JMeter Testing

Introduction:

This document provides an overview of performance testing which mainly focuses on Web application performance testing. The different types of tests involved are performance testing,load testing and stress testing.Apache jmeter is a desktop application used to simulate heavy load on a server,group of servers,network or object to test its strength or to analyze overall performance under different load types.

Performance testing:
Performance testing is used to ascertain how the components of a system are performing,given a particular scenario.Resource usage,scalability and reliability of the product are also validated under this testing.
The various activities performed during performance testing of any application include
Creating user scenarios
User distribution
Scripting
Dry run of the application
Running a load test and analyzing the result

Load Testing:
Load testing is a part of performance testing.Load testing is meant to test the system by constantly and steadily increasing the load on the system,till the time it reaches the threshhold limit.

Stress Testing:
Stress testing is focussed on determining or validating performance characteristics of the system or application under test when subjected to conditions beyond those anticipated during production operations.

Core Activities of Performance Testing:

Identify the test environment
Identify the physical test environment and the production environment as well as the tools and resources available to the test team.The physical environment includes hardware,software and network configurations.

Identify Preformance acceptance criteria:
Identfy throughput,response time and resource utilization goals and constraints.

Plan and design tests
Identify key scenarios,detesrmine variability among representative users and how to simulate the variability.

Configure the test environment
Prepare the test environment,tools and resources necessary to execute each strategy.

Implement the test design
Develop the performance test in accordance with the test design.

Execute the test
Run and monitor the test.

Analyze results,report and retest
Analyze the data both individually and as a cross functional platform.

Test Design
Identifying key scenarios
Identify all the scenarios for a specific web application.For example,consider an online test web application. The key scenarios are

Start Test
Submit test

Identify the activities involved in each of the scenarios preparing preparing script.For example,

Login to the application
Click attempt test
Start test
Submit test
Logout

Identify the scenarios that are most commonly executed or most resource intensive.For example,
For an online test web application,the main scenario will be start test, give test and submit test.

Identify work load
The work load model defines how each of the identified scenario is executed.

Test Environment:

Preparing the test environment is the next important step.To run the load test,we need to identify and set up the machine configuration.

Software:
Operating System
Java version
Load testing tool

Hardware Requirements:
When we perform a load testing, the number of virtual users a machine can generate depends on RAM and processor.

Tool set up:
Java version: Jmeter requires a fully compliant JVM 1.5 or higher.
Operating System: Jmeter is a pure java desktop application and should run on any system that has a java compliant version.

Download Jmeter:
To download jmeter,go to the link http://jmeter.apache.org/download and download the latest version.
Download either the binaries or the source.

Installing Jmeter:
The steps to follow are
Go to the folder where you have downloaded jmeter
  cd Downloads

