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Compaq Computer Corporation

Contents

Microsoft Internet Information Server 4.0 on the Compaq ProLiant 6500

Abstract: Microsoft Internet Information Server (IIS) is quickly becoming the leading Web Hosting Server software in the market. More and more web-based businesses are asking questions concerning performance capacity, reliability, scalability, and costs of platforms with IIS 4.0. To demonstrate Compaq's continual commitment in delivering leading industry-standard performance and superior total cost of ownership, Compaq's Internet Solutions Business Unit has conducted various static-dynamic load stress tests on the Compaq ProLiant 6500, using Ziff-Davis WebBench 2.0 web capacity analysis tool at Compaq Computer Corporation in Houston, Texas. With benchmark results of handling 139,363,200 transactions per day, the Compaq ProLiant 6500 reaffirms Compaq's prevalence in leading web server performance. In addition, by providing the latest technological information on web server development and deployment in this performance brief, Compaq clearly confirms its leadership in fulfilling all business needs today and in the future.

Notice

Microsoft Internet Information Server 4.0 on the Compaq ProLiant 6500
White Paper prepared by Internet Solutions Business Unit

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Compaq ProLiant 6500

The Compaq ProLiant 6500 offers superior performance, breakthrough reliability features, and unprecedented scalability capabilities while lowering total cost of ownership. Using the latest in processor and system technology, the Compaq ProLiant 6500 delivers superior performance for a wide range of high-volume file, application, and database services. The Compaq ProLiant 6500 also offers a full set of advanced fault-tolerant features to provide the highest levels of server availability and reliability possible. Additionally, the Compaq ProLiant 6500 includes superior system management tools and migration capabilities to future processor technologies that reduce total cost of ownership.

Key Features

- 200MHz Pentium Pro Processor (Quad processor capability)
- 512 KB or 1MB Level-2 cache per processor
- ECC, EDO, or Fast Page Mode (FPM) memory (Expandable to 4GB)
- Dual-peer PCI buses (Up to 9 PCI expansion slots)
- Integrated Wide-Ultra SCSI-3 Controller
- Up to 45.5 GB internal storage
- Dual-port Netelligent 10/100 TX PCI UTP Controller
- 6 PCI Hot Plug (8 total slots)
- Integrated Remote Console, and Automatic Server Recovery-2 (ASR-2)
- Integrated Management Display (IMD)
- Hot-Pluggable, redundant, load-sharing power supplies
- Hot-Pluggable, redundant fans
- Support for Microsoft Cluster Server (MSCS) available with ProLiant Clusters
- Available in both Tower and Rack form factors
- Optional Upgrade to Intel's next-generation Pentium II Xeon processor technology
- Compaq Insight Manager and SmartStart
- Protection, including a three-year limited warranty, a Pre-Failure warranty, and Compaq Service and Support Programs

Performance Test Results

Ziff-Davis WebBench 2.0 was used to measure web capacity performance on the Compaq ProLiant 6500 web server running Microsoft Internet Information Server 4.0. Mixed loads of 70% static pages with 30% dynamic pages, and 30% static pages with 70% dynamic pages were used to simulate the benchmark tests. The three dynamic applications used in these benchmark tests are Internet Server Application Programming Interface (ISAPI), Common Gateway Interface (CGI), and Active Server Page (ASP). The percentages of workload distribution are based on feedback and suggestions from Compaq customers. These percentages represent typical loads that actual real world web servers are subjected to ninety percent of the time. A web server's performance is measured by (1) the number of requests that it can handle per second, and (2) the total data rate that the server can provide, or its throughput.

