



SPECweb®2005 in the Real World: Using Internet Information Server (IIS) and PHP

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Abstract

In this paper we examine using the SPECweb®2005 benchmark to analyze various systems using Microsoft® Internet Information Services (IIS) as the Web server and PHP to serve dynamic content. PHP is a widely-used general purpose scripting language used for web development. Using IIS and PHP provides results for a representative “real-world” Web server configuration. Results will be compared between systems with various configurations.

Introduction

Today's SPECweb2005™ benchmark has brought a new dimension to the ability of other equipment manufacturers (OEMs) in the computer industry to show the relative performance of the various systems manufactured for the Web-serving market. With each alteration in the benchmark come new opportunities, and with the advent of SPECweb2005, the opportunities are becoming quite apparent. While SPECweb2005 can be used for research efforts in universities and by OEMs to evaluate alternative technologies, another avenue for its use is by Information Technology (IT) professionals in the purchase process. IT purchase evaluations start with a request to various OEMs to show their ability to handle specific end-user customer requirements, often using a benchmark that closely matches the market domain that the customers use.

Today SPECweb2005 has two alternatives to enable performance evaluation, either Java™ Server Pages (JSP™) or PHP. SPEC intended to enable the customers to understand the performance of these competing software alternatives in their production environments. However, the logic of SPECweb2005 is not complex enough to accurately represent end-user usage. As a result, we have learned that the performance achieved with the SPECweb2005/JSP kit is quite unrealistic with the top result translating to approximately 40,000 users able to be sustained under load against a single Web server. Helping IT customers understand the performance achieved using SPECweb2005/JSP and what the equivalent performance would have been using SPECweb2005/PHP can ensure that SPECweb2005 remains the benchmark of choice for the IT customer purchase process for Web server workloads.

Overview of the SPECweb2005 Benchmark

SPECweb2005 is the Standard Performance Evaluation Corporation latest benchmark for evaluating the performance of World Wide Web servers, superseding SPECweb99™ and SPECweb99_SSL™. Three workloads are part of the benchmark: SPECweb2005_Banking, SPECweb2005_Ecommerce, and SPECweb2005_Support. Each workload represents the characteristics of its specific market segment.

The SPECweb2005 benchmark also comes in two implementation variants: one uses JSP and the other uses PHP. Each workload variant of SPECweb2005 enables measuring the maximum number of simultaneous user sessions that a Web server is able to achieve while still meeting specific QOS metrics and error-rate requirements for the market segment represented. While the individual sub-metric scores indicate the total number of simultaneous user sessions the server can support, the overall SPECweb2005 metric for a compliant result is the geometric mean of the three sub-metrics, normalized to a reference platform score. For example, a score of 100 represents the same overall performance of the reference platform, whereas a score of 20,000 represents a score 200 times that of the reference platform.

SPECweb2005 benchmark clients run an application program that sends HTTP requests to and receives HTTP responses from a server. The benchmark requires that the Web server support HTTP 1.1 and SSL (HTTPS). Of course, the implementation of the Web server will lead to differences in observed performance on the same system under test. Today's performance using SPECweb2005 on the latest hardware with Accoria Networks Rock Web Server and the JSP kit is achieving performance that is roughly 370 times better than the reference platform used.

Overview of Top 15 Results

The top 15 results for SPECweb2005 as of November 2007 were submitted with either the Sun Microsystems Java System Web Server 7.0 or Accoria Networks Rock Web Server v1.4. These results are published on the SPEC Web site at <http://www.spec.org> (see Table 1). Thirteen of the top fifteen results were achieved with the Rock Web Server. Although Rock Web Server is undeniably fast, it has a relatively small customer base compared to Apache HTTP Server or Microsoft's Internet Information Services (IIS).

