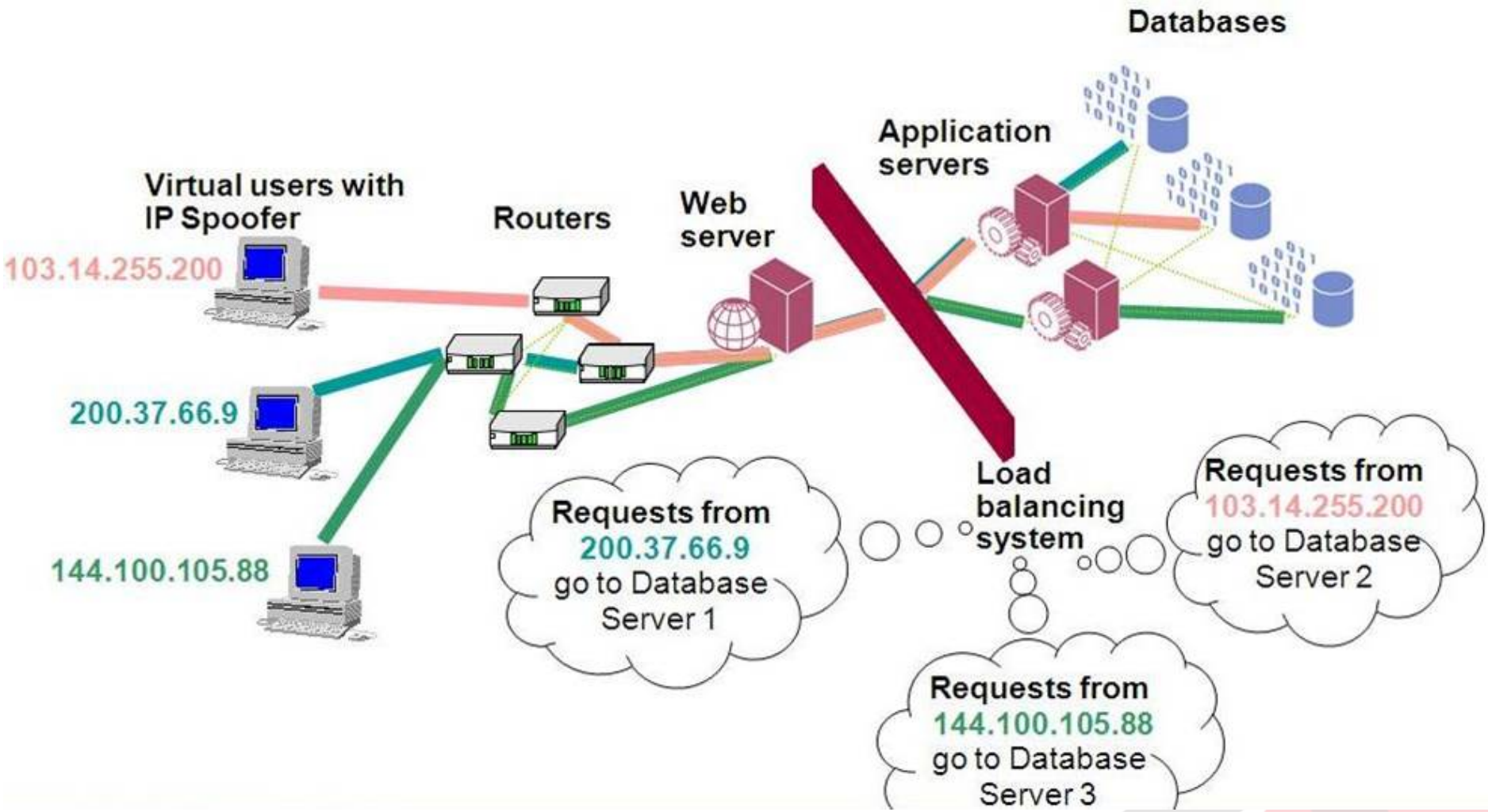


Figure: Server treating multiple requests without IP spoofing

With IP spoofing

Load balancing active



JMeter Implementation

IP and Subnet Details

We need to provide JMeter with IP address of the machine and the subnet it belongs to, and also specify the number of IP addresses required

IP allocation

JMeter internally allocates virtual IPs to the same machine, and each virtual user can send request from a distinct IP from newly allocated virtual IPs

Interface of IP Spoofing Config Element in JMeter

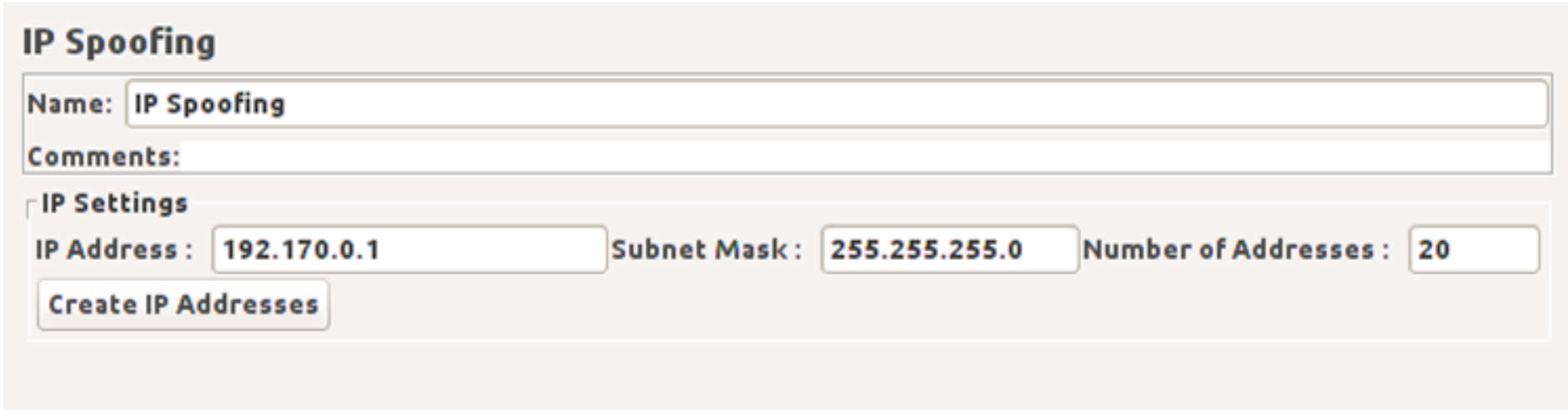


Figure: GUI of IP Spoofing

Virtual IPs allocated to machine

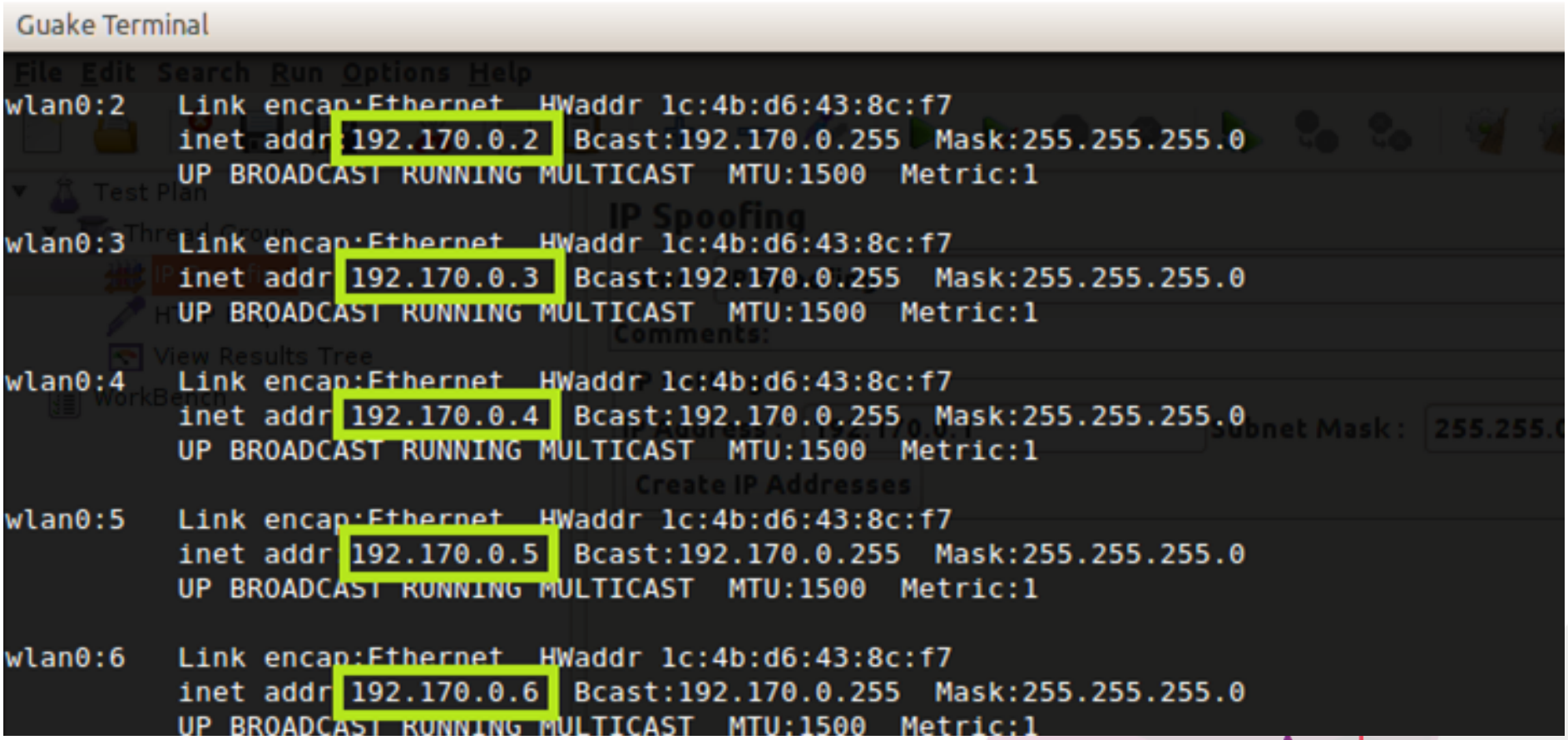
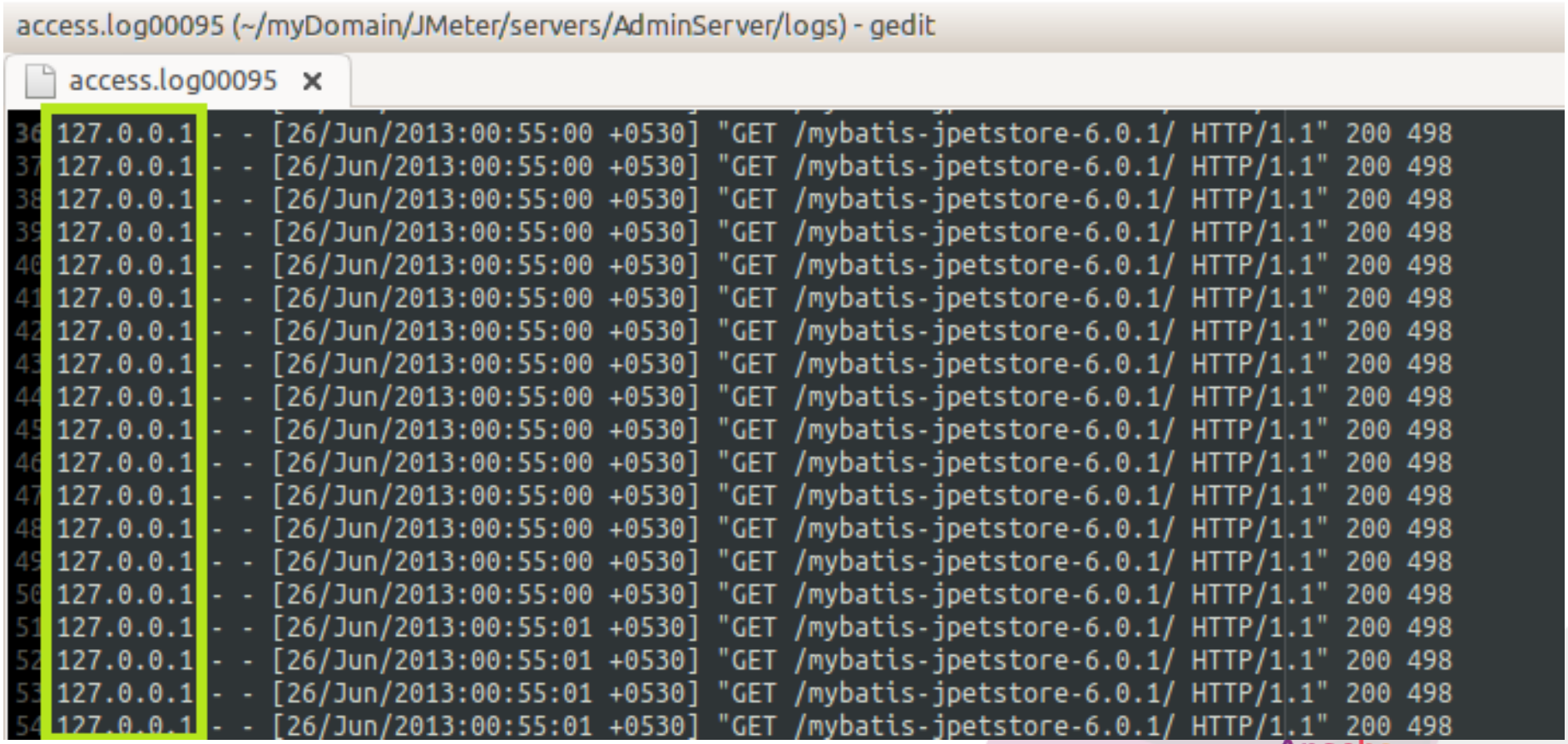