Table 1. Compaq ProLiant 6500 Test Configuration

Hardware	1st Test Configuration	2nd Test Configuration
Processor	(1) 200MHz Pentium Pro /w 512KB L2 cache	(2) 200 MHz Pentium Pro /w 512KB L2 cache
Memory	256MB EDO Memory	512MB EDO Memory
Array Controller	Smart -2DH Array Controller (RAID 5)	Smart-2DH Array Controller (RAID 5)
Hard Drive	(5) 4.3 GB Hot-Pluggable Hard Drive	(5) 4.3 GB Hot-Pluggable Hard Drive
NIC	(2) Compaq Netelligent 10/100 TX PCI UTP	(2) Compaq Netelligent 10/100 TX PCI UTP
Software	Windows NT Server 4.0 /w SP3	Windows NT Server 4.0 /w SP3
	Internet Explorer 4.0	Internet Explorer 4.0
	Microsoft Option Pack (Typical install)	Microsoft Option Pack (Typical install)
	WebBench 2.0 workload tree /w MS ASP file	WebBench 2.0 workload tree /w MS ASP file

Note: This summary indicates the server test configuration only. A detailed disclosure of the testbed can be found in Appendix A.

The following are request per second performance test results for the Compaq ProLiant 6500. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

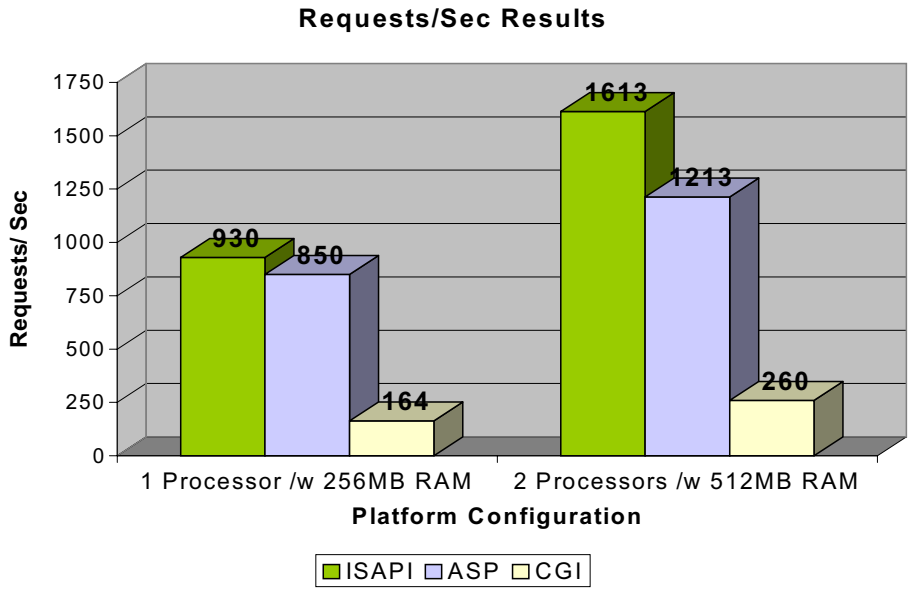

Figure 1. Requests per Second Results on ProLiant 6500 using 70% Static, 30% Dynamic Content Mix

The following are throughput performance test results for the Compaq ProLiant 6500. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