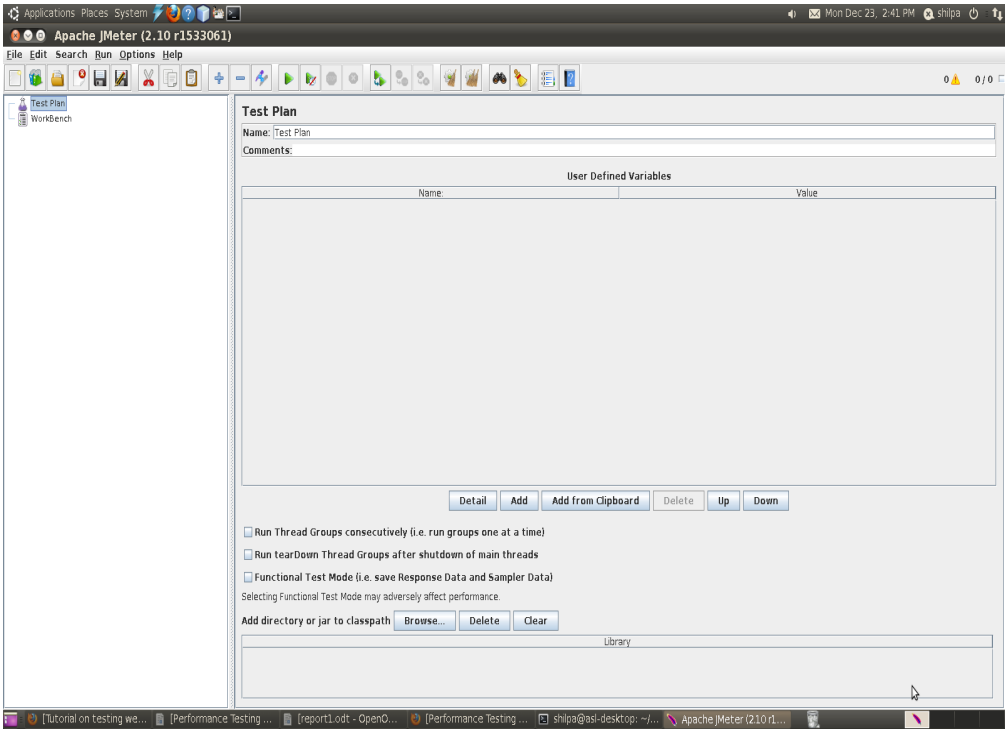
Unzip the zip file

To set the folder in a specific place,move it.
  Cp -rv apache-jmeter-2.10 /usr/local/src

Modify the permissions of jmeter.sh inside the folder
  ls -sail jmeter.sh
  chmod u=+xrw jmeter.sh
  ls -sail jmeter.sh

Run the jmeter.sh file
  ./jmeter.sh

This command open up the Jmeter interface.By default,two elements are shown in the left frame.



Test Plan:
A test plan describes a series of steps Jmeter will execute when run.A complete test plan will consist of one or more thread groups,samplers,logic controllers,listeners,timers,assertions and configurtaion elements.

Thread group:
Thread group elements are beginning of any test plan.Thread group element controls the number of threads jmeter will use during the test run.We can also control the following via thread group

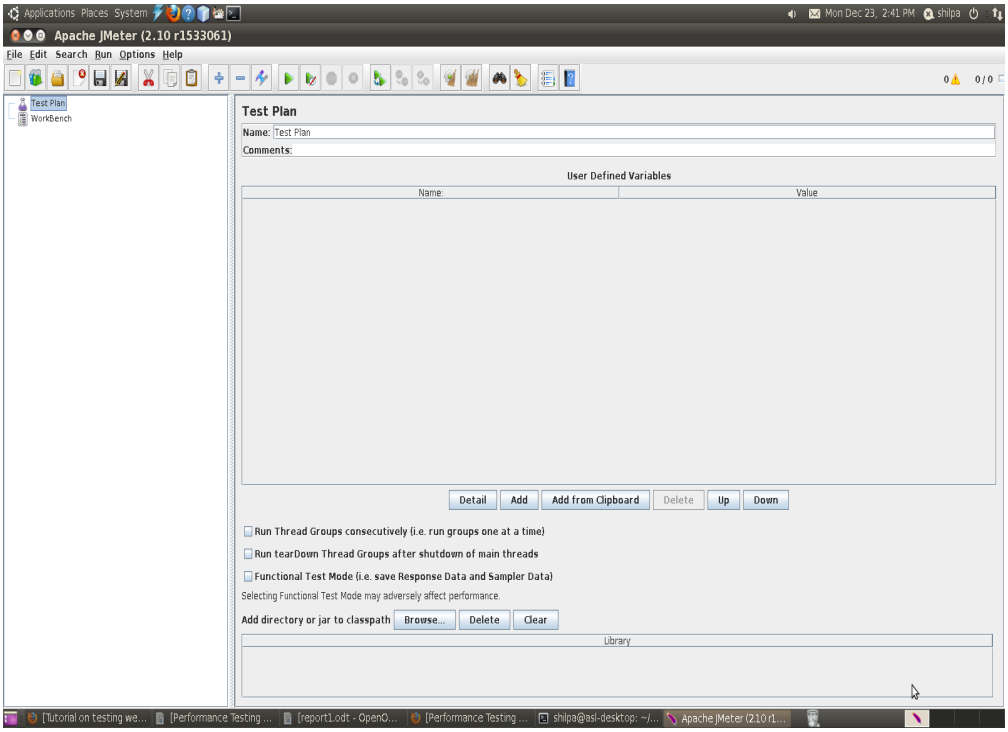
By setting the number of threads
By setting the ramp up time
By setting the loop count

Number of threads: Simulates the number of users to the server application
Ramp up period: Defines the time taken by jmeter to get all the threads running.
Loop count: Defines the number of times to execute the test.