Rank	Web Server	Chips	Cores	Processor	Result
1	Sun Java[™] System Web Server 7.0 Update 2	1	8	Sun UltraSPARC T2	37,001
2	Sun Java[™] System Web Server 7.0 Update 2	1	8	Sun UltraSPARC T2	37,001
3	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	4	Intel Xeon X7350 Processor	30,261
4	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	4	Intel Xeon E7330 Processor	26,119
5	Rock Web Server v1.4.6 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5365	26,077
6	Rock Web Server v1.4.3 (x86_64), Rock JSP/S	2	4	Intel XEON 5365 processor	22,332
7	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	2	AMD Opteron 8222SE	22,254
8	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	2	AMD Opteron 8220	21,470
9	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5355	20,387
10	Rock Web Server v1.4.0 (x86_64), Rock JSP/S	4	2	AMD Opteron 8220	20,235
11	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5355 Processor	19,931
12	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5355	19,661
13	Rock Web Server v1.4.0 (x86_64), Rock JSP/S	4	2	Intel Xeon 7140M Processor	18,981
14	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5365 Processor	18,931
15	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5355 Processor	18,917

Table 1: Top 15 SPECweb2005/JSP Scores

SPECweb2005 and the Real World

In today's Web server world, the complex combination of the number of users supported, content development language, and sub-category of the Web server market all add to the complexity of determining which Web-serving software and hardware to use. Many IT customers view performance measurements made using industry benchmarks as a way to evaluate the complex combination and make a purchase decision. Many IT professionals do not have much spare time to understand the subtleties of a benchmark, and often they simply use simple terms to describe the benchmark combination that they would like OEMs to evaluate. The end result of the IT customer purchase process is that the OEMs are constrained by competitive pressures to produce leading results. These constraints, coupled with the lack of awareness of the available alternatives to SPECweb2005, often results in the publication of SPECweb2005 performance scores that do not reflect real-world IT customer performance.

The consistent trend for Web servers has been that under load the total number of connections supported has been in the range of 200-2,000 sustained customer connections. As processing capacities have improved, so have the concerns for security, along with the addition of complexities in formulating the responses for Web server requests.¹ Many of the papers written

¹ Various papers are showing connection loads for end-user scenarios ranging from 100s to 1000s of connections sustained during time intervals of one second.

<http://www.cs.bu.edu/techreports/1999-001-dpr-cluster-load-balancing.pdf>

<http://209.85.173.104/search?q=cache:GtJ7HQvTTFYJ:www.cs.bu.edu/faculty/crovella/paper-archive/usits99.ps+connection+loads+to+webservers&hl=en&ct=clnk&cd=1&gl=us>

http://actapress.com/Content_Of_Proceeding.aspx?ProceedingID=391

Distributing Requests by (around k)-Bounded Load-Balancing in Web Server Cluster; OK and PARK IEICE Trans Inf & Syst.2006; E89-D: 663-672.