Figure: Server records same IP for each virtual user

Server Response Without IP Spoofing



```
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:00 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:01 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:01 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:01 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
127.0.0.1 - - [26/Jun/2013:00:55:01 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
```

Figure: Server records same IP for each virtual user

Server Response With IP Spoofing

access.log (~/myDomain/JMeter/servers/AdminServer/logs) - gedit

access.log

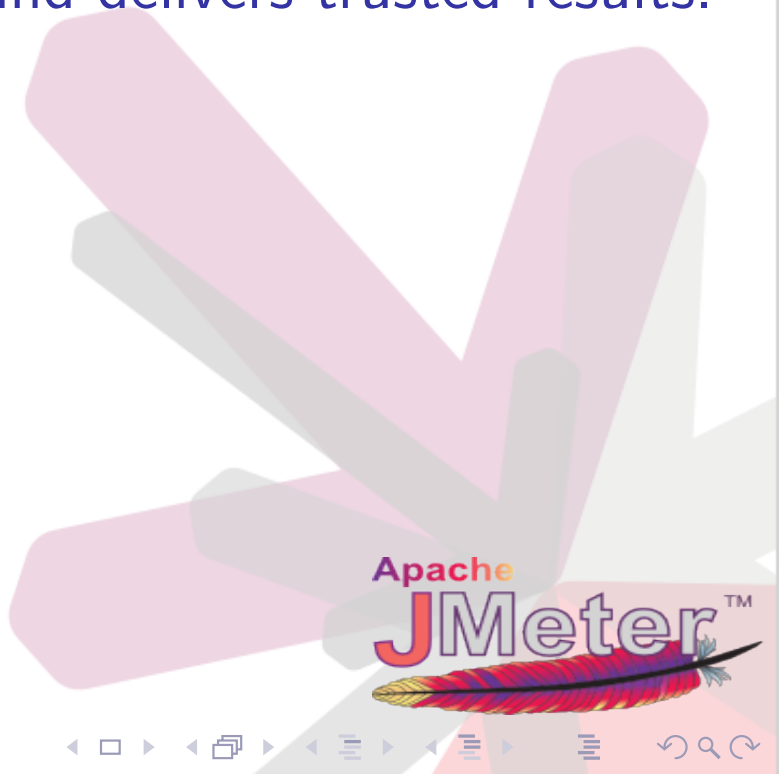
```
192.170.0.1 - - [03/Jul/2013:00:49:56 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.2 - - [03/Jul/2013:00:49:56 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.4 - - [03/Jul/2013:00:49:56 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.3 - - [03/Jul/2013:00:49:56 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.5 - - [03/Jul/2013:00:49:56 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.6 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.7 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.8 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.9 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.10 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.11 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.12 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.13 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.14 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.15 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.16 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.17 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.18 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.19 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
192.170.0.20 - - [03/Jul/2013:00:49:57 +0530] "GET /mybatis-jpetstore-6.0.1/ HTTP/1.1" 200 498
```

Figure: Server records distinct IP for each virtual user

Automating TPC-C Benchmarking

Automating TPC-C Benchmarking

- TPC- Transaction Processing Council It defines transaction processing and database benchmarks and delivers trusted results.



Automating TPC-C Benchmarking

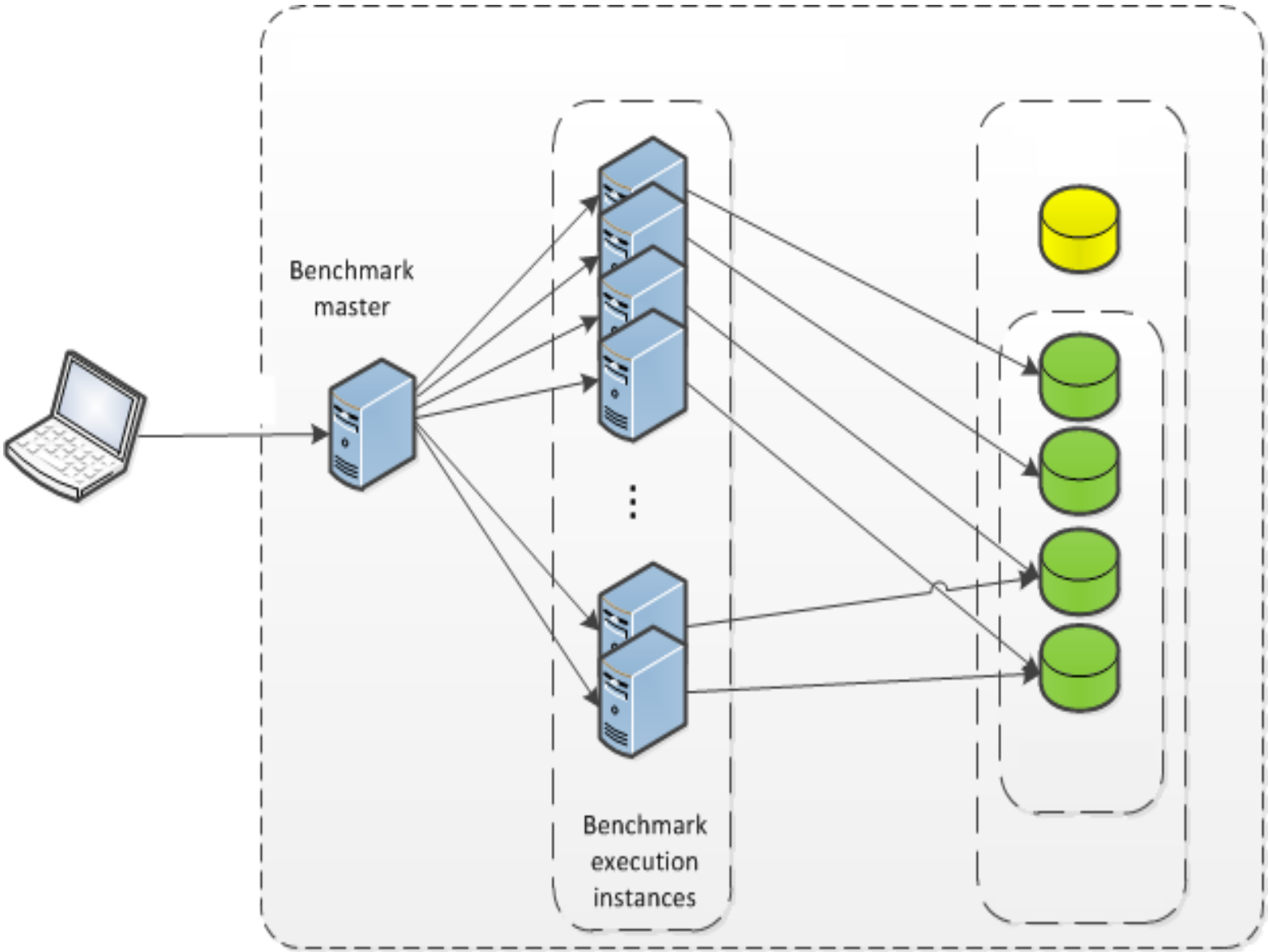
- TPC- Transaction Processing Council It defines transaction processing and database benchmarks and delivers trusted results.
- Some benchmarks undertaken under TPC:
  - TPC-APP
  - TPC-H
  - TPC-C

WHY TPC-C?

- A number of these benchmarks have been deprecated. TPC-C is currently in use and a rather complex process.
- A number of business houses use this benchmark to showcase their performance for OLTP transactions. It gives the measure of Server speed for online transaction processing.

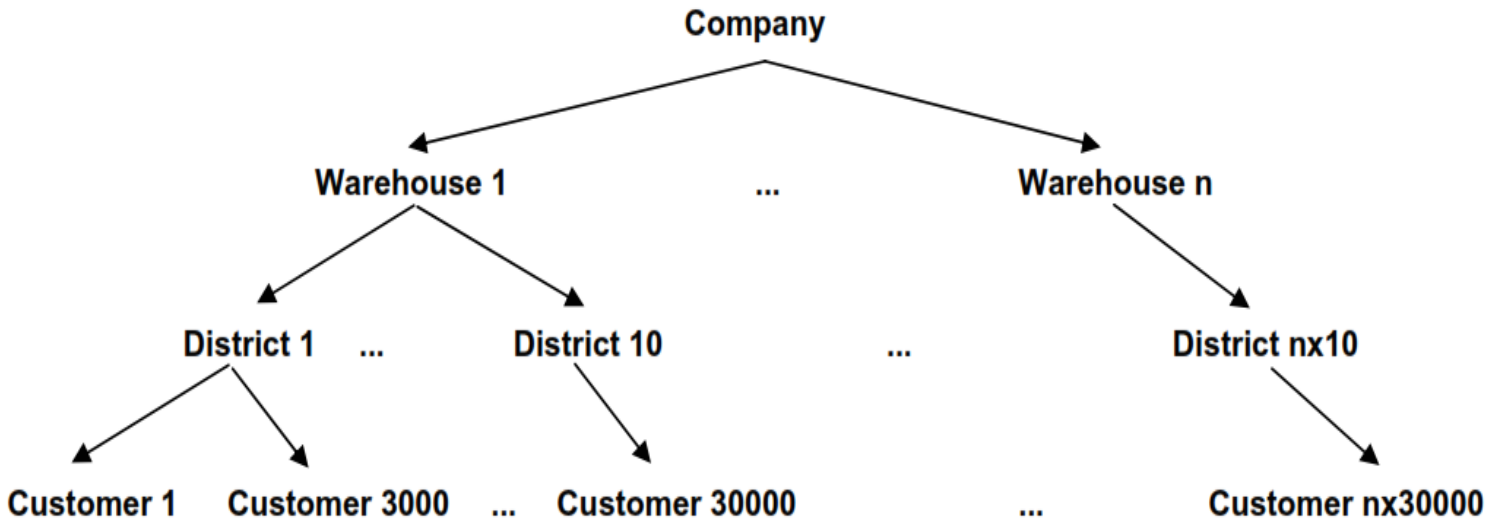
- The actual benchmarking process is a time taking and a costly affair.
- A preliminary test would be a highly useful tool to test a server for performance and hence improve it where it lacks.