Jmeter has two types of controllers:
Samplers and Logic controllers
Samplers: Samplers allow jmeter to send specific type of requests to a server
Logic controller: Logic controller controls the order of processing of samplers in a thread.They can change the order of requests coming from any of their child elements.

Listeners:
Listeners are used to view the results of samplers in the form of tables,graphs,trees or simple text in some log files.

Jmeter Web Test Plan:
To build a simple test plan which tests a webpage,open the jmeter window using the command jmeter.sh in ubuntu.The jmeter window will appear as shown.



Jmeter window consists of two node on the left.

Test Plan node is where the real node is kept.Test plan is saved and we can run the test.
Workbench node is where the temporary data is kept.It is not saved with test plan.

Steps to design a test plan:

1.Right click on test plan and add thread group.
Mention the number of users,ramp up period and the thread count.

2.Thread group -> Add -> Config element -> Http Request Defaults
The main goals of using Http default request is to
Avoid data duplication in tests.
Make test scripts more maintainable.
Http Request defaults consist of the following fields.
Name : Reflects the action to be performed
Server name or ip: Here, we give the web server name.
Path: Type as / which means we need to test the root page of the server

3.Thread group -> Add -> Sampler -> Http Request
Samplers tell jmeter to send request to a server and wait for response.

4. Thread group -> Add -> Listeners -> View Results tree
Different types of listeners are available like graph results,summary report,aggregate report etc.

5. Save the test paln

6. Run the test plan

7. View Output

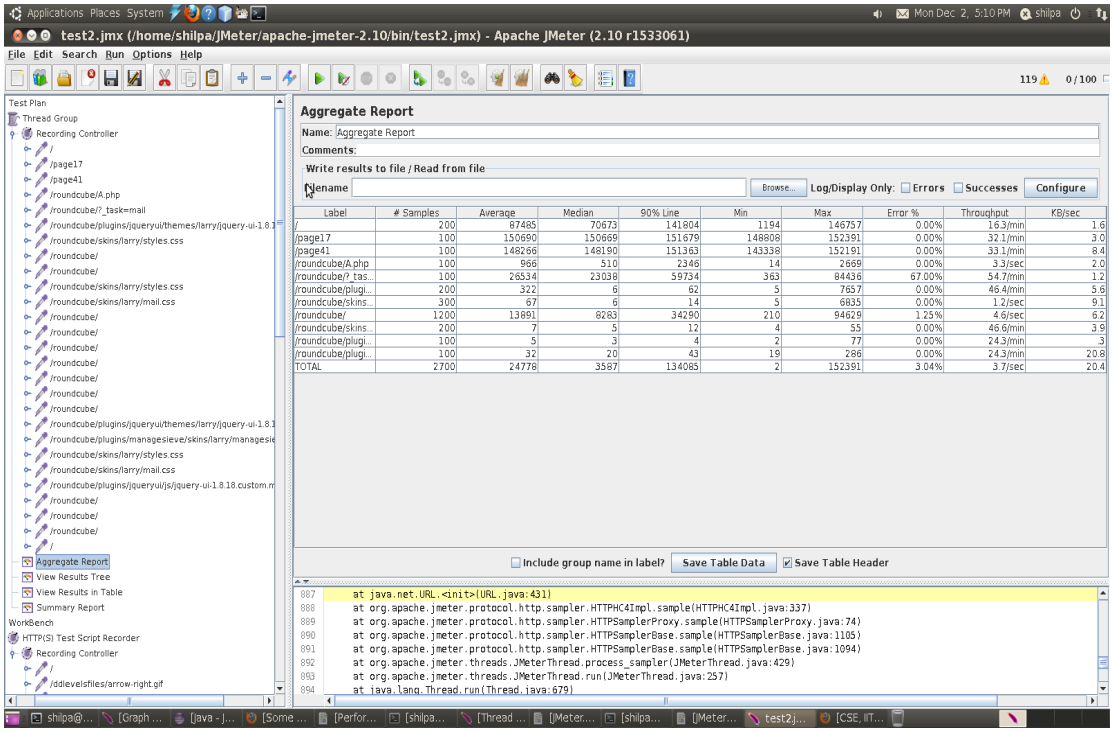
Recording Script with Jmeter
Jmeter helps to record script,maintain script and run script.