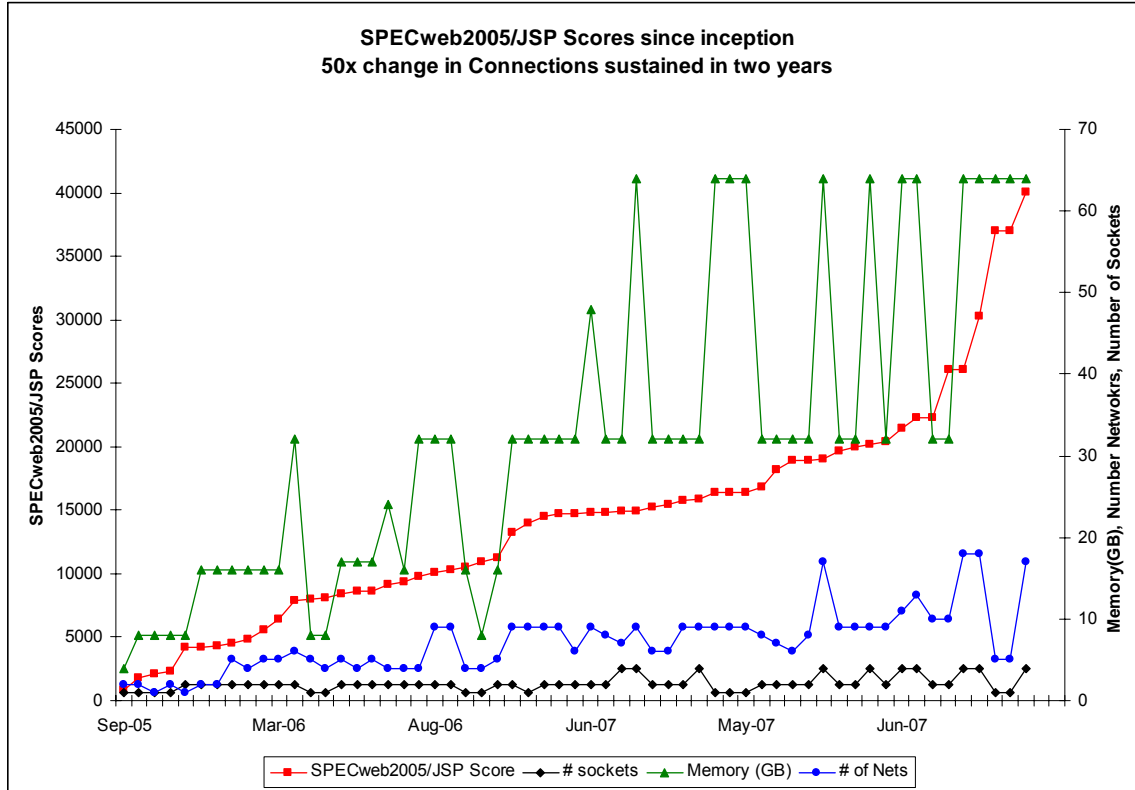


Figure 1: 50x Sustained Connection in Two Years

from 1999 to today, show the connection loads at constant levels, at a time when processing capacities and software performance have continued to increase. One paper shows connection loads in ranges of 400 in a 1-second interval in the 2,000 timeframe, when SPECweb99 results were showing connection loads ranging from 400-4,000. During the years of SPECweb99 publications we can find results that range from 400-25,000 for the five years of the publication. Meanwhile, Web server connection rates remained in the 1,000s range. Thus while SPECweb99 results achieved a 62x change in total connections able to be sustained, the end users were only seeing about a 4x change in total performance.

This is part of the problem the Web server market is encountering with SPECweb2005 as well. The published results for SPECweb2005/JSP on 2- and 4-socket systems as shown in Figure 1 have begun to reach levels approaching 50,000 users simultaneously connected to a single system for a duration of a half hour. This is in sharp contrast with a majority of the industry, where the published connection load from research papers tends to be in the 2,000-3,000 user range.²

By studying the SPECweb2005/PHP kit's performance and comparing the performance achieved with that achieved on SPECweb2005/JSP, we should be able bridge the gap between what the real world is encountering for connection loads, and what could be published with the existing SPECweb2005 benchmark. The IT industry would be served well by this benchmark as a result because they would be able to understand how the new equipment planned for purchase will help them in their environment. Perhaps with this added understanding, the IT industry would also be

² <http://dirt.cs.unc.edu/packmime/docs/INFOCOM04.pdf>
<http://whitepapers.techrepublic.com.com/whitepaper.aspx?docid=326508>
<http://www.mu.jisc.ac.uk/reports/viewreport.php?reportid=23>

and many other papers with similar connection rates.

able adjust their requests for equipment performance studies to be specifically done using the SPECweb2005/PHP kit.

Analysis of Currently Published SPECweb2005 Results

The present Request for Information (RFI) and Request for Proposal (RFP) processes have led many OEMs to develop publications for SPECweb2005. Yet the RFI and RFP processes are also forcing OEMs to use software combinations that enable leading performance results. Competition is great a way to ensure that the final purchased product meets the needs of the end customer. Competition constrained by a benchmark that closely matches the end-user environment helps produce an informed purchase, with benchmarks providing a means to mimic the end-user environment.

Unfortunately the present sets of published results are not constrained (see Figure 1). The trend with the SPECweb2005/JSP results is the connection rates have climb at a rate that exceeds prior SPECweb99™ rate of 62x in 5years. The top fifteen results show a connection rates that are at least 10-20x higher than connection loads that are normally seen by Web Servers³. The unhindered trend will see connection loads of 90000 within another year.