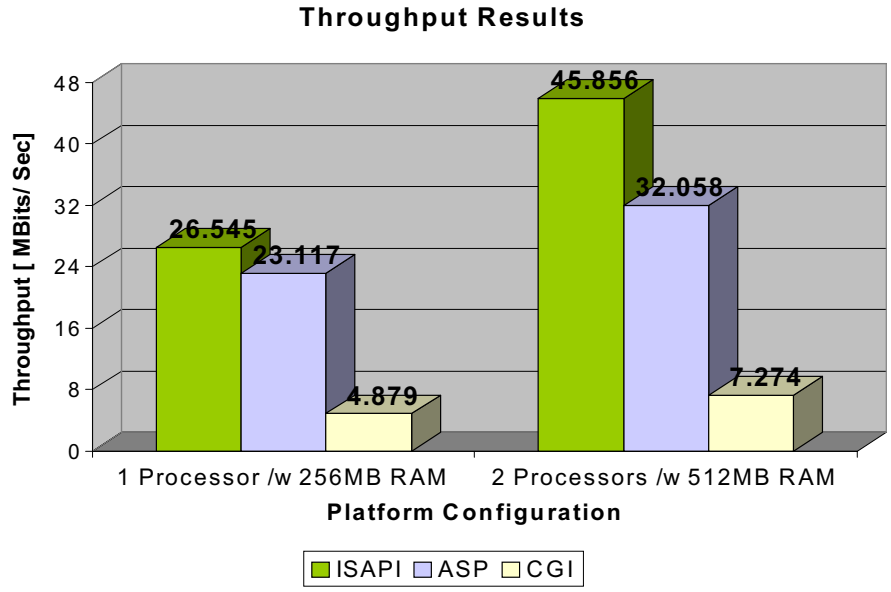

Figure 2. Throughput Results on ProLiant 6500 Using 70% Static, 30% Dynamic Content Mix

The following are requests per second performance test results for the Compaq ProLiant 6500. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

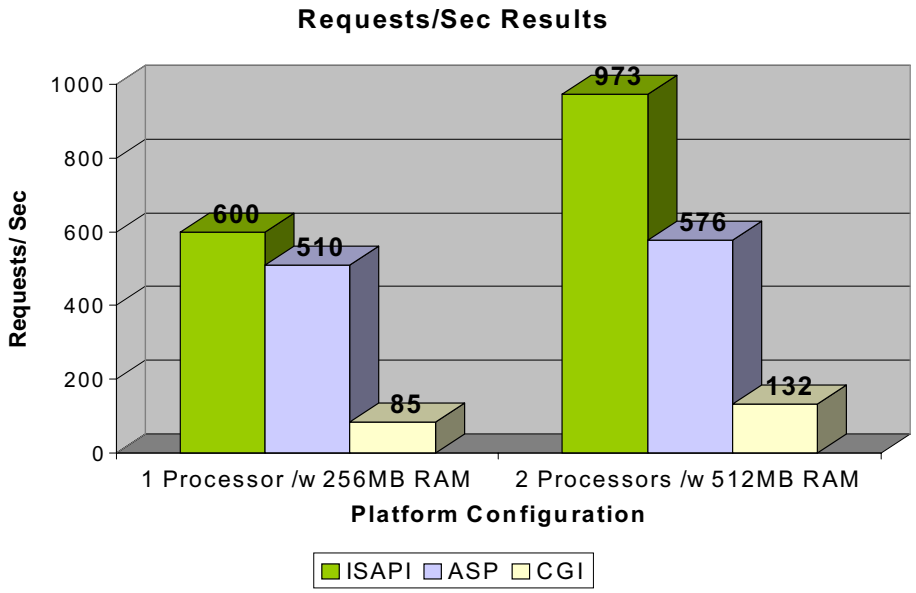

Figure 3. Requests per Second Results on ProLiant 6500 Using 30% Static, 70% Dynamic Content Mix.

The following are throughput performance test results for the Compaq ProLiant 6500. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

