

Technical Memorandum: PHP & JSP Comparative Benchmark

Overview

This document outlines the procedure and conclusions of a comparative benchmark of the JSP and PHP environments running functionally identical code implementing the most basic functionality of the AP Practice Exam system. The goal of this benchmark is to demonstrate the superior scalability of the PHP environment in the specific problem domain of the AP Practice Exam.

Environment

All benchmarks were run on the developers' private system, a Pentium III class Linux server environment. In all tests the database and webservices platform were run simultaneously on the same machine.

The original JSP version of the system was installed and run under Apache Jakarta/Tomcat version 5.5.7 using Java 1.4.2-01. This system was installed exactly as provided with the following changes:

- Code dependent on the Microsoft Windows operating system was changed to operate in a standard cross-platform manner.
- Character case irregularities were fixed.
- Database login information was changed to interact with the local database setup.

The PHP version of the system was implemented by the developers for the purpose of the benchmark. Wherever possible similar class and function layouts were used to create a PHP implementation that operates as closely as possible to the JSP version. All outputs were made consistent or even identical with the original JSP version where possible. The aim of this prototype was not to be as efficient as possible, but to closely replicate the inner functionality of the original version.

Procedure

Benchmarks were performed from the command line using the `time` command to measure total time of execution of the `wget` command. The `wget` command is a very simple program that retrieves a URL from a web server. To ensure minimal influence of the testing tool on the benchmark results, output was sent to `/dev/null`.

Individual test runs were performed with the following commands:

- **PHP** - time wget -O /dev/null "http://127.0.0.1/~cs3911/questionForBenchmark.phtml?maxQuest=1&examType=1&mode=question&questNum=1&forceInitDB=true"
- **JSP** - time wget -O /dev/null "http://127.0.0.1:8090/apExam/begin.jsp?numQuestions=1&examType=1"

The results here use the "real" component of time measurement, as it measures the complete time to execute the command, which closely measures the time until the requested page is fully loaded in the user's browser.

Both implementations were measured for scalability by requesting the first question in the exam series and varying the number of total questions requested. This operation was chosen because it is the most data-intensive and historically problematic operation with respect to scalability. Tests were run 5 times each for the following maximum number of questions: 1, 5, 10, 15, 20, 25, 30, 35, 40, 50, 60.

Results

Full results may be found in appendix A. The summary results are presented here.

Both implementations showed a trend of linear increase of response time when more questions were requested. The difference in scaling factor, however, was very large - the JSP version scaled upwards more than 25 times more quickly than the PHP version.

The following graph shows these trends:

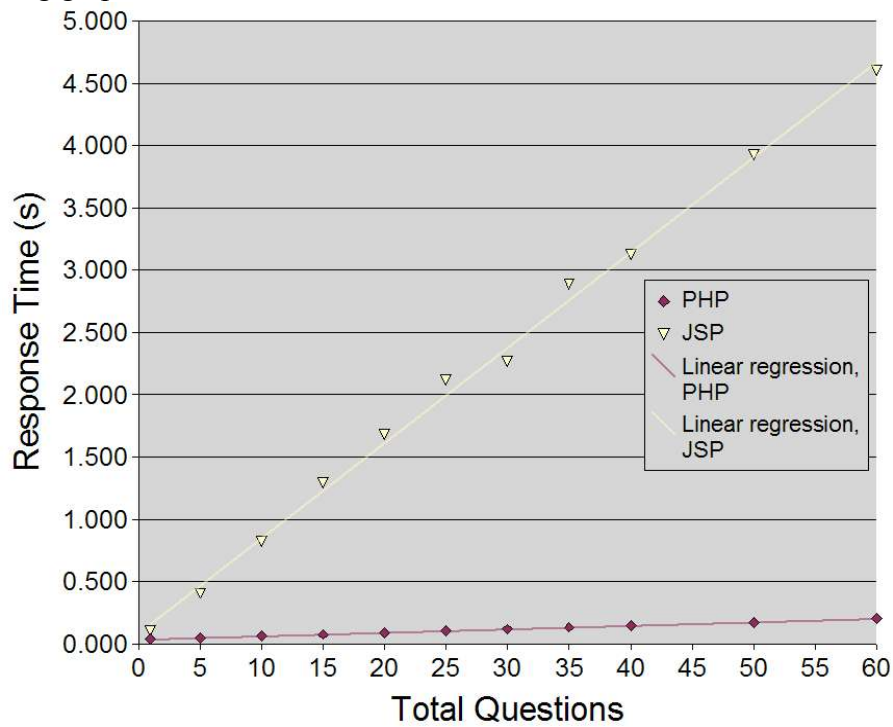


Figure 1 - PHP vs. JSP Implementation Scaling Comparison

Appendix A: Detailed Results

Total Questions	PHP Response Time (s)	(average)	JSP Response Time (s)	(average)
60	0.204		4.637	
60	0.205		4.594	
60	0.204	0.205	4.580	4.605
60	0.207		4.609	
60	0.205		4.603	
50	0.177		3.507	
50	0.177		4.038	
50	0.176	0.174	4.014	3.925
50	0.161		4.029	
50	0.179		4.035	
40	0.146		3.316	
40	0.150		2.806	
40	0.148	0.147	3.338	3.128
40	0.146		3.364	
40	0.147		2.814	
35	0.133		3.001	
35	0.133		2.969	
35	0.134	0.134	2.496	2.889
35	0.135		2.983	
35	0.133		2.994	
30	0.119		2.132	
30	0.117		2.657	
30	0.118	0.118	2.124	2.267
30	0.117		2.145	
30	0.119		2.276	
25	0.104		2.273	
25	0.105		1.810	
25	0.105	0.103	2.300	2.117
25	0.097		1.868	
25	0.103		2.335	
20	0.091		1.459	
20	0.091		1.455	
20	0.089	0.090	1.980	1.682
20	0.089		1.487	

20	0.091		2.029	
15	0.075		1.319	
15	0.075		1.156	
15	0.076	0.076	1.136	1.294
15	0.077		1.650	
15	0.075		1.208	
10	0.062		0.944	
10	0.062		0.803	
10	0.062	0.062	0.791	0.821
10	0.062		0.782	
10	0.062		0.784	
5	0.048		0.402	
5	0.047		0.407	
5	0.047	0.048	0.416	0.407
5	0.051		0.401	
5	0.048		0.407	
1	0.036		0.096	
1	0.036		0.113	
1	0.036	0.036	0.120	0.107
1	0.036		0.111	
1	0.036		0.095	