The Benchmarking Model



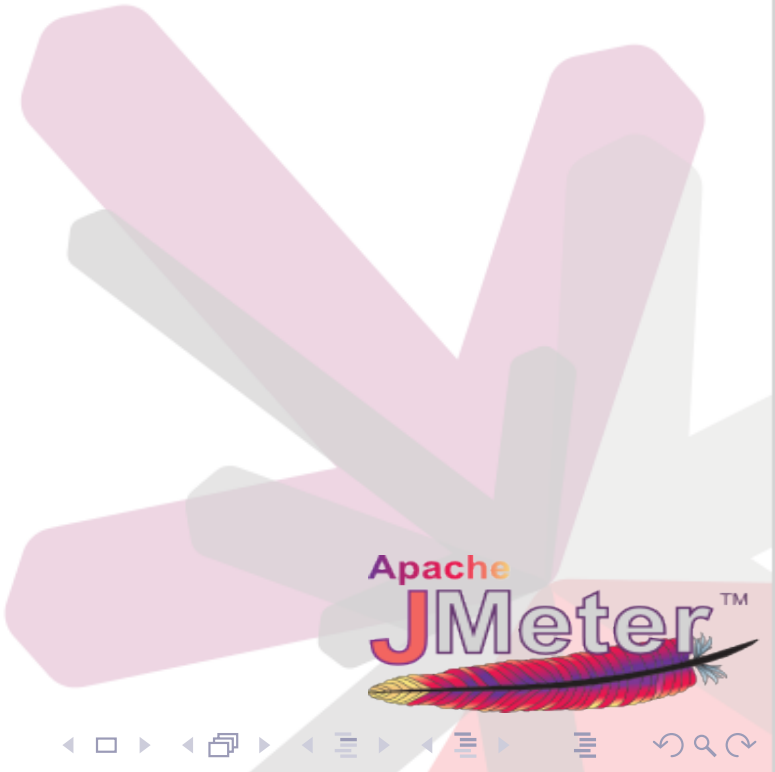
The Benchmarking Model

The model emulated for TPC-C



Tables in the TPC-C schema

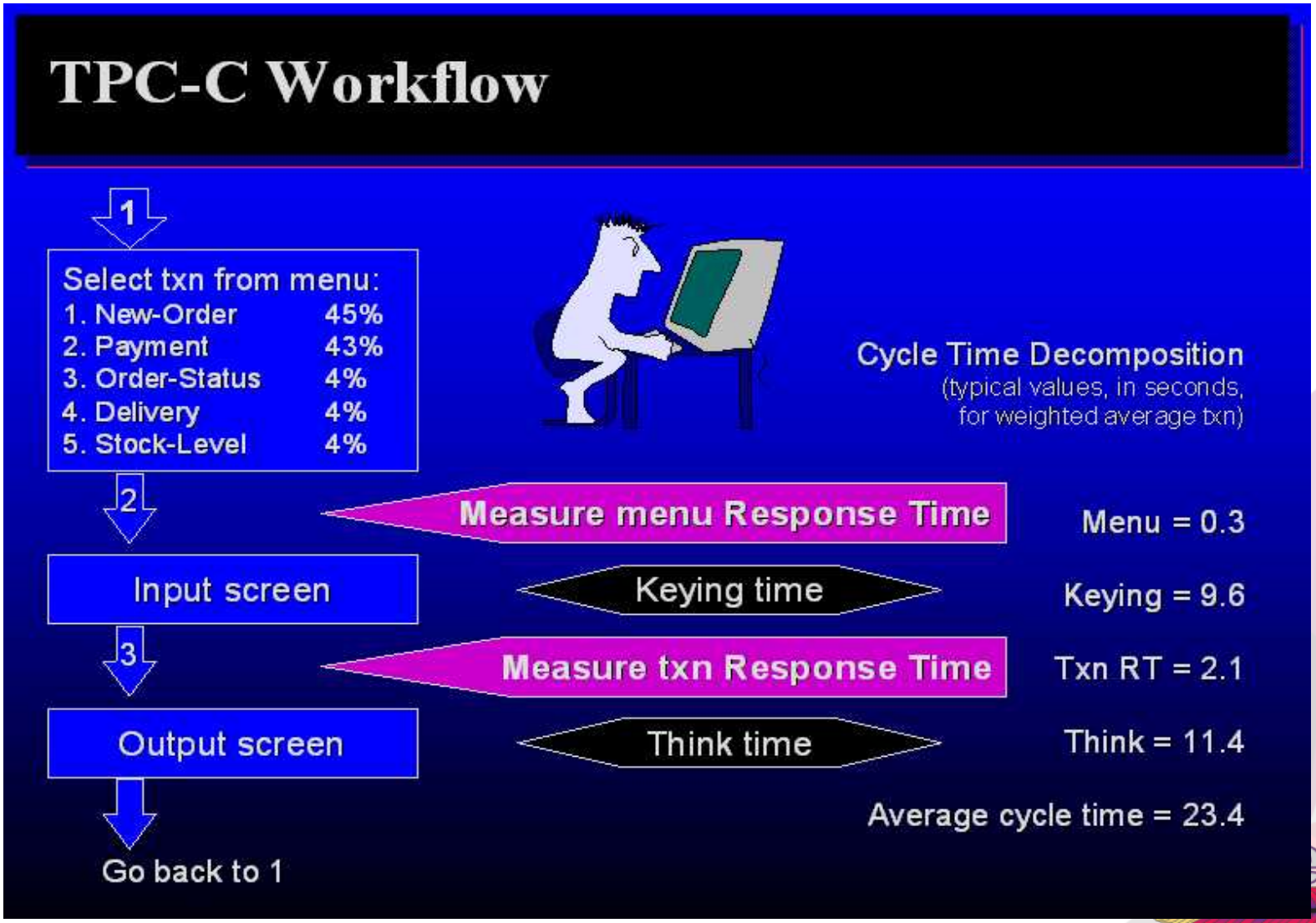
- Item
- Warehouse
- History
- District
- Customer
- New Order
- Orders
- Order Line
- Stock



Transactions

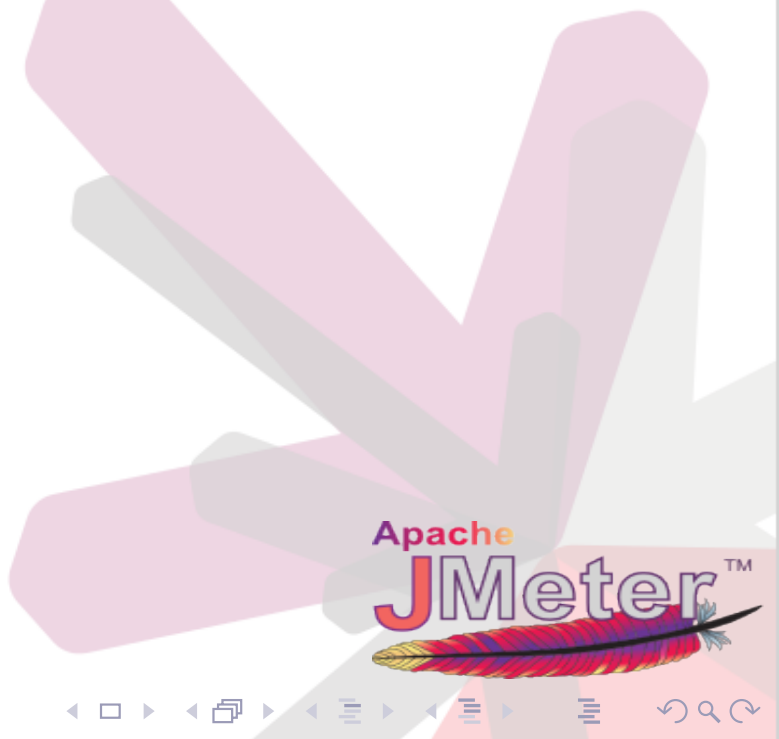
- New-order: enter a new order from a customer
- Payment: update customer balance to reflect a payment
- Delivery: deliver orders
- Order-status: retrieve status of customers most recent order
- Stock-level: monitor warehouse inventory

TPC-C Workflow



Why JMeter to automate??

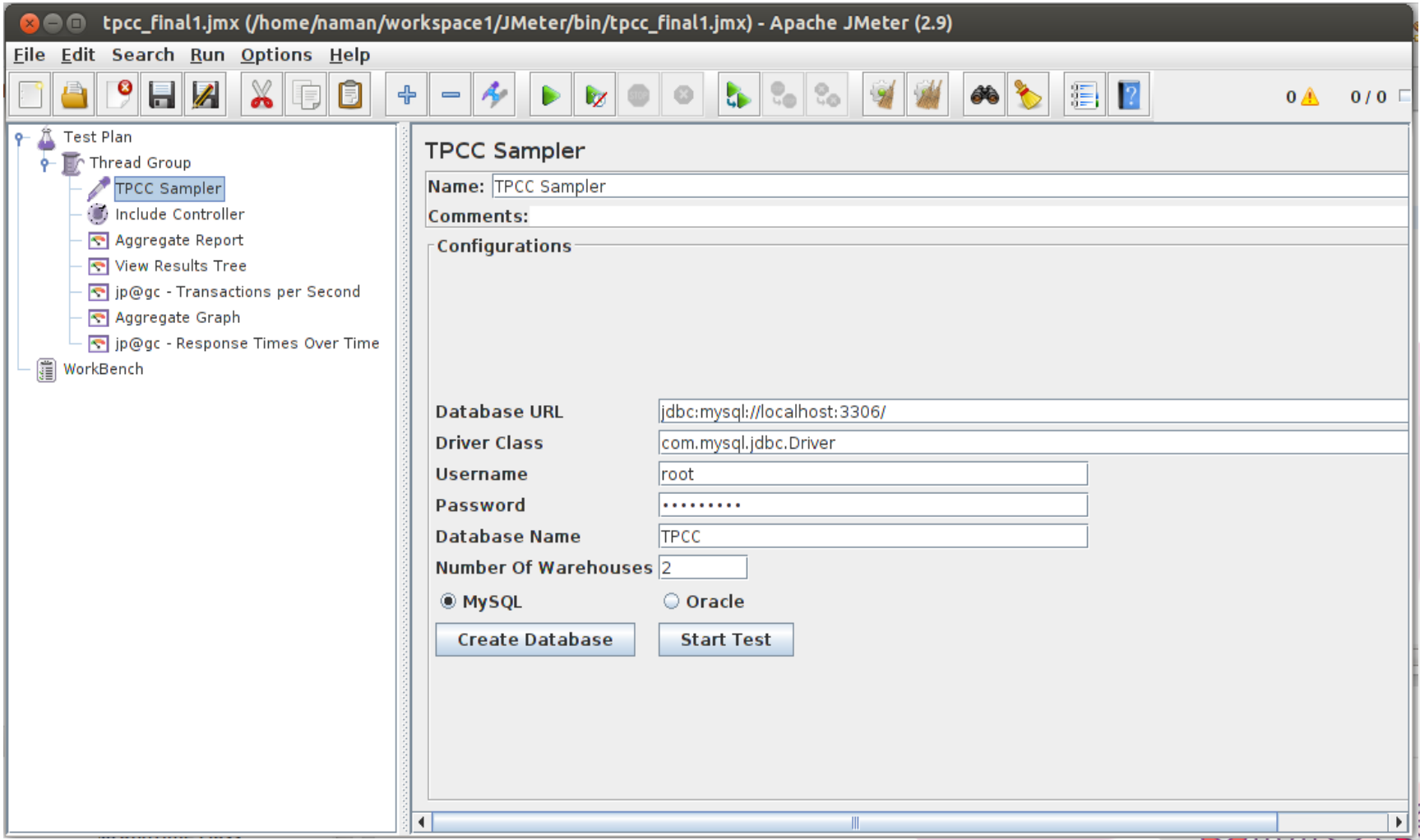
- JMeter is already capable of spawning a large number of virtual users to simulate the interaction of the real users with the system under test.



Why JMeter to automate??

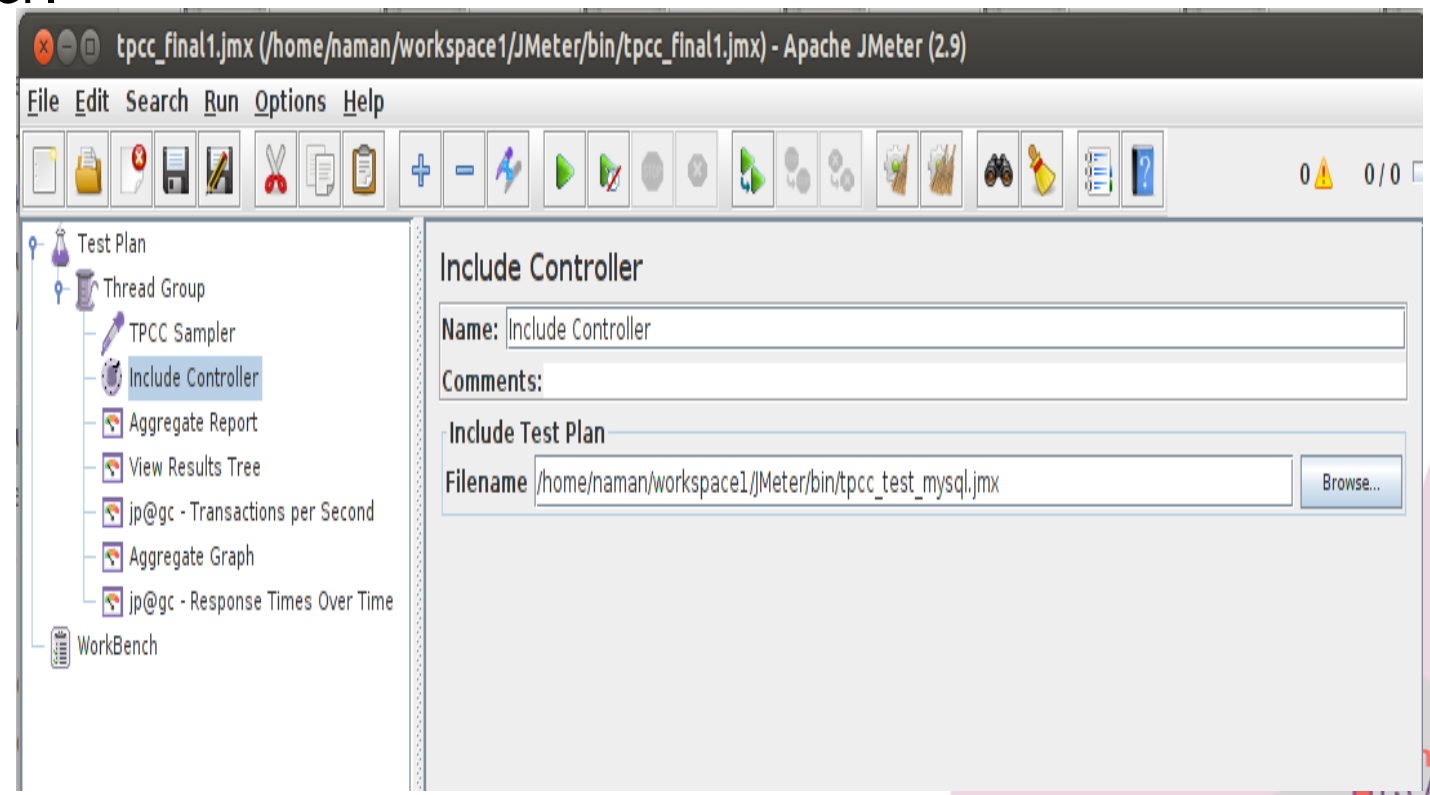
- JMeter is already capable of spawning a large number of virtual users to simulate the interaction of the real users with the system under test.
- The firing of a request and measurement of response time as well as throughput is embedded in JMeter.