Comparison of Web Servers

Of the top 15 SPECweb2005 results thirteen of those results were using the Rock Web Server v1.4. The Rock Web Server is a proprietary, non-open source Web server developed by Accoria Networks. The number of customer for this server product is currently not able to be measured by any Web Server market analysis company. Of the other top 15 SPECweb2005 results two were submitted using Sun Java System Web Server 7.0. This is a proprietary, non-open source Web server developed by Sun Microsystems. The Web server chosen for the results presented in this paper is Internet Information Services (IIS), a proprietary, non-open source Web server developed by Microsoft Corporation.

Web Server	Creator	Windows	Linux	Solaris	CGI	FastCGI	Servlet	ASP.NET
IIS	Microsoft	Yes	No	No	Yes	Yes	No	Yes
Rock Web Server	Accoria Netwo	Yes	Yes	Yes	Yes	Yes	Yes	No
Sun Java System	Sun Microsyst	Yes	Yes	Yes	Yes	Yes	Yes	No

Table 2 - Comparison of Web Servers

Table 2 shows a comparison of the operating systems and dynamic content supported by each of the Web Servers mentioned above. Sun Java Systems supports Windows®, Linux®, and Solaris™. Rock Web Server supports Linux and Solaris; IIS supports only Windows. The major difference in dynamic content is that IIS supports ASP.NET while Rock Web and Sun Java System supports servlets (JSP).⁴

³ See other referenced materials earlier in this paper.

⁴ http://en.wikipedia.org/wiki/Comparison_of_web_servers

Web Servers Currently Used in Submissions

The choice of which Web server is used when preparing results for a submission is largely up to the OEM. As new hardware and software components become available, or a possible customer develops an RFI, the OEM has to make a choice about how to achieve results that will differentiate the value to the end consumer. The contributing components of the choice for a Web Server to use depends on whether the results are prepared as market collateral to show the value of a hardware and/or software component, or in response to a customer's RFI process.

As new hardware or software components are made available, marketing material that can aid in the education of the end-user community on the value of the new product is prepared. The OEMs develop most of these marketing materials and do so via a variety of benchmark publications and white papers. Market conditions are the primary variable that regulates the decision of which Web Server to use in these cases. The easiest way to ensure that the maximum value of the new components is shown is to use the best possible combination of hardware and software; otherwise, the OEM would not only need to educate the consumer on the new product but also on the value of the information supplied using less than ideal components.

Often, during an RFI process, the IT consumer explicitly requests SPECweb2005 scores without understanding that there are two benchmark kit variants. The results achieved can vary depending on which kit is used. This variation in results has implications that are relevant to the purchase decision. The OEM upon receipt of the RFI is left with the decision of whether to produce a set of results that might be lower in performance but more relevant to the consumer, or to produce results that are industry-leading and perhaps less relevant to the customer's needs. Left with the increased cost of educating the IT consumer on the value of the more relevant result versus simply achieving the highest result possible, the decision is influenced by the increased costs and risks associated with producing results that are more pertinent to the customer's environment and also more likely to be misunderstood.

Time to market, cost of producing a benchmark result, and the costs associated with any additional education needed to realize the value of the final information—all of these considerations come to bear on the choice of the best available software and hardware combination. In the case of Web Server software, this translates into the server software stack that produces the highest result regardless of the number of customers of the end product.

