Exploiting Moodle Performance under Various Configuration

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Abstract

Education is not the learning of facts. It's rather training of the mind to think as said by Einstein. Online learning plays a vital role in any educational sector. From the past few decades this is really expand in terms of the development of latest technology both hardware and or software to make e-learning (virtual and also remote) possible across the globe. There are several resources available now a days in market both proprietary and or open source, Moodle is one of them which are indexed under the open source (this is one of the biggest advantage). For distance education Web-based labs are innovative tools that help to describe scientific phenomena. Those phenomena require costly equipment which is also very hard when it comes to the arrangement of those equipments. Easy Java Simulations (EJS) is the promising tool for such problem. Open Source Physics (OSP) repository shows how important EJS is. OSP hosts hundreds of free EJS labs. In this case Moodle LMS (learning management system) provide social contexts where students interact with each other. The work described in this paper looks for the best performance gives by Moodle configuration which is decided by changing the paging size of a server machine. To check this we use Jmeter as a server Load testing Tool. Finally decided paging is use for server configuration for showing a setup of EJS virtual lab which helps maximum number of user to understand the Gyroscope (as an experiment).

Keywords: Moodle, learning management system, remote laboratory, virtual laboratory, web-based experimentation.

1. Introduction

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a mainstream open-source learning management system widely welcomed due to its simple and clear operation as well as flexible space expanding capability [1]. Moodle offers a great flexibility in order to achieve large number of user support at any time. It is not just a small application but it gives wide varieties of online learning options. It provides an open source learning environment in which huge numbers of developers are contributing freely. Moodle provide a flexible and smart way to establish our own virtual learning environment in which number of users support and platform support documents are available online. Working environment for Moodle in UNIX system is a server with LAMP configuration, short for Linux operation system, Apache server, Mysql database and PHP scripting language. On windows we can use either Bitnami Stack or XAMPP configuration for using Moodle. This architecture could optimize Moodle and makes it more stable and safer [2]. Because of present technologies and competitions, educations organization has to go to the next level of teaching so more funds are required. More generally we can say that cost and men power are become the most important assets for any organization who adapt this kind of virtual learning environment.

Challenge is to provide maximum with the use of minimum (in one word). To overcome this we are going to use a very popular and stable tool for deploying online learning environment named Moodle.

In previous research, I have to study different types of "Moodle adaptation for virtual lab" so increasing the RAM size are the key for maximization of the user support. But this is costly approach or solution this paper shows the significance of paging file size of a system.

This paper also included the goal to generate a simulation environment by using real time test result and using Jmeter that could be used as a platform for further studies within the area of adapting Moodle in ad hoc networks. This simulation environment should if possible, be based on Jmeter for server capability. The **objectives** of this work can be outlined as follow:

1) Compare Moodle Learning Management System (LMS) performance across different configuration on windows system. (Hardware is same SAMSUNG R528 i3 2 GB of ram).Which is mainly based on changing paging size of the server in which Moodle binaries takes place for virtual lab setup.
2) Show an experiment based on EJS lab. A case study of Gyroscope.

2. Experimental Setup and suggested work and used tool

2.1 Paging:

A paging file is an area on the hard disk that windows use as if it were RAM. Total paging size for all drive in this case by default is 1920 (MB), in this paper it's the main factor which is modifies and result is calculated by the help of Jmeter.

2.2 Apache JMeter™

The Apache JMeter™ application is an open source hundred percent pure Java application which was designed to load test functional behavior and produce performance with the help of different performance units. It was originally designed for testing Web Applications but has since expanded to other test functions. Apache JMeter may be used to test performance both on static and dynamic resources (Web services (SOAP/REST), Web dynamic languages - PHP, Java, ASP.NET, Files, etc. Java Objects, Data Bases and Queries, FTP Servers and more). It can be used to simulate a heavy load on a server, group of servers, network or object to test its strength or to analyze overall performance under different load types. We can test our server/script/object behavior under heavy load which is concurrent. A network simulator is a kind of software or hardware that predicts behavior of a network, without network being present in actual real time scenario. A network simulator is a program that performs working of a computer network. The computer network is modeled with devices, traffic etc. in network simulator and the performance is finally find out and analyzed. Users can then modify the simulator for the requirement of specific needs.