TPC-C Testing in JMeter

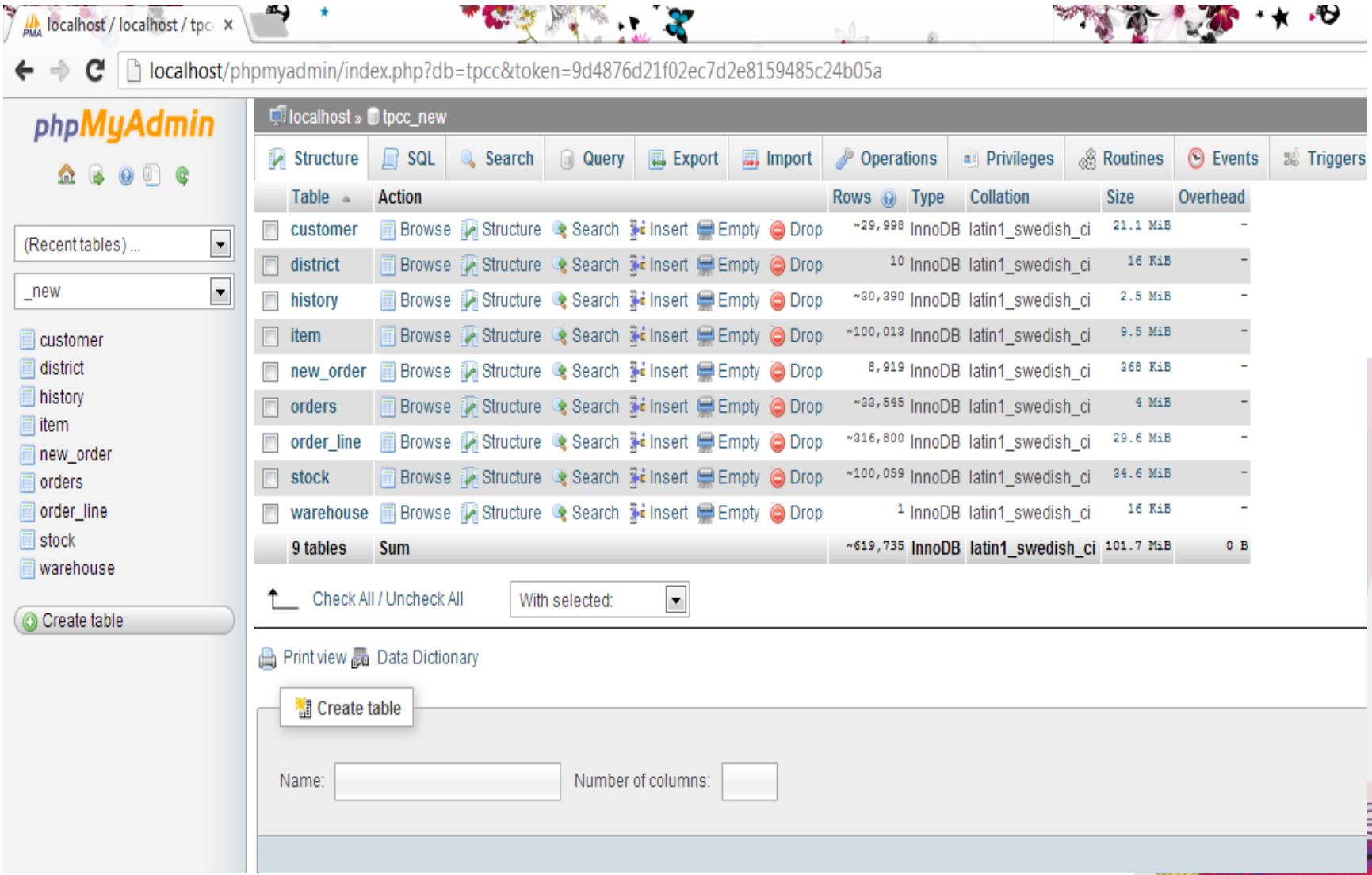


Controllers

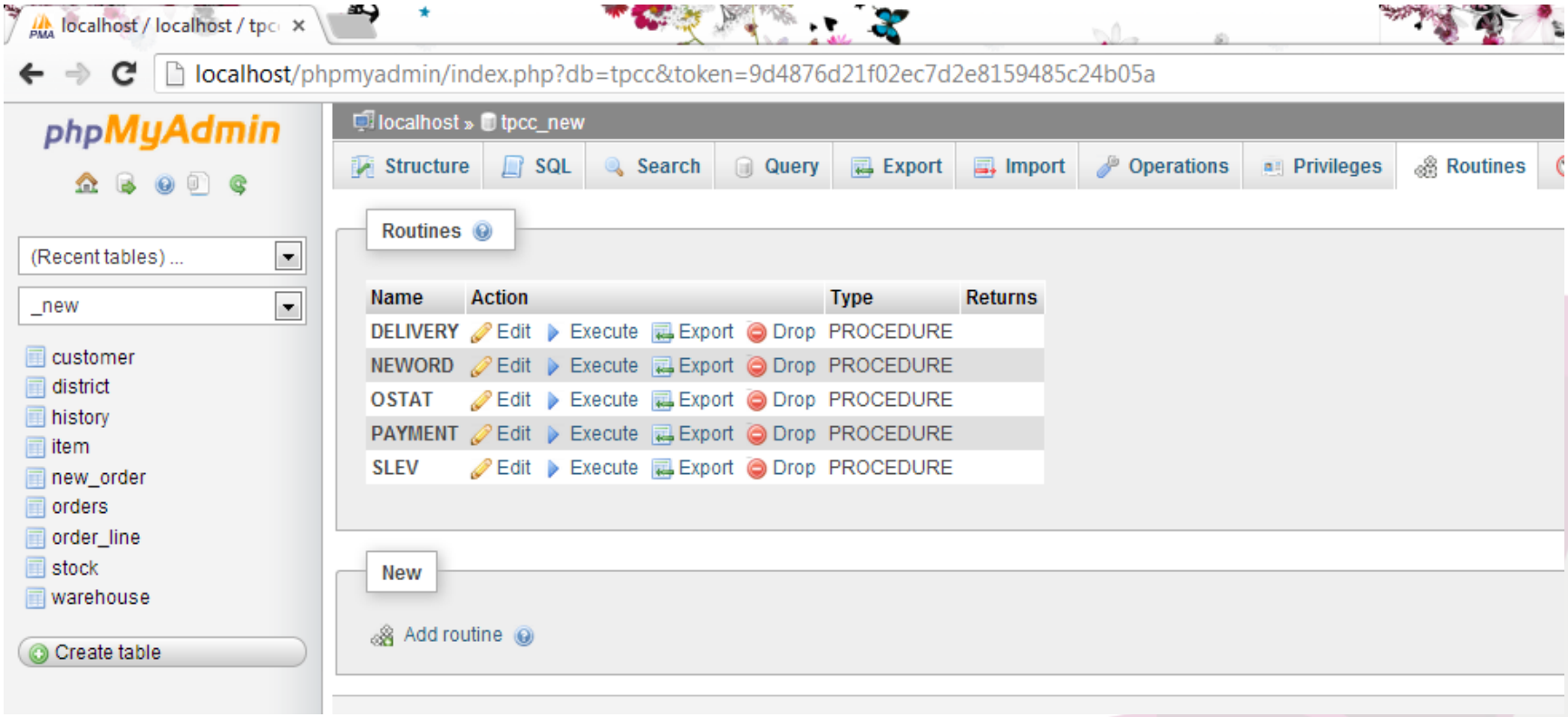
Include Controller is a component of JMeter used to run saved scripts in JMeter.