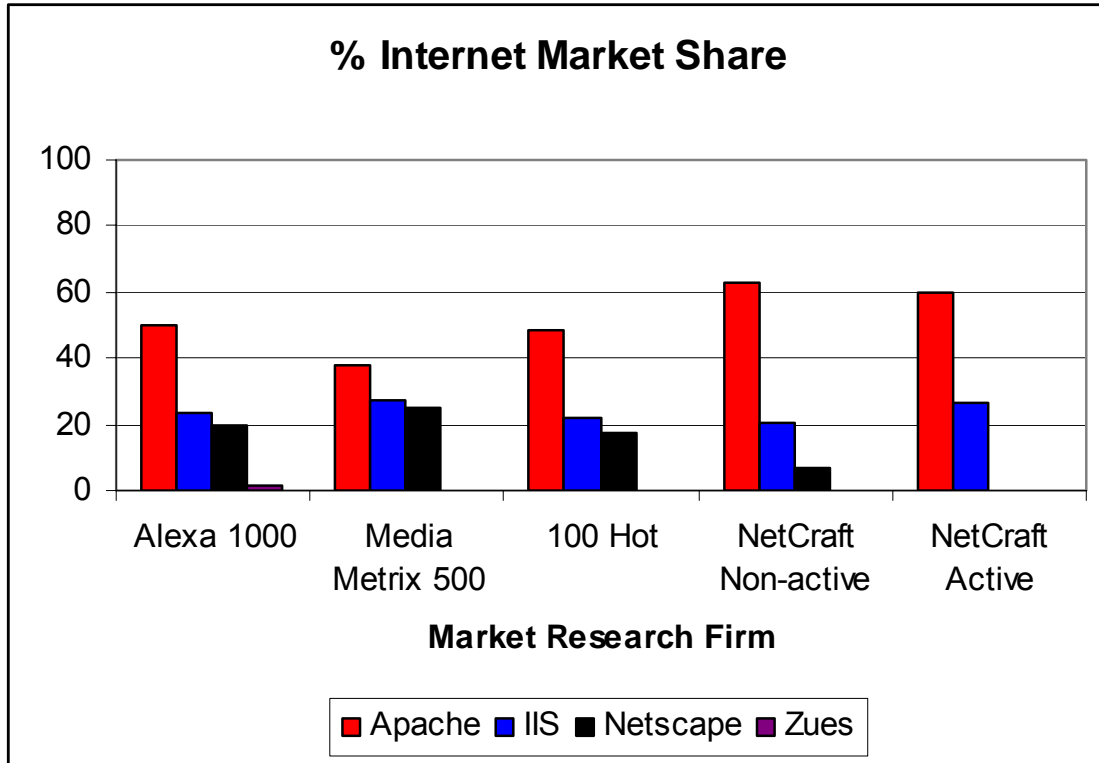


Figure 2 - Market Share Data in Year 2004 from a Variety of Market Research Firms

Presently the net result of the various decision-making processes is that two Web Servers have been used in nearly all of the submissions. Accoria Network's Rock Web Server has shown itself to be quite capable of achieving industry-leading results. Thirteen of the top fifteen results use this product. Rock Web Server has been used in a majority of the submissions by the OEMs. Sun Microsystems' Sun Java System has been used in the two other submissions that comprise the top 15. Figure 2 and Table 3 show the market share for a number of web servers. Oddly, neither Apache nor IIS, which are both used by the majority of the Web Server analysis companies, has been used in any submission in the last two years.

Developer	7-Oct	Percent	7-Nov	Percent	Change
Apache	68,155,320	47.73%	76,028,287	50.76%	3.03
Microsoft	53,017,735	37.13%	53,679,916	35.84%	-1.29
Google	7,763,516	5.44%	7,910,879	5.28%	-0.15
lighttpd	1,541,779	1.08%	1,505,122	1.00%	-0.07
Sun	2,262,019	1.58%	619,262	0.41%	Yes

Table 3 - Latest Data on Market Share from Netcraft

JSP Use in Submissions

Presently, all of the results submitted for SPECweb2005 have used the JSP kit. Although JSP is a widely used language, it is not the primary content development language used.⁵ Once again,

⁵ See IDC publications in press in June 2007.

the primary reason is that to achieve leading-industry results, an OEM needs to use a software stack that has the lowest overhead required to generate a response. The current implementation of SPECweb2005 in JSP has lower overhead than the PHP kit.

Analysis of Real-World Workloads

While the industry results on SPECweb2005/JSP have improved by about 50x since inception, the publications from various universities show that the true connection loads have improved and are trending at levels at least one-tenth of those observed in publications. Similarly on SPECweb99 the same disconnect occurred where the performance achieved in the most recent publications was 62x higher than the initial publications, while other publications were only showing a 4x change in performance. The Web Server industry that uses SPECweb2005 publications to evaluate hardware and software combinations in making purchase decisions should understand this, because there is an alternative available.