One might notice that JMeter and browser are two different piece of software pragram. As long as web-services and remote services are issues, JMeter is like a browser (or multiple browsers); however JMeter and browser does not work in an exact same way. Mainly speaking, JavaScript found in HTML pages are not executed by Jmeter.

2.3 Software and Hardware Requirement for Jmeter

The minimum requirements are as follows:

System Requirement

JDK	1.6 or above.
Memory	No minimum requirement.
Disk Space	No minimum requirement.
Operating System	No minimum requirement.

2.4 Java Version

JMeter requires a fully compliant JVM 6 or higher. Because JMeter uses only standard Java APIs, please do not file bug reports if your JRE fails to run JMeter because of JRE implementation issues.

2.5 Operating Systems

JMeter is a 100% Java application and should run correctly on any system that has a compliant Java implementation. Operating systems tested with JMeter can be viewed on JMeter wiki. Even if your OS is not listed on the wiki page, JMeter should run on it provided that the JVM is compliant.

2.6 Optional

If you plan on doing JMeter development, then you will need one or more optional packages listed below.

2.6.1 Java Compiler

If you want to build the JMeter source or develop JMeter plug-in, then you will need a fully compliant JDK 6 or higher.

2.6.2 SAX XML Parser

JMeter comes with Apache's Xerces XML parser. You have the option of telling JMeter to use a different XML parser. To do so, include the classes for the third-party parser in JMeter's classpath, and update the jmeter.properties file with the full classname of the parser implementation.

2.6.3 Email Support

JMeter has extensive Email capabilities. It can send email based on test results, and has a POP3(S)/IMAP(S) sampler. It also has an SMTP(S) sampler.

2.6.4 SSL Encryption

To test a web server using SSL encryption (HTTPS), JMeter requires that an implementation of SSL be provided, as is the case with Sun Java 1.4 and above. If your version of Java does not include SSL support, then it is possible to add an external implementation. Include the necessary encryption packages in JMeter's classpath. Also, update system. properties to register the SSL Provider. JMeter HTTP defaults to protocol level TLS. This can be changed by editing the JMeter property https.default.protocol in jmeter.properties or user.properties.

The JMeter HTTP samplers are configured to accept all certificates, whether trusted or not, regardless of validity periods, etc. This is to allow the maximum flexibility in testing servers. If the server requires a client certificate, this can be provided. There is also the SSL Manager, for greater control of certificates. The JMeter proxy server (see below) supports recording HTTPS (SSL) The SMTP sampler can optionally use a local trust store or trust all certificates.

2.6.5 JDBC Driver

You will need to add your database vendor's JDBC driver to the classpath if you want to do JDBC testing. Make sure the file is a jar file, not a zip. -

2.6.6 JMS client

JMeter now includes the JMS API from Apache Geronimo, so you just need to add the appropriate JMS Client implementation jar(s) from the JMS provider. Please refer to their documentation for details. There may also be some information on the JMeter Wiki.

2.6.7 Libraries for ActiveMQ JMS

You will need to add the jar activemq-all-X.X.X.jar to your classpath, e.g. by storing it in the lib/ directory. The other required jars (such as commons-logging) are already included with JMeter.