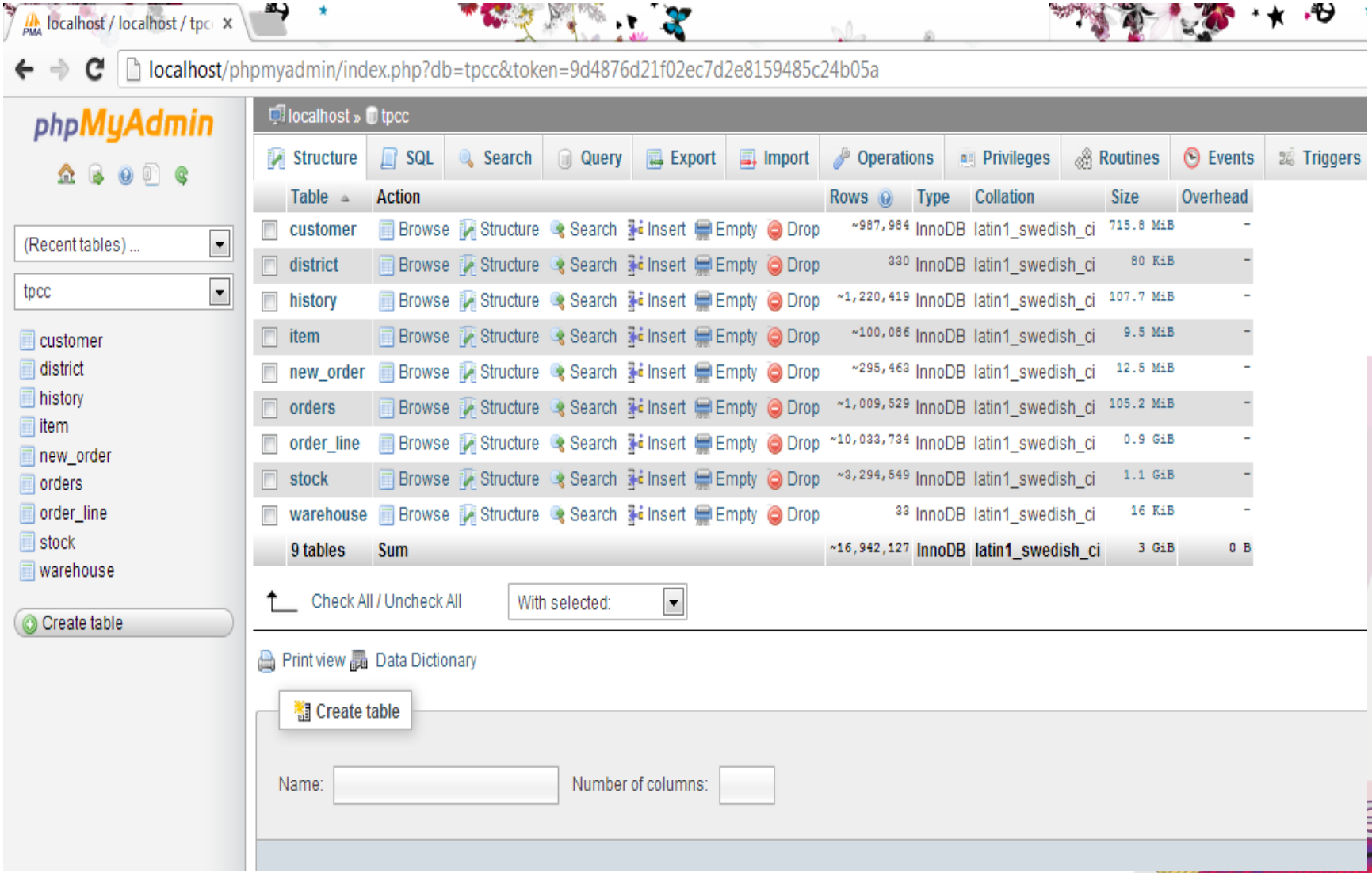
Test with 1 warehouse



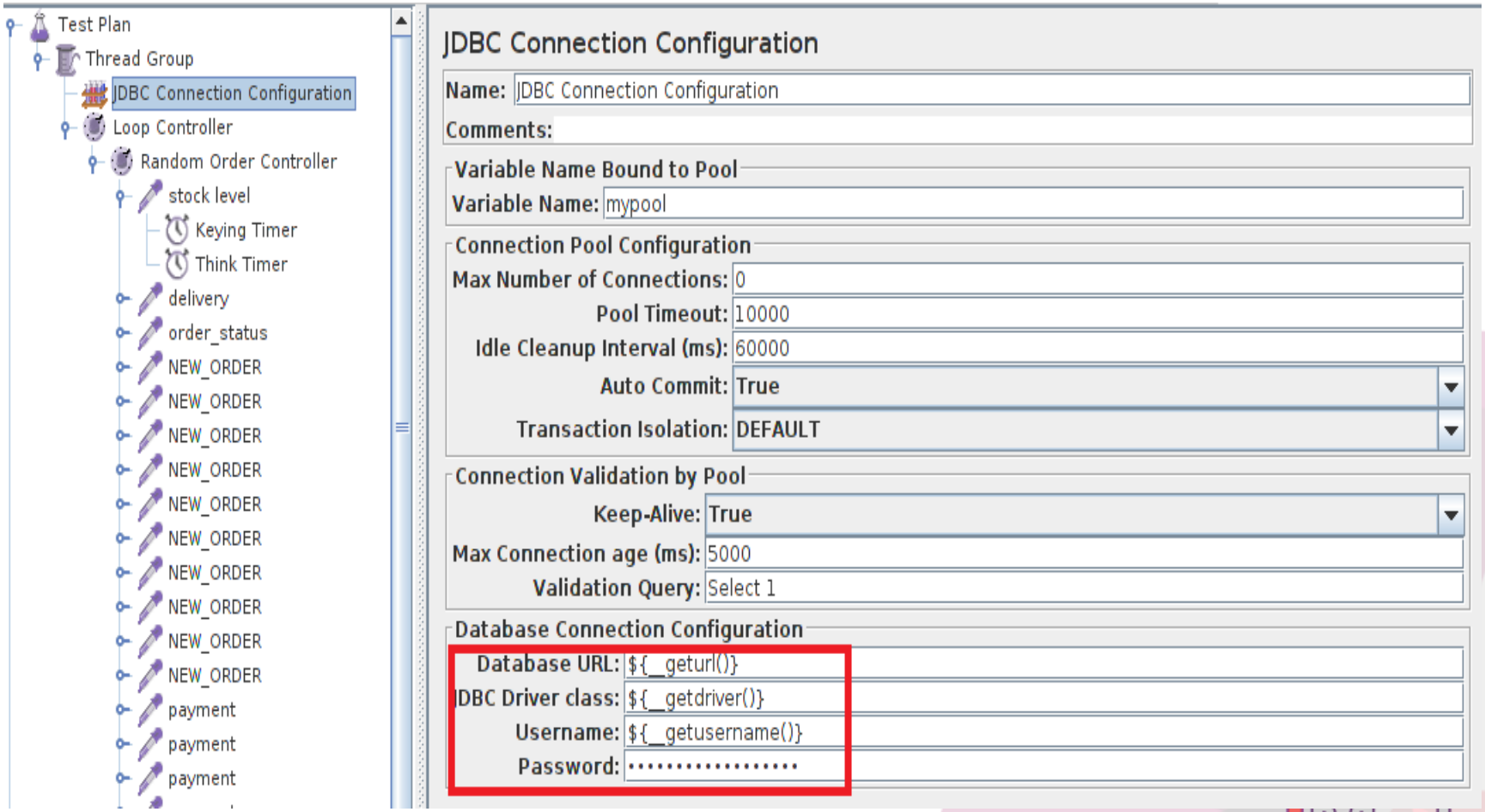
Procedures


localhost / localhost / tpc
localhost/phpmyadmin/index.php?db=tpcc&token=9d4876d21f02ec7d2e8159485c24b05a
phpMyAdmin
(Recent tables) ...
_new
customer
district
history
item
new_order
orders
order_line
stock
warehouse
Create table
localhost » tpcc_new
Structure
SQL
Search
Query
Export
Import
Operations
Privileges
Routines
Routines
Name
Action
Type
Returns
DELIVERY Edit Execute Export Drop PROCEDURE
NEWORD Edit Execute Export Drop PROCEDURE
OSTAT Edit Execute Export Drop PROCEDURE
PAYMENT Edit Execute Export Drop PROCEDURE
SLEV Edit Execute Export Drop PROCEDURE
New
Add routine