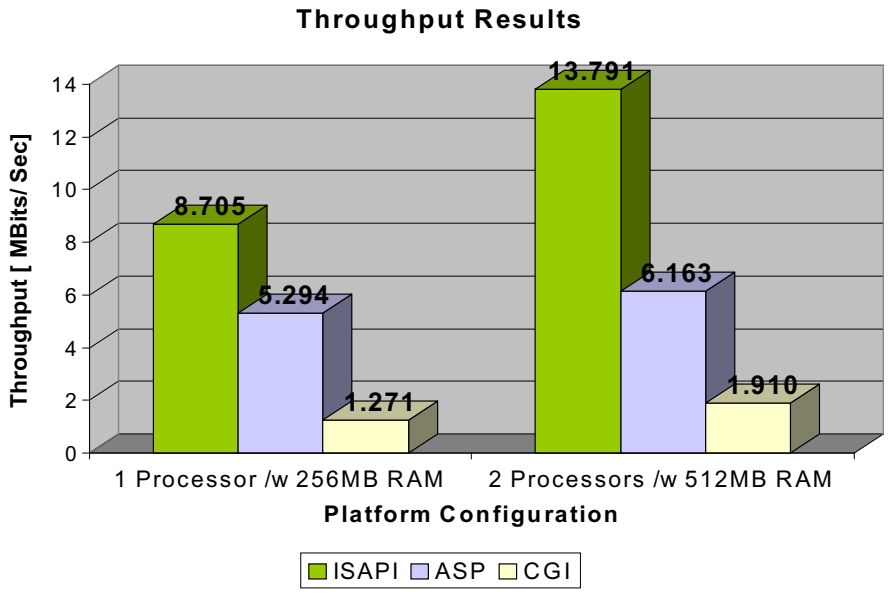

Figure 4. Throughput Results for the Compaq ProLiant 6500 using 30% Static, 70% Dynamic Content

Note: The Compaq ProLiant 6500 can support larger amounts of transactions per second and provide higher throughput. These results are based solely upon the specified server tested configurations only. Adding additional processors, changing RAID tolerance type, increasing memory, or upgrading processor and system technologies will result in significant increases in server capacity. A detailed disclosure of the testbed can be found in Appendix A.

Capacity Planning in the Real World

Many hardware vendors, including Compaq, conduct web capacity and performance activities for Microsoft Internet Information Server. The purpose of these benchmarks is to give web capacity and deployment planners a baseline reference in understanding the capabilities of a given hardware vendor's platform. However, when interpreting these benchmarks, one must evaluate whether the testbed configurations represent a typical, real world web server environment. Vendors may publish benchmarks based on platform configurations that are not plausible for the real world. For instance, many vendors publish benchmarks using disk subsystems configured with RAID0 disk arrays. Although RAID0 provides the highest levels of disk subsystem performance, most real world web servers are configured using RAID5 or RAID 1 for server reliability. Such configuration changes may affect server performance and web capacity. In addition, most vendors, including Compaq, conduct benchmark tests based on a single server network environment, or network structure to which only one physical web server exists. Most web-based businesses individualize their news, mail, FTP, and HTTP websites onto independent server units for better performance and reliability. Furthermore, most benchmark test configurations do not account for deployment issues such as firewalls, databases, server management tools, and backup utilities. Different benchmark tools may produce different benchmark results. Benchmark results may vary, depending upon the type of requests sent to the server during testing and the size and configuration of the workload tree used. For example,

WebBench 1.1 and WebBench 2.0 will produce different performance results on the same server platform. All these factors must be considered and are crucial in helping you develop and deploy your website.

WebBench 2.0

Ziff-Davis WebBench 2.0 web capacity analysis tool was exclusively used in the performance testing on the Compaq ProLiant 6500. WebBench uses client PCs as web browsers to create workload stress on defined web servers. However, unlike actual browsers, these WebBench clients do not display the actual static or dynamic file requested. Instead, when a WebBench client receives a response from the server, it records pertinent information associated with the response, then immediately sends another request to the server.

All client requests are governed by WebBench's workload file. This text file contains a listing of all requests sent to the server and the *request percentage* associated with each request. These *request percentages* determine how often each request is sent to the server. The *request percentages* used in testing are based upon stress loads that typical real world web servers are subjected to ninety percent of the time.

All client requests query files from WebBench workload tree located on the web server. The workload tree is comprised of WebBench static files, WebBench ISAPI and CGI dynamic files, and Microsoft ASP files. This workload tree accurately simulates file content and structure of live production web servers. First of all, the workload tree contains the same type of symmetrical structure common to most websites. Second, the lengths of the directory names used in the workload tree are the average lengths of directory names of live websites researched by WebBench. This is crucial in server performance since directory name lengths do affect the amount of parsing a server must perform on a given URL. Finally, file sizes and the file arrangement used in the workload tree also mimic those found on typical websites. These factors may seem miniscule but can affect server cache capabilities and skew the accuracy of the results.