In using the SPECweb2005/PHP kit on systems equivalent to those used for the SPECweb2005/JSP publications, we are finding that the change in connection loads observed is not as high. The Intel® Xeon® X5355 processor has achieved performance in a range of 18,000-20,000. Using the SPECweb2005/PHP kit, the processor has achieved around 1,000 connections. Oddly enough, this is approximately the same level of connections being observed in various university publications.

Having SPECweb2005 scores that more closely match the IT industry would help in the purchase evaluation cycle. Equivalently the computer manufacturing industry would be better served by helping prospective customers understand the true benefit that can be realized from the new products launched in the marketplace. One simple solution would be for the IT industry to explicitly require SPECweb2005/PHP scores for the RFI process. Yet at the same time, the ability to spend the time to study the true relevance of the SPECweb2005/PHP kit to the real workloads used in the IT industry is limited at best. The intent of this paper is to provide awareness of the relevance of the SPECweb2005/PHP results to real-world workloads.

Web Server Statistics

There are numerous papers that discuss Web server statistics found in the real world. Many of these look at connection rates or connection loads of Web servers. Others look at response times. The Aversa and Bestavros paper⁶ shows a TCP connection load of between 496 and 663 requests served. The mean response time is between 0.92s and 0.26s depending on whether load balancing is used or not. The analysis in the Grottke paper⁷ showed a maximum connection rate of 390 connections/second (c/s). Additionally, the Cao paper⁸ showed measured connection rates of between 0.18 c/s and 34 c/s on one network and between 2.41 c/s and 230 c/s on another. From these papers it is obvious that connection rates on real Web servers and networks are generally much lower than those measured by the top SPECweb2005 results. For this reason, it seems reasonable to look at a scenario where the top connection rates measured are in the 2,000-3,000 connections/second range.

⁶ "Load Balancing a Cluster of Web Servers: Using Distributed Packet Rewriting," Luis Aversa and Azer Bestavros.

⁷ "Analysis of Software Aging in a Web Server," Michael Grottke, Lei Li, Kalyanaraman Vaidyanathan, and Kishor S. Trivedi.

⁸ "Stochastic Models for Generating synthetic HTTP Source Traffic," Jin Cao, William S. Cleveland, Yuan Gao, Kevin Jeffay, F. Donelson Smith, Michele Weigle.

Discussion of the Use of IIS

Because the Sun Java System Web Server results were achieved on Solaris 10 and the other results use Rock Web Server v1.4, it is useful to look at results for a widely used Web server. For this paper Microsoft Internet Information Server (IIS) was chosen. According to various Web Server market analyses companies, approximately 35% of Internet Web servers use IIS as shown in Figure 2 and Table 3. A quick interpretation of the trend across the set of Web Server market analysis reports also reveals that IIS tends to be used for Web sites with more traffic. The important point though is that none of these Web Server market analysis companies are able to measure the market share represented by Rock Web Server, which is the Web Server product used in all but a handful of the current SPECweb2005 submissions.

While Netcraft data doesn't automatically split out active and inactive sites, we can see from the latest data available that around 36% of the Web Server market is IIS-based (see Table 3). Observing the top five Web Servers used, Rock Web Server is not among them. This in combination with the broader set of data in Figure 2 would leave one to wonder how the IT industry correlates the performance reported from SPECweb2005 submissions with their own environment.

Discussion of the Use of PHP

A variety of marketing companies have analyzed the percentage of the market share for the various content development languages. These research firms show levels from 35% to 75%, depending primarily on whether the analysis includes all known Web sites or newer Web sites actively being developed.⁹ The consistent trend in the market place has been that Web site content development has been increasing from ~25% in 2001¹⁰ to ~50% PHP content developed in 2007.¹¹ There are a variety of reasons a developer would gravitate to one language over another, for example, familiarity, ease of development, comprehension of the API set available, and time available to develop. For this paper we don't try to understand why PHP is chosen; simply, we are finding from various publications that this development language is used.