3. Scenario of Simulation Setup

All extensive simulations were conducted using J meter and in this work we change the paging size for a server machine to check the outcome.
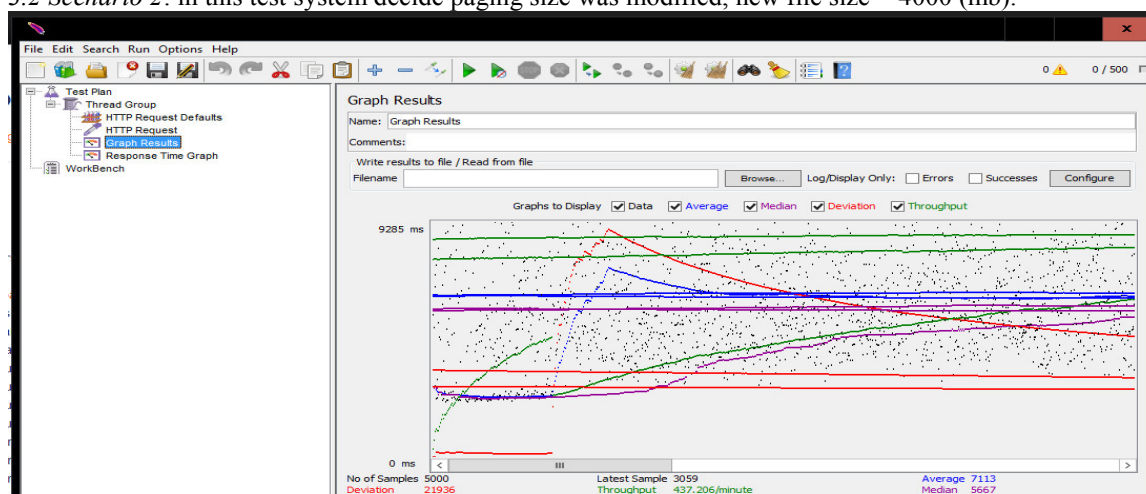
3.1 Scenario 1: in this test system decide paging size is set, no external changes is to be done.
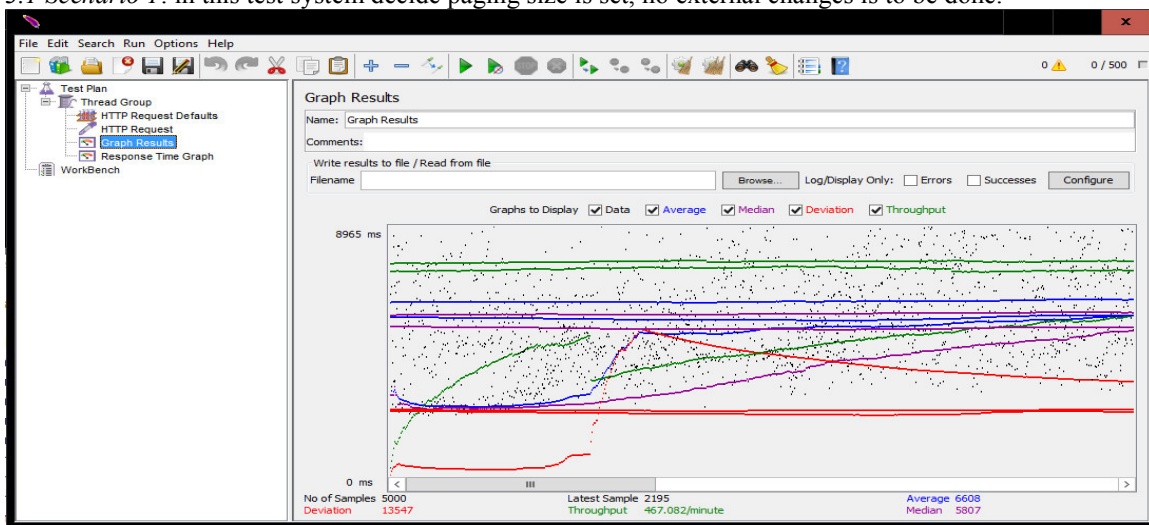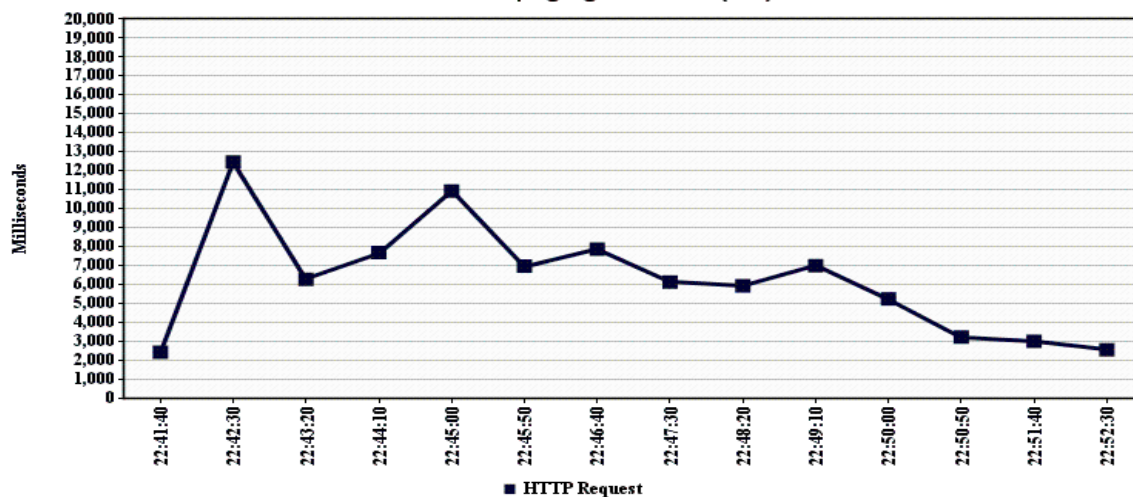