The setup and configuration of the testbed is also critical in obtaining accurate benchmark results. First, all unnecessary system services and applications that do not pertain to the performance test need to be disabled or removed from the testbed environment. Next, WebBench 2.0 should be installed using typical WebBench installation instructions. Since WebBench 2.0 does not come with its own dynamic ASP file, Microsoft has graciously sent Compaq a working ASP file with similar functionality to WebBench ISAPI and CGI files for these tests. After installation, a test suite should be created to define all parameters for the test. To test Microsoft Internet Information Server 4.0 capabilities, the test suite should contain parameters using persistent connections and pipeline requests. The performance test should also be designed to push the web server CPU usage to saturation. Once test suite configuration is completed, an initial test run should be conducted to detect and resolve all possible bottlenecks and system errors within the testbed. A minimum of five test runs should be collected to obtain an overall performance evaluation of the platform system. Please note that the server should be rebooted after each performance test to clear the server disk cache subsystem. By following these steps, one should be able to produce a precise and accurate web capacity benchmark for a given platform system.

Power Performance Without the Price

Although web capacity benchmarks are vital tools in choosing a web hosting server platform, one must consider other factors such as scalability, manageability, reliability, and cost of ownership before making a final decision. While other competing hardware vendors may offer platforms with similar web capacity performance capabilities, they provide these systems at significantly higher costs. Compaq platforms are designed to deliver superior performance, unlimited scalability, easy manageability, industry-leading reliability, and the lowest cost of ownership possible.

Today, businesses must be able to expand and grow to compete within the ever-growing forum of the Internet market. Great care must be taken during web hosting implementation and deployment planning. Not only should the web server platform be capable of handling high loads of daily transactions and deliver them at exceptional speed, it must also be easy to manage, capable of handling hardware system failures, and adaptable to future system technologies. Compaq leads the server industry in these fields with award-winning system management software, PCI Hot-Plug technology, a wide range of redundant hardware system capabilities, Automatic Server Recovery technology, and industry-leading migration programs to the latest processor and system architectural technologies. With such superior performance and these factors, Compaq is clearly the best choice for all your enterprise needs.

APPENDIX A: PERFORMANCE TEST DISCLOSURE

Table 2. Performance Test Configuration and Software

Testbed Item	Configuration	Software
(1) Server	Compaq ProLiant 6500	NT Server 4.0 /w SP3
	1st Test:	Internet Explorer 4.0
	1 Processor (200MHz) /w 256MB RAM	Microsoft Option Pack (Typical Installation)
	2nd Test:	WebBench 2.0 Workload tree /w Microsoft ASP file
	2 Processors (200MHz) /w 512MB RAM	
(1) Controller	Compaq ProLiant 1500	NT Workstation 4.0 /w SP3
	1 Processor (166MHz) /w 64MB RAM	Internet Explorer 4.0
		Microsoft Excel 7.0
		WebBench 2.0 Controller
(24) Clients	Compaq ProLiant 850R	NT Workstation 4.0 /w SP3
	1 Processor (200MHz) /w 32MB RAM	Internet Explorer 4.0
		WebBench 2.0 Client
(2) Network Repeater	Compaq Netelligent 1224	
	10 Base-T / 100 Base-TX	

Note: All performance tests were done on an isolated network system.

Performance Data Disclosure

Test Configuration #1 (1 processor /w 256MB RAM)

Dynamic Type	Mix Type	70% Static 30T Dynamic		30% Static 70% Dynamic	
		Requests/Sec	Throughput [Bytes/Sec]	Requests/Sec	Throughput [Bytes/Sec]
ISAPI	ISAPI #1	925	3,457,388	564	1,068,829
	ISAPI #2	**930**	**3,479,259**	562	1,068,034
	ISAPI #3	927	3,459,884	**566**	**1,070,897**
	ISAPI #4	930	3,462,839	563	1,069,823
	ISAPI #5	929	3,478,342	560	1,067,842
ASP	ASP #1	**850**	**3,029,971**	540	730,893
	ASP #2	845	2,989,713	543	729,029
	ASP #3	848	2,998,329	**543**	**729,160**
	ASP #4	850	3,008,329	542	730,839
	ASP #5	850	3,018,239	543	729,039
CGI	CGI #1	162	638,238	85	156,098
	CGI #2	164	638,829	84	155,439
	CGI #3	**164**	**639,535**	**85**	**156,146**
	CGI #4	163	635,980	85	155,989
	CGI #5	164	638,890	85	156,102