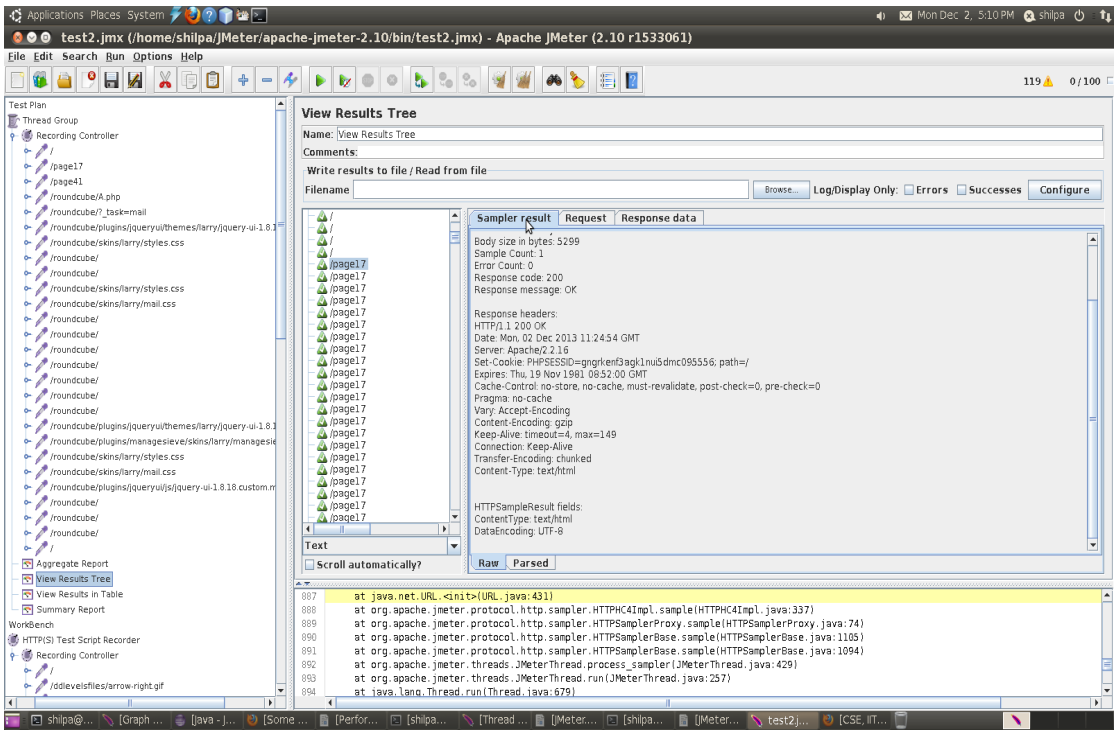
Setting Workbench and proxy server:

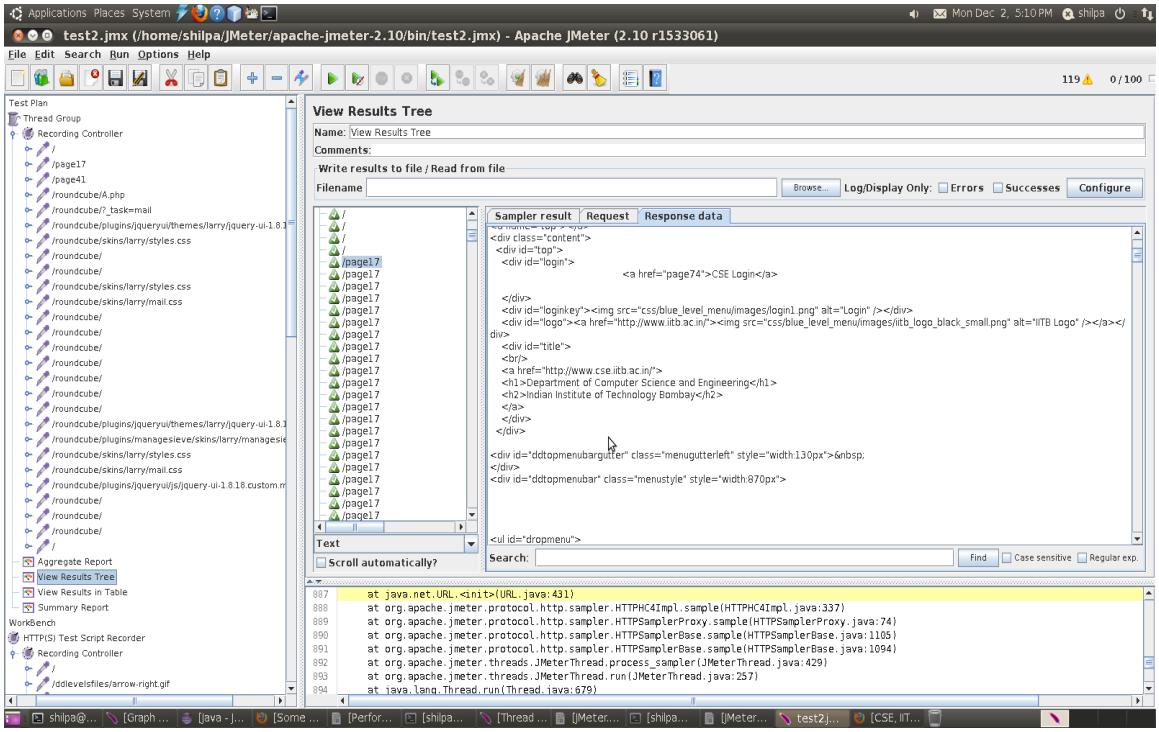
- In jmeter window,right click on workbench,select Add -> Non-test-elements -> Http test script recorder.
- Now in http test script window,port value will be 8080 by default,otherwise set it to 8080
- In the drop down list,select recording controller as the target controller.
- In the next step,add recording controller,under http test script recorder.Recording controller enables to record script under it,so that it will be in a structured way.
- The workbench is now ready to record scripts.Now open web browser and go to settings.
- In settings,go to proxy server and check the check box.
- Type localhost in the address text box and in the port provide the port number which we have given to proxy server port ie 8080.
- Finally click ok button and close the window.
- To start recording the script, type url of the application in the browser and press enter.
- Now in recording controller under workbench,some http request will be recorded. For eg, if the static web site has five pages and if we want to record those five pages in different group or specified name,then it can be done.
- In the next step, add simple controller to the http test script recorder and select the entire http request from the recording controller and paste it under simple controller.
- Once the recording is done,go to internet options and uncheck the check box in proxy server and save it.
- In the next step,copy the script to test plan under thread group.

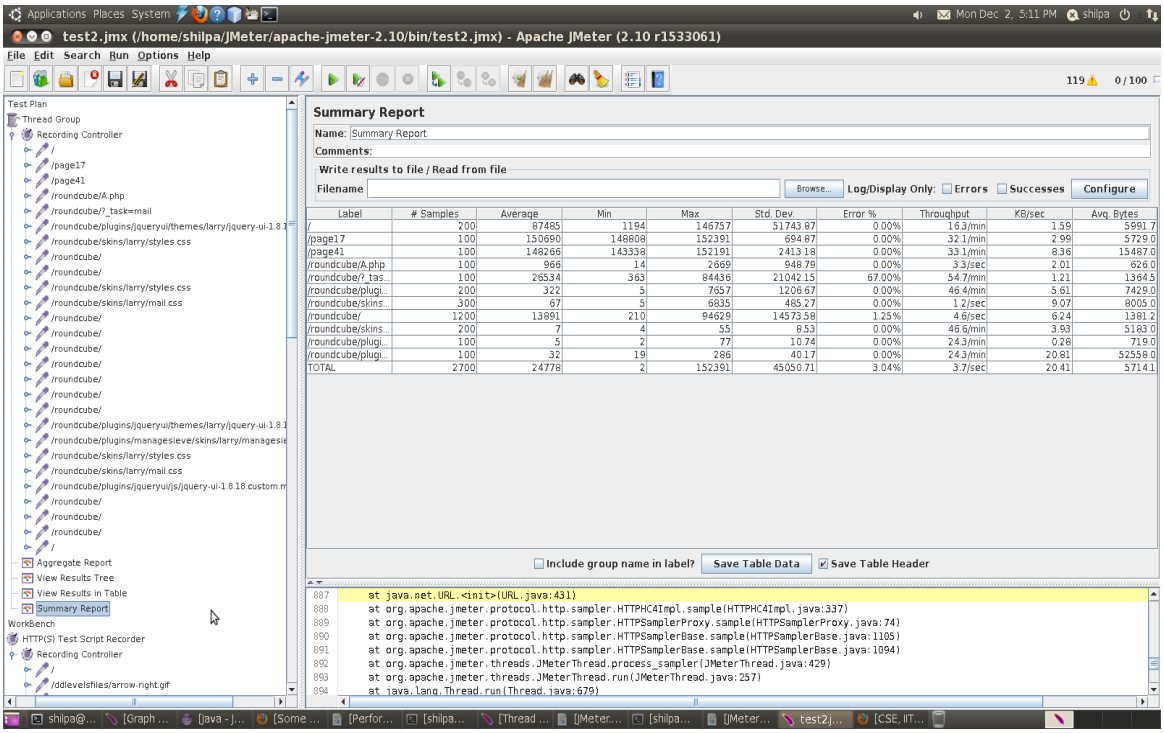
- Finally, add listeners to the thread group.Add agrregate grph,view results tree and response time graph to view the results.