500 threads automatic paging (System decided)
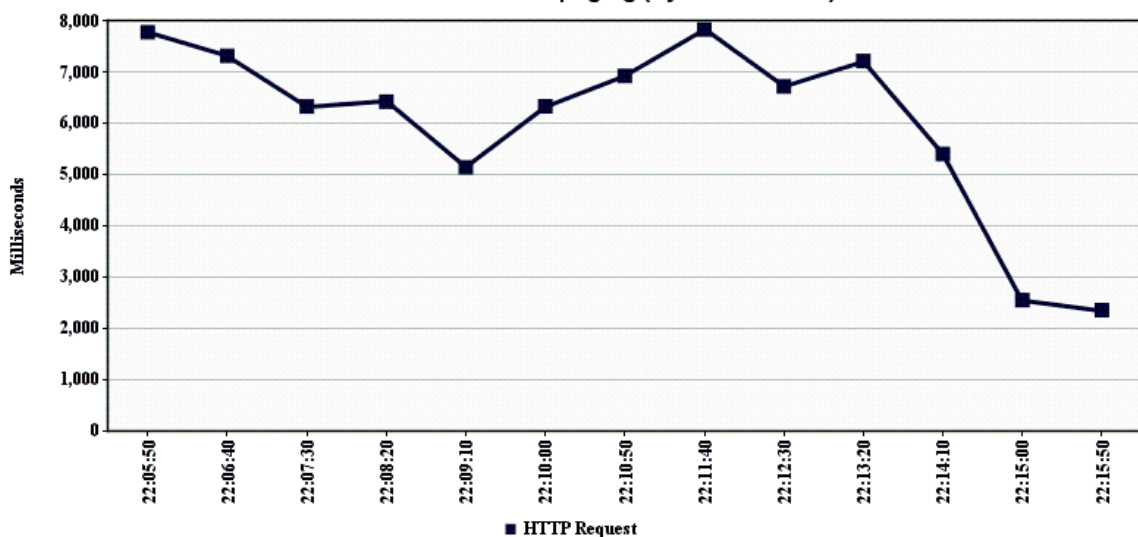
3.2 Scenario 2: in this test system decide paging size was modified, new file size = 4000 (mb).

500 threads paging size 4000 (MB)

4 Results and Discussion
4.1 System configuration

4.2 Table1: By scenario one and two a table has been generated.

	No of samples	Average	Deviation	Throughput	Median
paging file size (in MBs)					
(System default) 1920	5000	6608	13547	**467.082/minute**	5807
(Increased) 4000	5000	7113	21936	**437.206/minute**	5667

5. Conclusion and Suggestions for Future Work

5.1 Conclusion

Overall work shows that one can easily adopt virtual learning by choosing Moodle as LMS only things is to remember if number of users are large enough so one can use double the paging size of a server system so he/she get improvement of performance in terms of Throughput although there is slight disadvantage of this approach while number of user is less than or probably small of what we expect.

Conclusion of this work is that one can easily deploy virtual learning system with the help of Moodle (Free ware) and with little knowledge of internet he/she can easily use EJS tool for a synchronized collaborative Virtual lab for learning purpose.

Based on our conclusive configuration the case study about Gyroscope: virtual lab enhancement with Moodle shows large number of student increase their interest in an area of virtual learning, to make sure this a survey was conducted using 50 students of GGITS Jabalpur and result is remarkably good.

5.2 Suggestions for Future Work

One can test more configuration with the use of more variables that affect the systems overall performance like in this work only paging file size is selected but for expansion of this work people can choose to increase size of RAM or processing unit itself so better configuration will be extracted from the experiments and on can choose his/her desired configuration based on his/her user support requirement.