SPECweb2005/PHP Results and Analysis

The external publications not using SPECweb2005 show that at actual customer sites the number of connections per Web Server is in the range of 2,000-3,000 connections range. At the same time, SPECweb2005/JSP publications are showing connections ranges approaching 40,000. By concentrating a few of these submissions and producing results using the SPECweb2005/PHP kit we find promising data though, as the number of connection drops dramatically to around 1,000-2,500 users depending on the workload used. The Geomean and reference platform pull the arithmetic value down making the result unit-less, yet the individual workload results still retain the number of simultaneous connections. The representativeness of SPECweb2005's core design for the three workloads, coupled with an implementation language that has equivalent PathLength¹² results in connection loads more similar to the connection loads encountered by end users. The key value of a benchmark is its ability to accurately predict for the intended market segment the value of the new hardware or software component, and with the SPECweb2005/PHP kit there appears to be more similarity.

⁹ http://www.nexen.net/chiffres_cles/phpversion/php_statistics_for_april_2006.php#global

¹⁰ http://www.imakenews.com/badblue/e_article000044504.cfm

¹¹ See IDC publications in press for June 2007.

¹² Instructions retired by the processor per request.

Another, interesting result from using the SPECweb2005/PHP kit is that the hardware requirements to achieve the peak result have decreased dramatically. While each customer tends to by unique combinations of components on their systems, the standard Web Server doesn't tend to have the same level of hardware as that required to presently achieve the leading SPECweb2005/JSP results. Rather, the systems purchase tends to more closely match what are considered the default configurations available by most OEMs. When we compare the hardware requirements of the SPECweb2005/PHP results we find that they are closer to these default OEM configurations.

Though there are many ways to produce a result at connection loads in the range of 2,000-3,000 using SPECweb2005. By looking further into the SPECweb2005/PHP results we should be able to observe if the system under test was loaded to the maximum possible load, or simply under-loaded to achieve the result. By doing this we help ensure that the benchmarks ability to predict end user performance, even in scenarios where market conditions motivate OEMs to achieve peak results, will still produce customer relevant results.

Dual-Socket Results

	SPECweb2005 Score	Support	Bank	Ecommerce	Simultaneous Conr
X5350	964	1900	750	1400	1259
X5355	1082	2200	800	1600	1412

Table 4 – Dual-Socket-Class Server Details

SPECweb2005	PHP	JSP
	Avg Resp	Avg Resp
	Time (sec)	Time (sec)
Support	5.133	6.334
Ecommerce	1.432	1.511
Banking	0.652	1.366

Table 5 – SPECweb2005 PHP and JSP Average Response Times

The system used was a dual-socket server with the Intel® Xeon® X5355 processor. Here the equivalent results can be seen in Table 4. The Support workload achieved the highest connection load, with Banking producing the lowest connection load. Each workload has different characteristics, and based on the Web Server and Operating System combinations, the bottlenecks encountered can differ. Yet with this Web Server and Operating System combination the performance achieved is with in the range of approximately 1000-2000 users for a dual socket class system.

The Support and Ecommerce workloads achieved processor utilizations that exceeded 95%, and the Banking workload achieve processor utilizations above 80%. The responses times for Ecommerce are nearly equivalent to the SPECweb2005/JSP results, and the similarly for the Support which were approximately 0.83x that of JSP. The response times for Banking were quite a bit lower than that of the JSP workload, achieving 0.47x that of JSP. The Banking workload using the SPECweb2005/PHP kit has software serialization, in part due to the session state having higher processing and I/O requirements that limits the processor utilization achievable. The key issue is that across the three workloads the request response times are nearly the same, or with understood reasons for the differences (see Table 5).

Multi-Socket Results

Characteristics observed in two-socket systems are observed also in the measurements for a four-socket system. When we used an Intel® Xeon® 7140M system, the connection rates improved slightly for Ecommerce and Banking and had a slight degradation on the Support workload (see Table 6).