Note: Server CPU usage for all benchmarks results confined between 98 to 100 percent. Benchmark values used in the performance brief charts are marked in bold.

Test Configuration #2 (2 processors /w 512MB RAM)

Dynamic Type	Mix Type	70% Static 30T Dynamic		30% Static 70% Dynamic	
		Requests/Sec	Throughput [Bytes/Sec]	Requests/Sec	Throughput [Bytes/Sec]
ISAPI	ISAPI #1	1,608	5,998,998	1,010	1,919,646
	ISAPI #2	1,610	6,008,933	**1,014**	**1,919,241**
	ISAPI #3	1,605	5,992,990	1,014	1,910,829
	ISAPI #4	**1,613**	**6,010,464**	1,012	1,911,823
	ISAPI #5	1,611	6,009,984	1,014	1,918,832
ASP	ASP #1	**1,213**	**4,201,900**	670	889,932
	ASP #2	1,208	4,189,023	669	888,920
	ASP #3	1,211	4,188,239	672	901,804
	ASP #4	1,211	4,200,930	**672**	**909,534**
	ASP #5	1,210	4,201,899	672	909,043
CGI	CGI #1	258	950,829	132	249,832
	CGI #2	255	948,200	130	250,014
	CGI #3	253	948,923	130	249,490
	CGI #4	257	950,823	**132**	**250,412**
	CGI #5	**260**	**953,447**	132	249,850

Note: Server CPU usage for all benchmarks results confined between 98 to 100 percent. Benchmark values used in the performance brief charts are marked in bold.

APPENDIX B: REFERENCES

The following documents are available on Compaq's website:

Compaq ProLiant 6500

http://www.compaq.com/products/servers/ProLiant6500/index.html

Compaq ProLiant 6500: Competitive Differentiation

http://www.compaq.com/products/servers/ProLiant6500/comparison.html

Program Description: ProLiant 6500 Deschutes Slot 2 Upgrade

http://www.compaq.com/products/servers/upgrade/ProLiant6500-upgrade-ov.html

Product Description: ProLiant 6500

http://www.compaq.com/products/servers/ProLiant6500/description.html

Compaq ProLiant 850R Dedicated Windows NT Web-Hosting Server

http://www.compaq.com/support/techpubs/whitepapers/061a0797.html

Web Server Performance Test Results on Compaq ProLiant 5000 Servers

http://www.compaq.com/support/techpubs/whitepapers/210a0596.html

Web Server Performance Comparison for Microsoft Internet Information Server: Compaq, Digital Equipment, Hewlett-Packard, and IBM

http://www.compaq.com/support/techpubs/whitepapers/404a0597.html

Performance Tuning Your Windows NT Web Server

http://www.compaq.com/support/techpubs/whitepapers/457a1096.html

Disk Subsystem Performance and Scalability

http://www.compaq.com/support/techpubs/whitepapers/ecg0250997.html

Compaq SMART-2 Array Controller Technology

http://www.compaq.com/support/techpubs/whitepapers/667a0697.html

Hardware vs. Software Fault Tolerance

http://www.compaq.com/support/techpubs/whitepapers/ecg066/0298.html

Pentium II Processor Technology

http://www.compaq.com/support/techpubs/whitepapers/046_0897.html

Configuring the Compaq ProLiant 5000 Server for Peak Performance

http://www.compaq.com/support/techpubs/whitepapers/679a0697.html