CSE web testing:
The below screenshots shows the successful running of webpage for 100 virtual users and the ressults obtained.






test2.jmx (/home/shilpa/JMeter/apache-jmeter-2.10/bin/test2.jmx) - Apache JMeter (2.10 r1533061)
File Edit Search Run Options Help
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse...
Log/Display Only: Errors Successes
Configure
Sampler result
Request
Response data
Text
Scroll automatically?
Search:
Find
Case sensitive
Regular exp.
Test Plan
Thread Group
Recording Controller
Aggregate Report
View Results Tree
View Results in Table
Summary Report
WorkBench
HTTP(S) Test Script Recorder
Recording Controller


test2.jmx (/home/shilpa/JMeter/apache-jmeter-2.10/bin/test2.jmx) - Apache JMeter (2.10 r1533061)
File Edit Search Run Options Help
Summary Report
Name: Summary Report
Comments:
Write results to file / Read from file
Filename
Browse...
Log/Display Only: Errors Successes
Configure
Label # Samples Average Min Max Std. Dev. Error % Throughput KB/sec Avg. Bytes
/ 200 87485 1194 146757 51743.87 0.00% 163/min 1.59 5991.7
/page17 100 150690 148808 152391 694.87 0.00% 32.1/min 2.99 5729.0
/page41 100 148266 143338 152191 2413.18 0.00% 33.1/min 8.36 15487.0
/roundcube/A.php 100 966 14 2669 948.79 0.00% 3.3/sec 2.01 626.0
/roundcube/?_tas... 100 26534 363 84436 21042.15 67.00% 54.7/min 1.21 1364.5
/roundcube/plugi... 200 322 5 7657 1206.67 0.00% 46.4/min 5.61 7429.0
/roundcube/skins... 300 67 5 6835 485.27 0.00% 1.2/sec 9.07 8005.0
/roundcube/ 1200 13891 210 94629 14573.58 1.25% 4.6/sec 6.24 1381.2
/roundcube/skins... 200 7 4 55 8.53 0.00% 46.6/min 3.93 5183.0
/roundcube/plugi... 100 5 2 77 10.74 0.00% 24.3/min 0.28 719.0
/roundcube/plugi... 100 32 19 286 40.17 0.00% 24.3/min 20.81 52558.0
TOTAL 2700 24778 2 152391 45050.71 3.04% 3.7/sec 20.41 5714.1
Include group name in label?
Save Table Data
Save Table Header
Test Plan
Thread Group
Recording Controller
Aggregate Report
View Results Tree
View Results in Table
Summary Report
WorkBench
HTTP(S) Test Script Recorder
Recording Controller

Jmeter testing in non gui mode:

If you are using a linux system, jmeter should be invoked from shell command. use the below cmd:
1) navigate to the path of jmeter bin folder.
2) type sh jmeter.sh -n -t "file_name.jmx"

References:

Apache Jmeter, https://jmeter.apache.org/
http://resources.infosecinstitute.com/apache-jmeter-part-4/