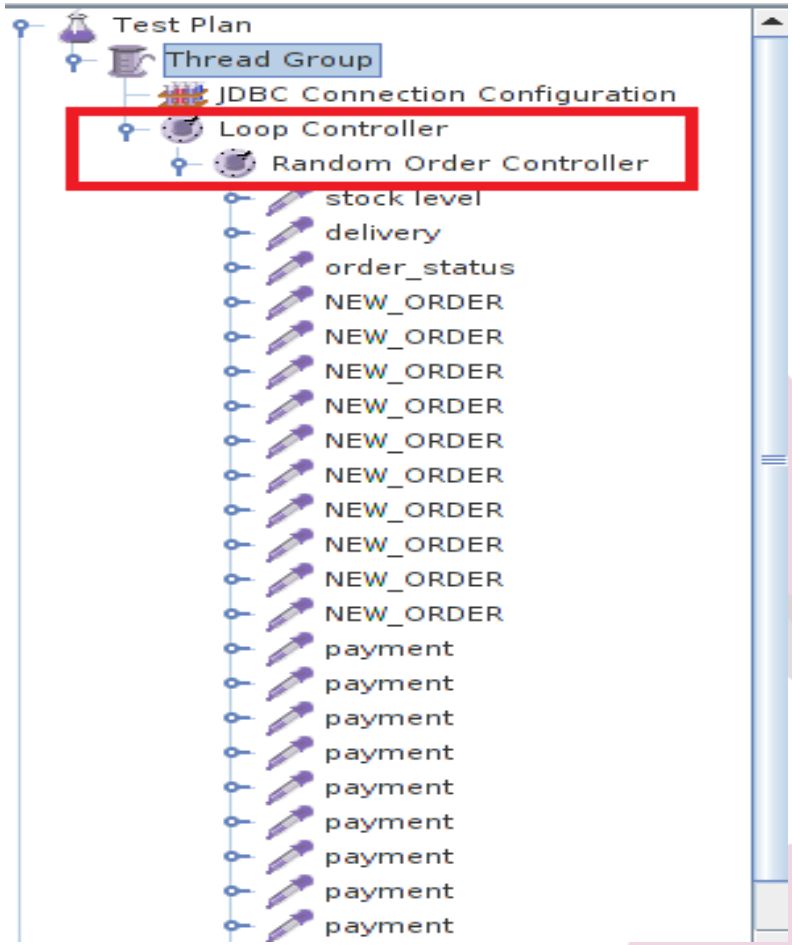
Test with 33 Warehouses



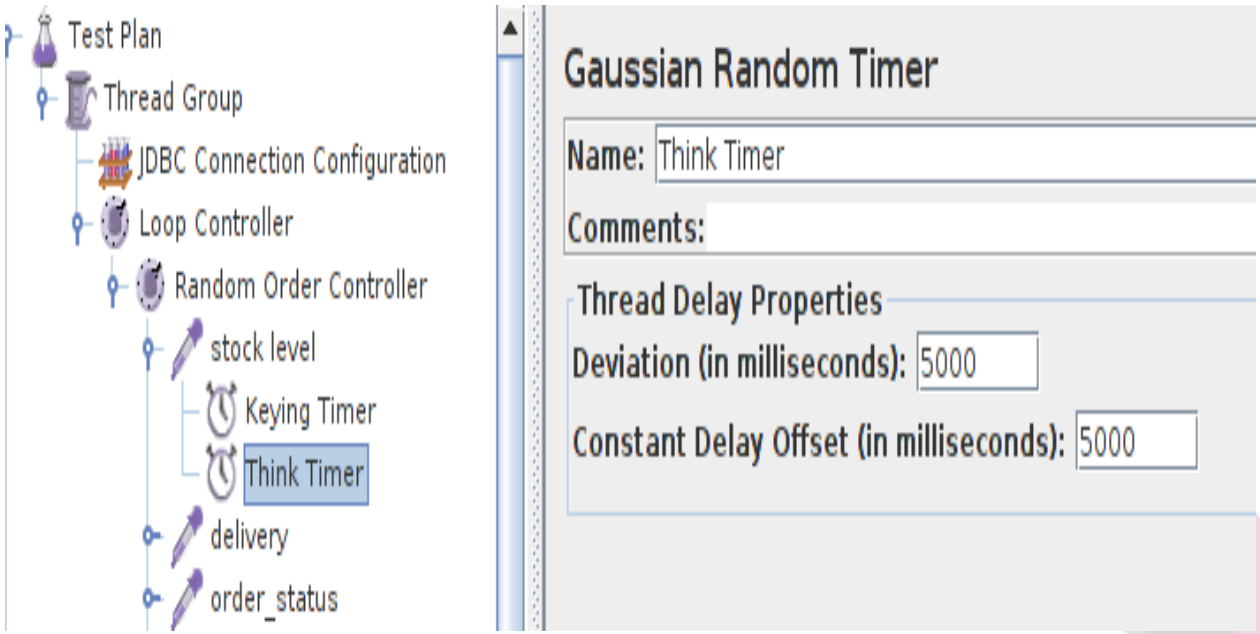
JDBC Configuration



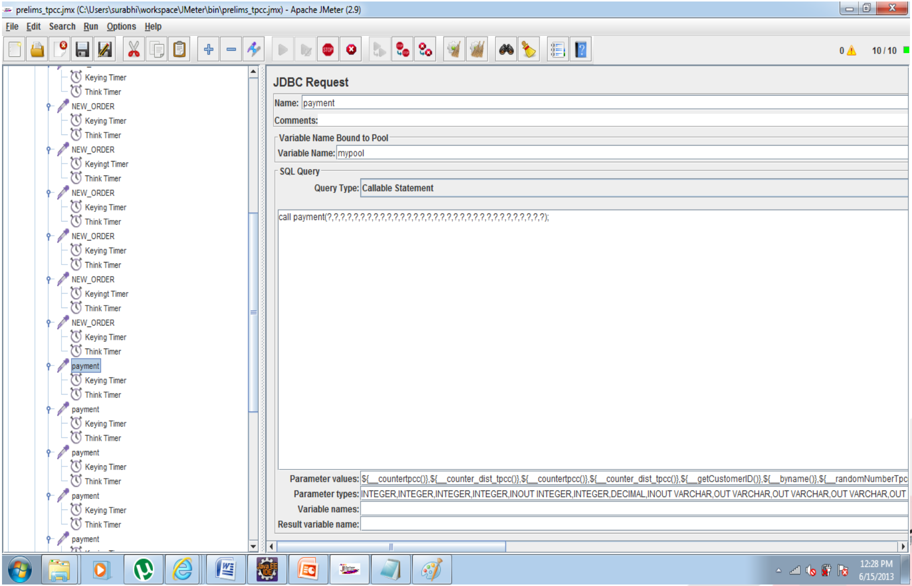
Controllers



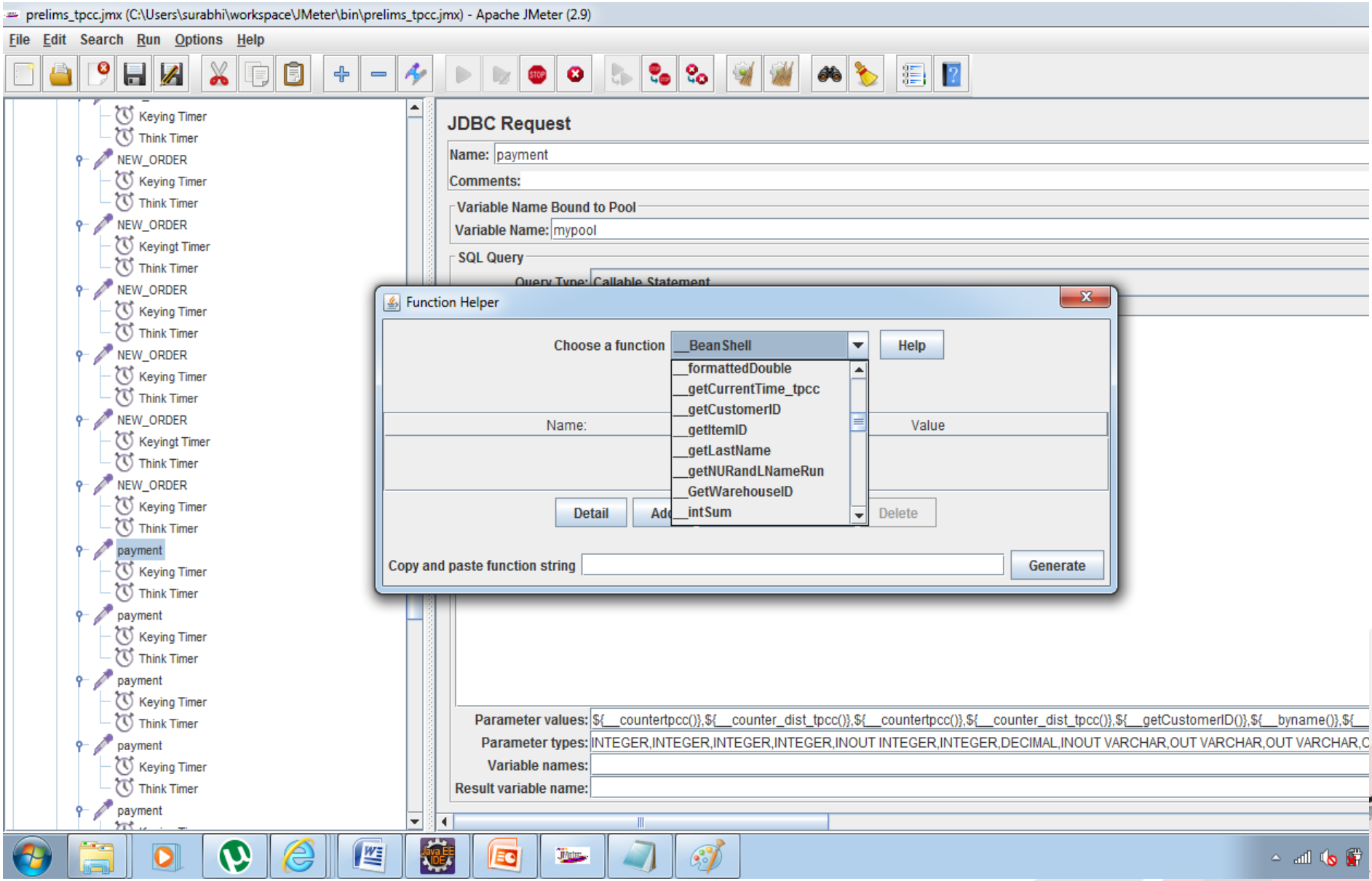
Timers


Test Plan
Thread Group
JDBC Connection Configuration
Loop Controller
Random Order Controller
stock level
Keying Timer
Think Timer
delivery
order_status
Gaussian Random Timer
Name: Think Timer
Comments:
Thread Delay Properties
Deviation (in milliseconds): 5000
Constant Delay Offset (in milliseconds): 5000

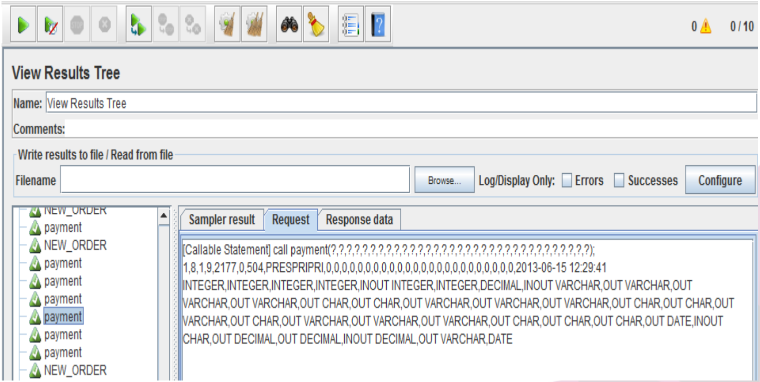
Transaction Call



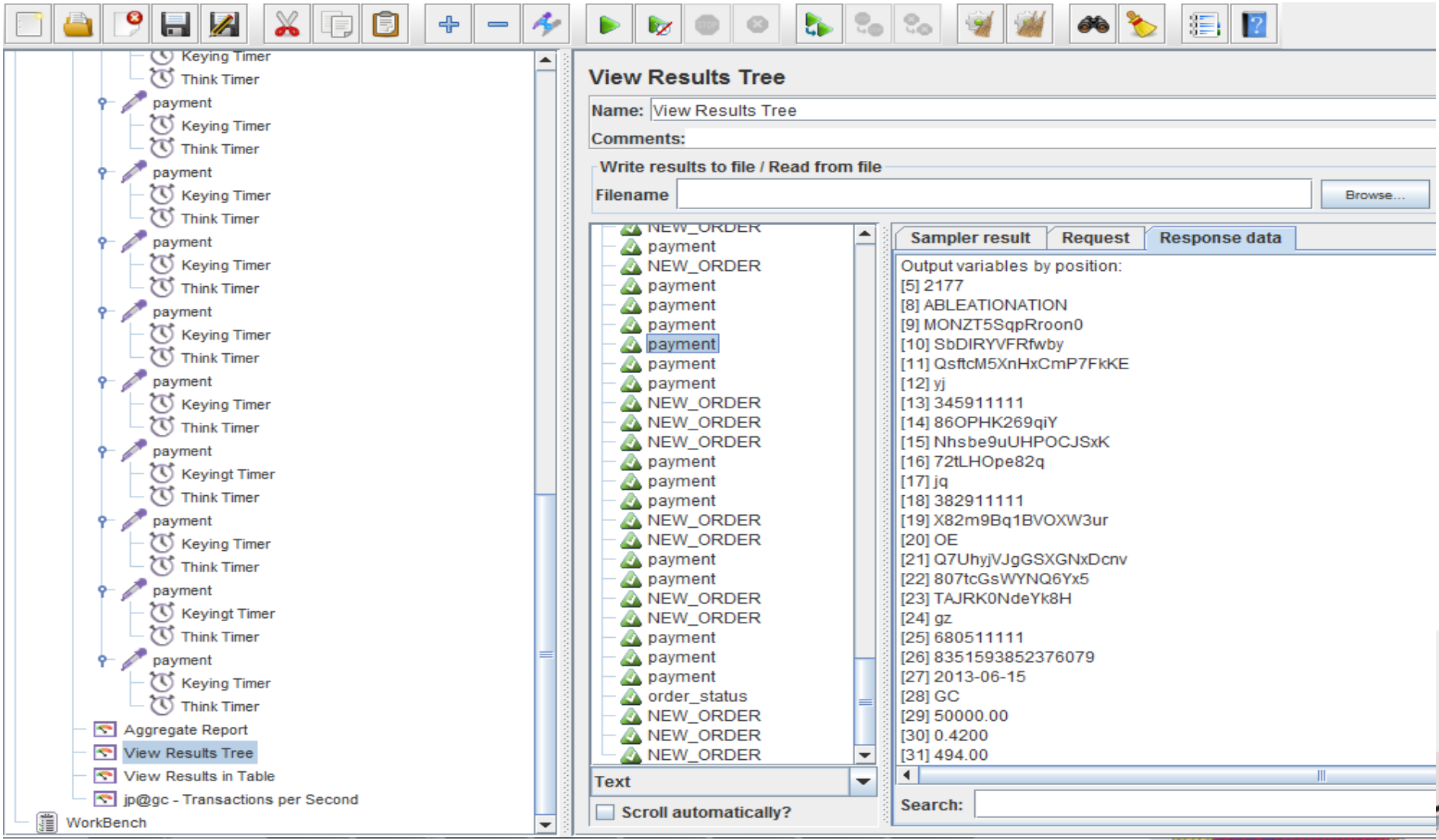
Function Helper



Procedure Request



Response


Keying Timer
Think Timer
payment
Keying Timer
Think Timer
payment
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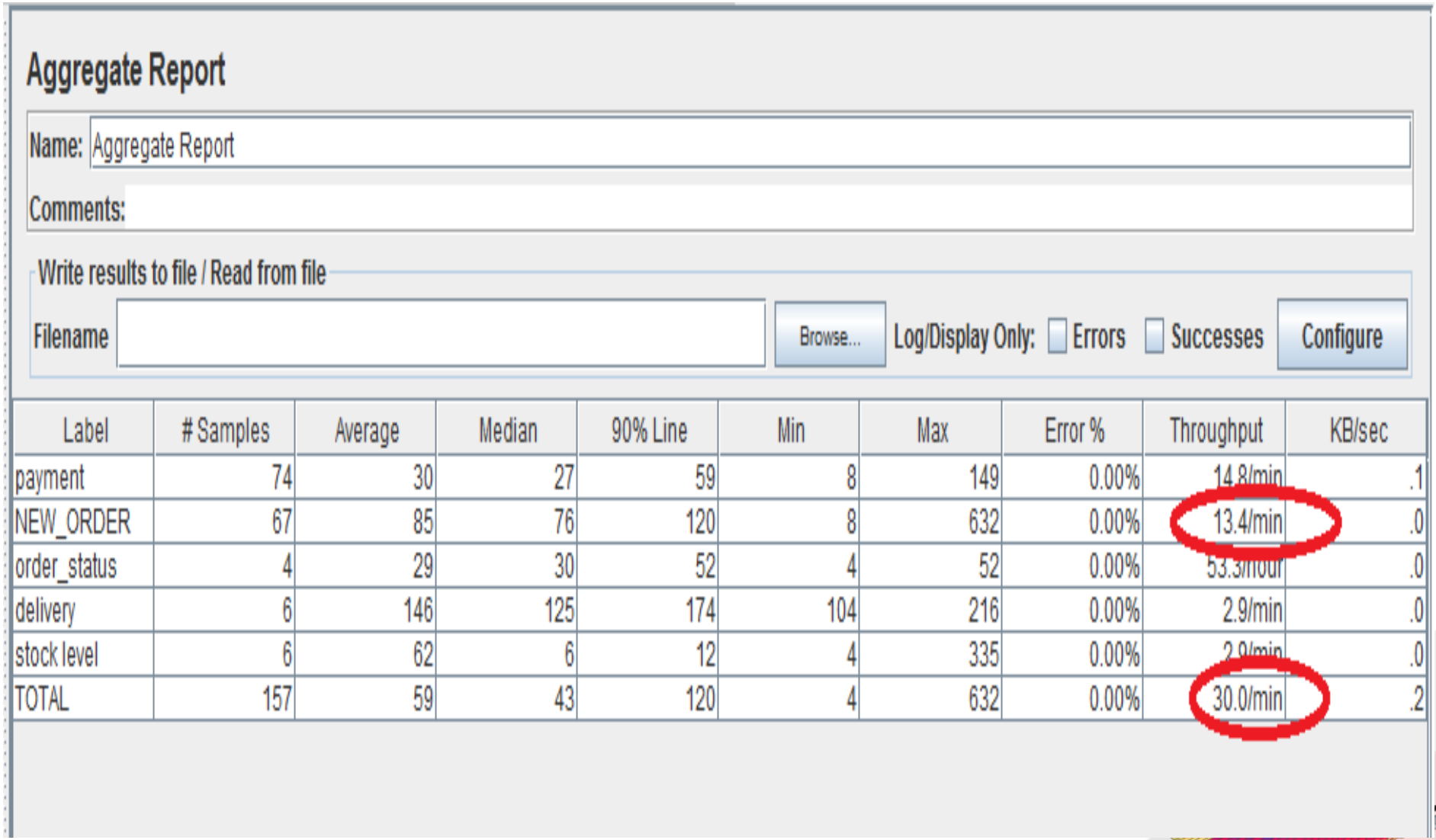
payment
Keying Timer
Think Timer
Aggregate Report
View Results Tree
View Results in Table
jp@gc - Transactions per Second
WorkBench
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse...
NEW_ORDER
payment
NEW_ORDER
payment
payment
payment
payment
payment
payment
NEW_ORDER
NEW_ORDER
NEW_ORDER
payment
payment
payment
NEW_ORDER
NEW_ORDER
payment
payment
NEW_ORDER
NEW_ORDER
payment
payment
payment
order_status
NEW_ORDER
NEW_ORDER
NEW_ORDER
Text
Scroll automatically?
Sampler result
Request
Response data
Output variables by position:
[5] 2177
[8] ABLEATIONATION
[9] MONZT5SqpRroon0
[10] SbDIRYVFRfwby
[11] QsftcM5XnHxCmP7FkKE
[12] yj
[13] 345911111
[14] 86OPHK269qiY
[15] Nhsbe9uUHPOCJSxK
[16] 72tLHOpe82q
[17] jq
[18] 382911111
[19] X82m9Bq1BVOXW3ur
[20] OE
[21] Q7UhyjVJgGSXGNxDcnv
[22] 807tcGsWYNQ6Yx5
[23] TAJRK0NdeYk8H
[24] gz
[25] 680511111
[26] 8351593852376079
[27] 2013-06-15
[28] GC
[29] 50000.00
[30] 0.4200
[31] 494.00
Search:

Aggregate Report



Aggregate Report

Name: Aggregate Report

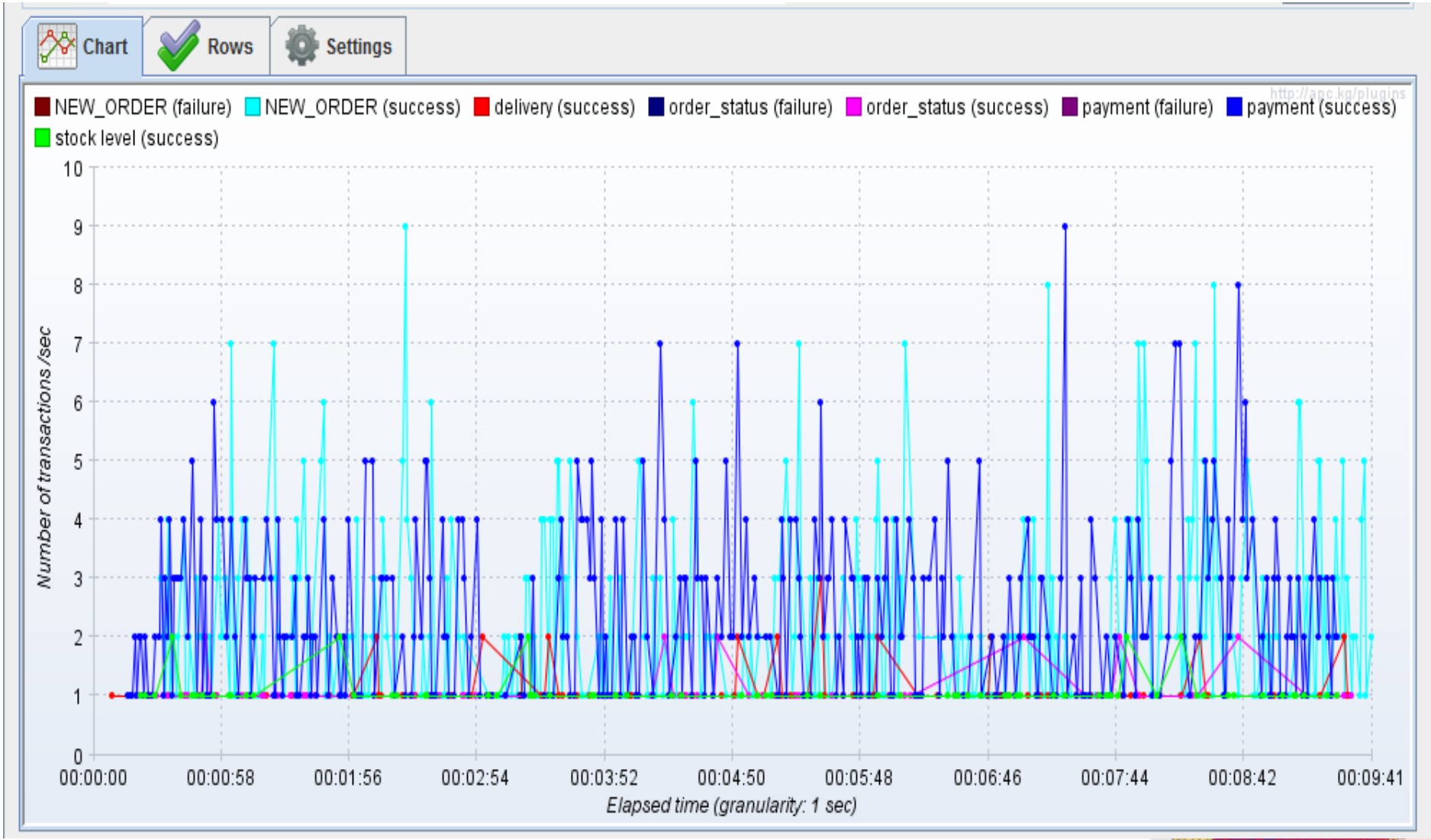
Comments:

Write results to file / Read from file

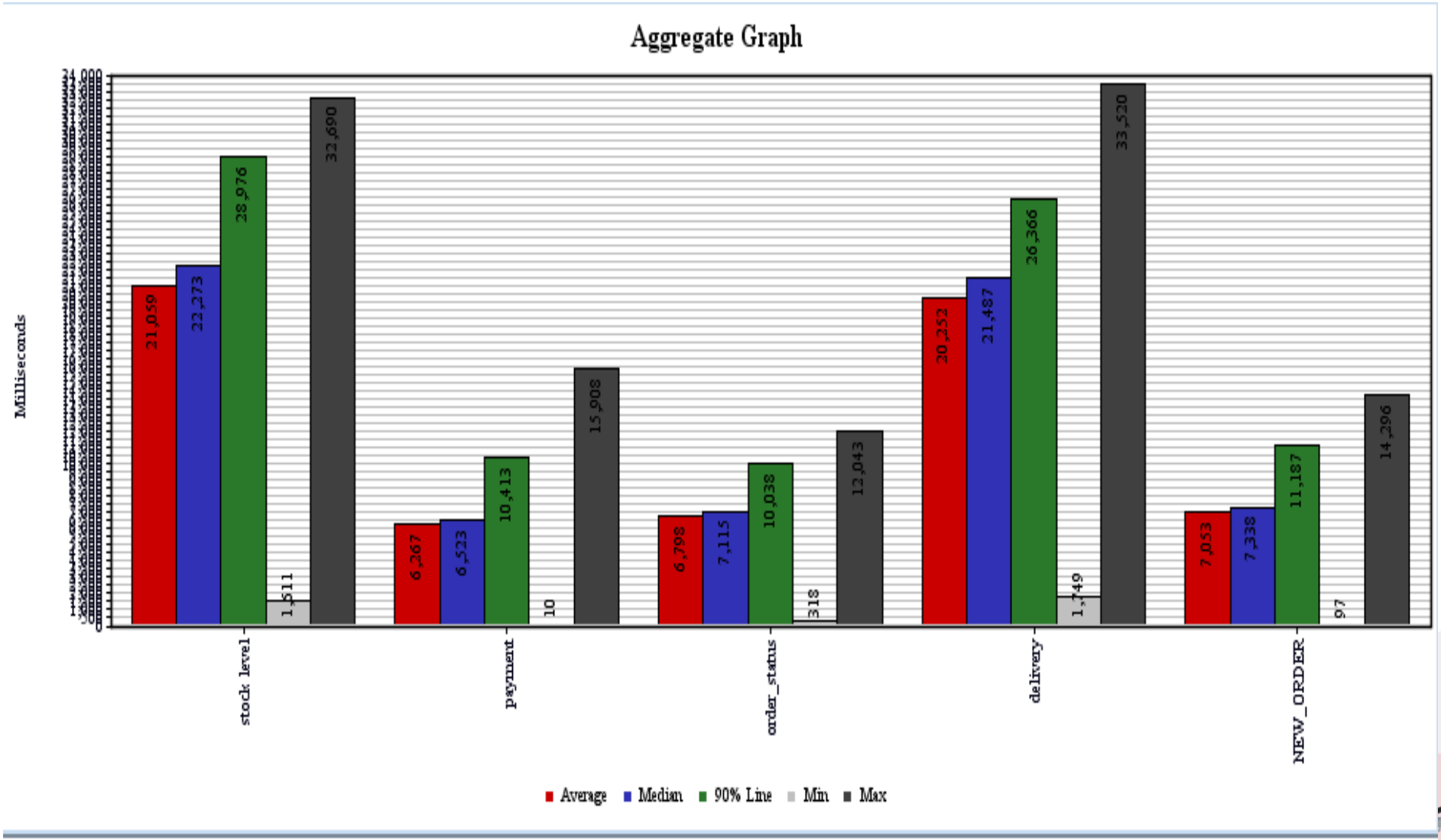
Filename | Browse... | Log/Display Only: Errors Successes | Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
payment	74	30	27	59	8	149	0.00%	14.8/min	.1
NEW_ORDER	67	85	76	120	8	632	0.00%	13.4/min	.0
order_status	4	29	30	52	4	52	0.00%	53.3/hour	.0
delivery	6	146	125	174	104	216	0.00%	2.9/min	.0
stock level	6	62	6	12	4	335	0.00%	2.9/min	.0
TOTAL	157	59	43	120	4	632	0.00%	30.0/min	.2