	SPECweb2005 Score	Support	Bank	Ecommerce	Simultaneous
7140M	1141	2100	900	1750	1490

Table 6 - Four-Socket-Class Server Details

Equivalent to the two sockets, the Banking workload had high software serialization, which inhibited the ability of the system to achieve higher than 70% processor utilization; while Support and Ecommerce achieved higher than 90% utilization.

Comparisons to Published Results

SPECweb2005 offers two different implementations of the logic that comprises the workloads for the market segments using the technologies of PHP and JSP¹³. Currently, all submissions for SPECweb2005 have used JSP to serve dynamic content. One of the major determining factors for each OEM's choice to use the JSP kit is that the path lengths, or number of instructions required to generate a response, for JSP to serve the dynamic content are much shorter than for PHP to perform the same task. When using the PHP variant of SPECweb2005 the results are lower as a direct result of the number of instructions required to generate a response (see Table 7). The net result of this is that PHP achieves approximately 10-11x higher performance than the reference platform.

Rank	Web Server	Chips	Cores	Processor	JSP Results	PHP Results
1	Sun Java[™] System Web Server 7.0 Update 2	1	8	Sun UltraSPARC T2	na	
2	Sun Java[™] System Web Server 7.0 Update 2	1	8	Sun UltraSPARC T2	na	
3	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	4	Intel Xeon X7350 Processor	na	
4	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	4	Intel Xeon E7330 Processor	na	
5	Rock Web Server v1.4.6 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5365	na	
6	Rock Web Server v1.4.3 (x86_64), Rock JSP/S	2	4	Intel XEON 5365 processor	na	
7	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	2	AMD Opteron 8222SE	na	
8	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	4	2	AMD Opteron 8220	na	
9	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5355	20387	1083
10	Rock Web Server v1.4.0 (x86_64), Rock JSP/S	4	2	AMD Opteron 8220	na	
11	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5355 Processor	19931	1083
12	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon Processor X5355	19661	1083
13	Rock Web Server v1.4.0 (x86_64), Rock JSP/S	4	2	Intel Xeon 7140M Processor	18981	1143
14	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5365 Processor	na	
15	Rock Web Server v1.4.1 (x86_64), Rock JSP/S	2	4	Intel Xeon X5355 Processor	18917	1083

Table 7 - Comparison of JSP to PHP Performance

There is a significant contrast between the hardware requirements for a top-performing JSP result and a top-performing PHP result. The JSP results require more than 5-18 subnets worth of unique 1Gb conduits into the server to supply enough bandwidth for the number of sessions required for the benchmark. For PHP, that number drops to two 1GbE conduits into the server for the information presented in this paper. All results presented used an optimum memory configuration of sixteen 1GB memory DIMMS for a total of 16GB of memory. The systems under test used four 80GB 15K RPM SATA drives. One drive was used for each of the following: the

¹³ As of Dec 2007 publications made using these two kit variations are identified by either SPECweb2005/PHP or SPECweb2005/JSP, respectively.

operating system, paging space, PHP session state information, and benchmark data files. Besides the increased bandwidth for the network to achieve a top-performing result, the JSP submissions also required more client systems to simulate the load, and up to 10 times the storage. The reason for the increased number of physical disks is to help provide enough disk I/O capacity in order to accommodate the increased demand for content on disk. The large data set for content grows as a function of the number of users supported by a SUT (see Table 8).

	kit variant	Memory	Network	physical disks	SPECweb2005 Score
4Socket	PHP	32	3	4	1083
	JSP	64	17	58	18981
2Socket	PHP	16	2	4	1083
	JSP	32	9	58	20387

Table 8 – Summary of Hardware Used to Achieve SPECweb2005 Results

Conclusion

By using the SPECweb2005/PHP kit, an OEM can evaluate a new system at a level of performance with respect to connection loads and response times that more closely matches a real-world scenario. Existing results using SPECweb2005/JSP are able to show system performance, and show improvements achievable from the new hardware. However, the performance gains realized, both in terms of the connection loads and corresponding response time effects are more realistic with PHP and have a better representation to end user scenarios.



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09-08
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