References

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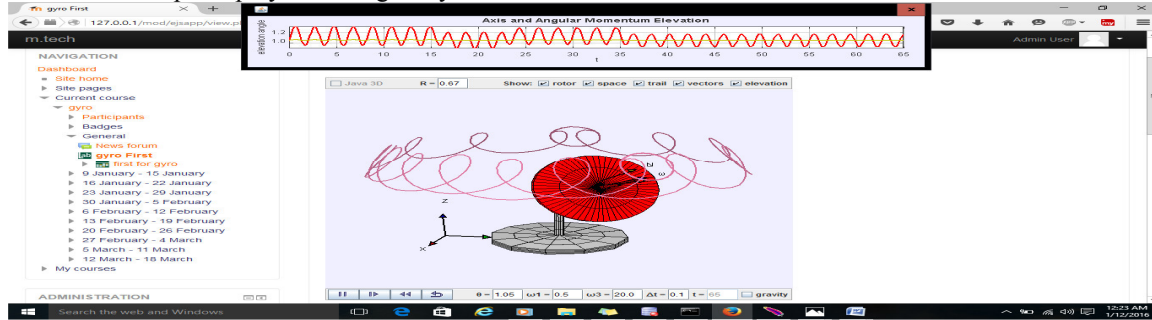
A Case Study

- Gyroscope study on virtual lab using EJSApp plug in into Moodle.
- Screenshot of the working system is shown below.
- 50 users participates and feedback is overall 8.7.(Conducting in GGITS campus)

- A typical user end screen
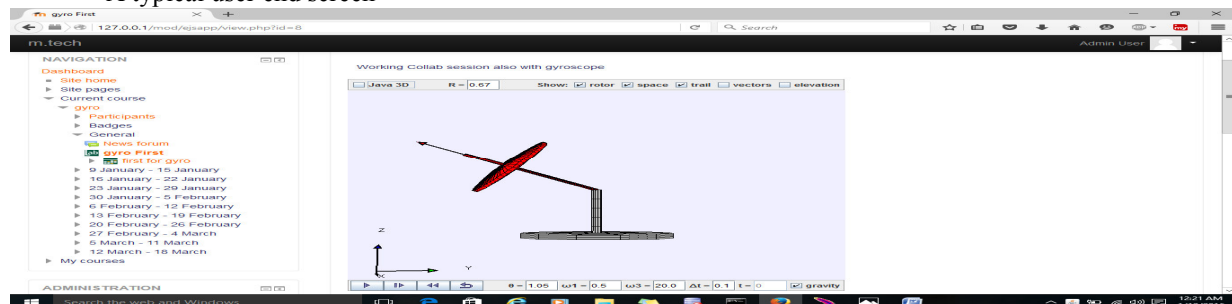
- When press play button with gravity
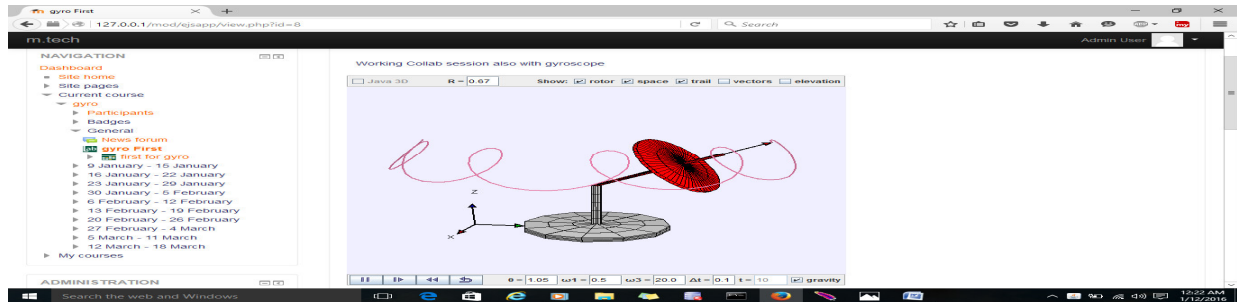
- When press play without gravity

- One can change the view or add additional blocks to show more understanding about impact of results
- After this study overall feedback from the student is positive and rating shows 8.7 which is excellent. (Internet is also showing the positive impact of Virtual Lab setup instead of physical setup of costly equipement)