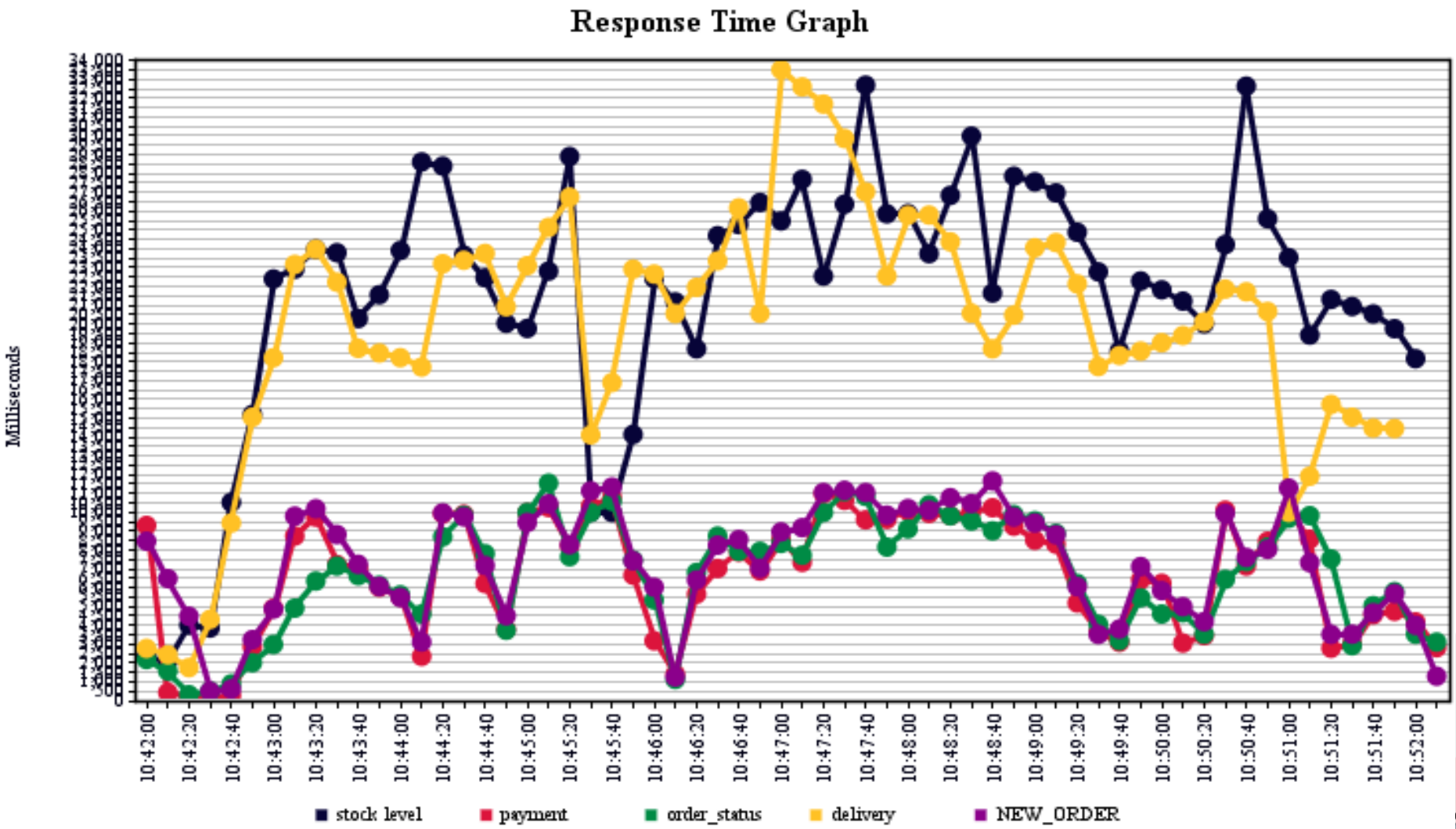
Transactions per second



Aggregate Graph

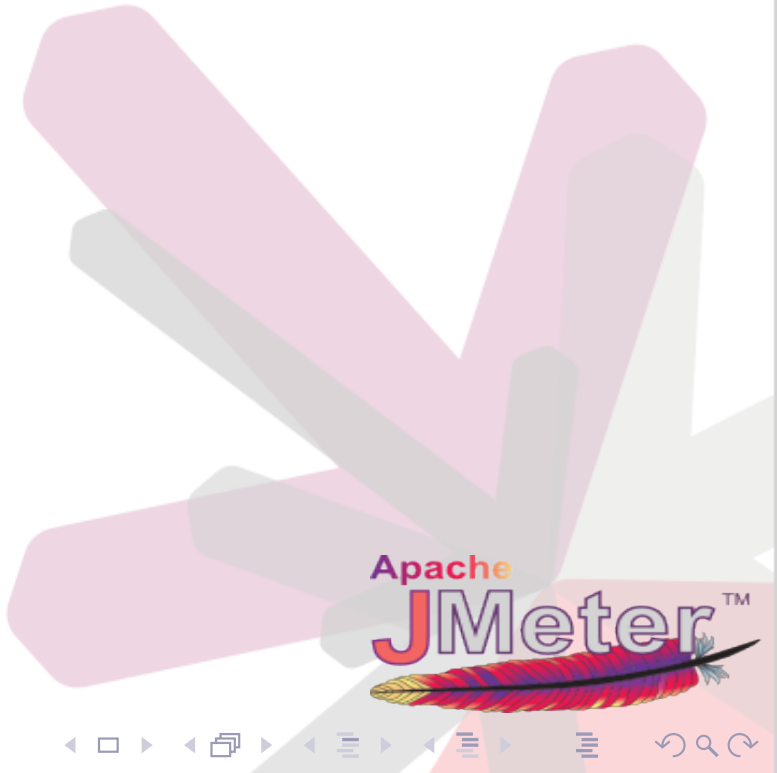


Response time over time



Challenges

1. Auto CSV Generation:
   Generating CSV file for a particular table from a specified Database



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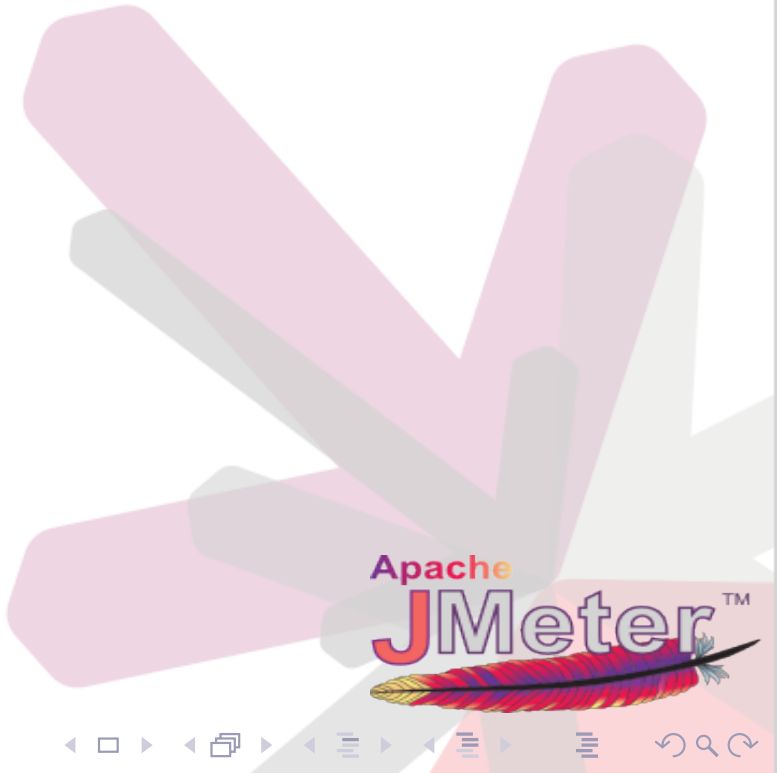
   Finding an array of un-used IPs and automating allocation of virtual IPs for a system
4. Automating TPC-C testing:
   Making tpcc testing capable of being run with different databases incroporating all the standards into JMeter

Future Work

1. Incorporating other Benchmarking support such as TPC-H, TPC-E etc. into JMeter.



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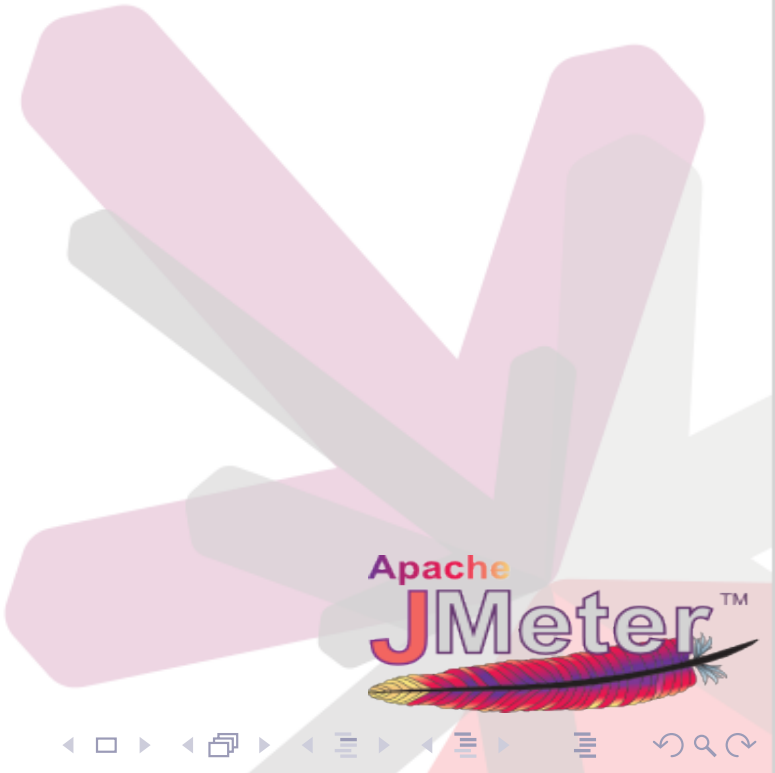
5. Better analysis of the results produced by JMeter via some complex graphs and better comparison between different graph results.

Conclusion

- The basic aim of the project was to enhance JMeter with the introduction of some new features and overcome some drawbacks.



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- We have made JMeter capable of performing more practical tests with the introduction of bandwitdh throttling and IP Spoofing.
- The user friendliness of JMeter has been improved with the introduction of auto csv generation and results filtering.
- Finally Jmeter has been extended from just a load testing tool to a Preliminary TPC-C benchmarking tool.

References

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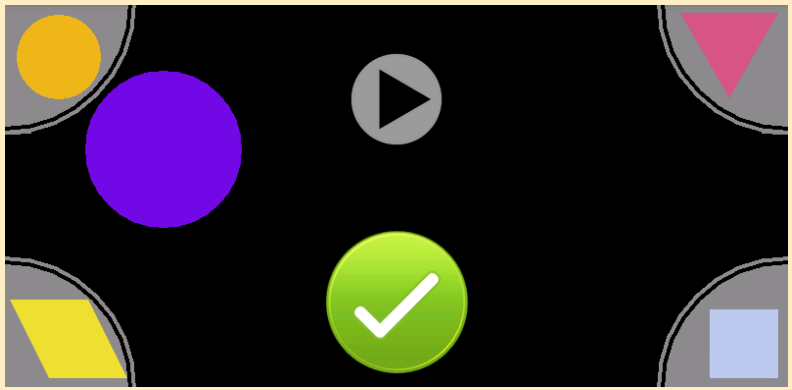
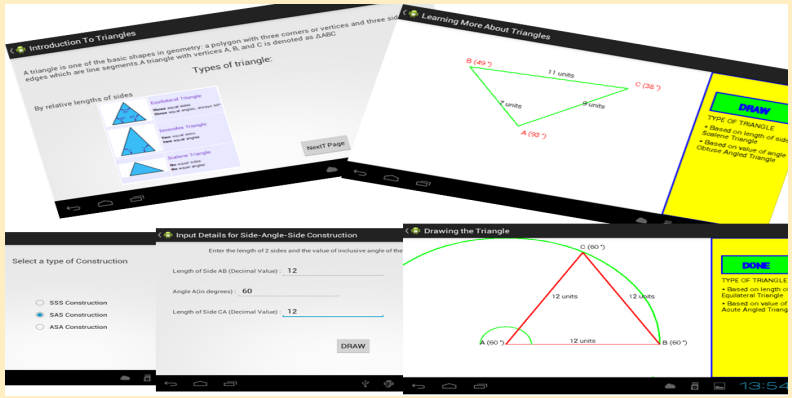
Educational Application

Learning Shapes



A simple application to teach young minds the sense of shapes and colors. This app tests the recognition skill shapes and colors among children

Traingles for High School



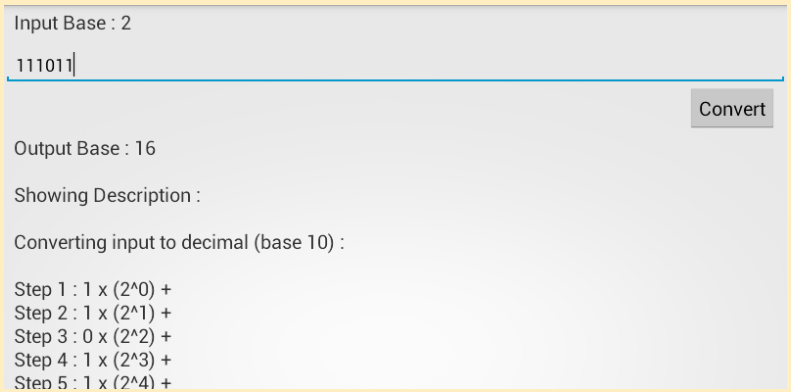
An application to aid learning about Triangles, allows construction of Triangles, also drawing Triangles from user Input

Educational Application

Mathematics Playground

Best friend of any student during examination for quick revision of the formulas.The detailed proofs and animation helps the student in recalling the logic behind the formula

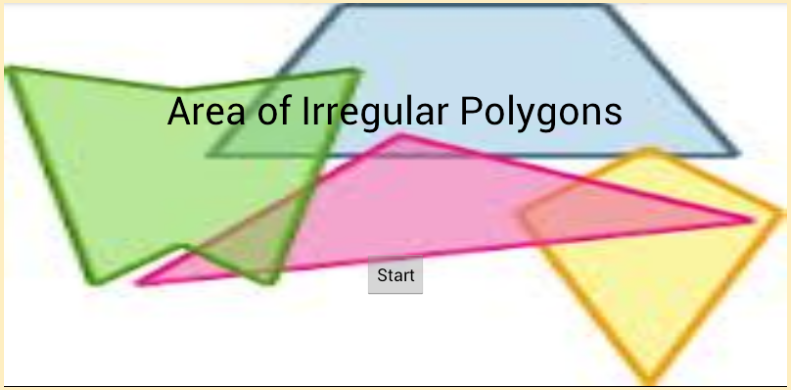
Base Conversion



This application teaches Base Conversion, it describes the conversion procedure from any positive integral base to any other positive integral base

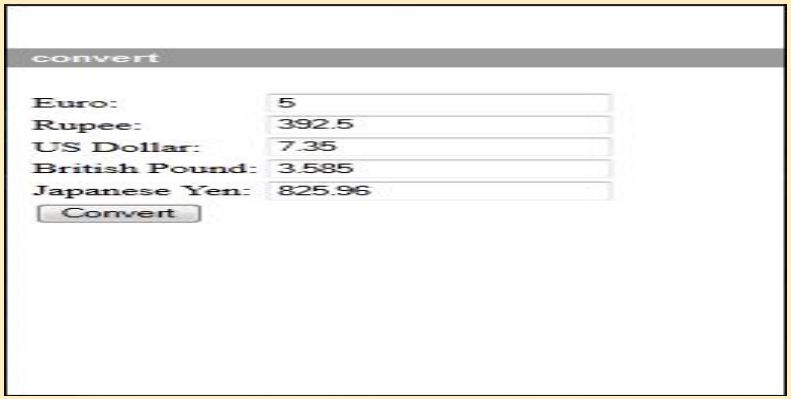
Educational Application

Area of Polygons



This application teaches methods to calculate area of any Polygon. Polygon is drawn by user input and area is calculated and displayed with explanation

Currency Converter

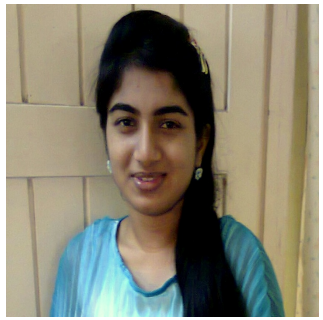


This application provides the methods of currency conversion as well as the details of the country to which the currency belongs.

Enhancement of JMeter - Team Members

B. Sushmitha

Dhruv Joshi



Manisha Choudhury

Naman Choudhary

Shekhar Saurav

Surabhi Mour