COMPAQ
White Paper

September 1998
ECG058/0998

Prepared by Internet Solutions Business Unit

Compaq Computer Corporation

Contents

Microsoft Internet Information Server 4.0 on the Compaq ProLiant 1850R

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 1850R using Ziff-Davis WebBench 2.0 web capacity analysis tool at Compaq Computer Corporation in Houston, Texas. With benchmark results of handling 167,443,200 transactions per day, the Compaq ProLiant 1850R 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 1850R
White Paper prepared by [Select or enter your Group name]

First Edition (September 1998)
Document Number ECG0580998

Compaq ProLiant 1850R

The Compaq ProLiant 1850R 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 1850R delivers unprecedented performance for a wide range of high-volume file, application, and database services. The Compaq ProLiant 1850R 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 1850R includes superior system management tools and migration capabilities to future processor system technologies that reduce total cost of ownership.

Key Features

- 350 / 400 MHz Pentium II Processor (Dual processor capability)
- 450 MHz Pentium II Processor Upgrade Capability
- Off-line Backup Processor
- 512 KB Level-2 ECC cache per processor
- 100MHz registered SDRAM ECC memory (expandable to 1GB)
- 100MHz GTL Bus
- Intel 443BX chipset for PCI Bus Utilization
- Server ‘97/8 Certified, ASM ready, and ACPI ready
- I2O Ready with embedded National ‘317 Super I/O I2O connector
- 4 internal expansion slots (3 PCI, 1 shared PCI/ISA: Bridged PCI bus)
- 3 Hot-Pluggable drive bays and 2 Non-hot Pluggable drive bays
- Integrated Dual Channel Wide-Ultra SCSI-3 Controller
- Up to 36.4 GB (hot-pluggable) internal storage
- EIDE channel ATA-2 support
- Compaq Netelligent 10/100 TX Embedded PCI UTP Controller
- Integrated ATI Rage 2C video controller with 1MB video DRAM
- Integrated Remote Console (IRC), and Automatic Server Recovery-2 (ASR-2)
- Support for Microsoft Cluster Server (MSCS) available with ProLiant Clusters
- Availability in both Tower and Rack form factors
- Compaq Insight Manager and SmartStart
- Protection, including a three-year limited warranty, a Pre-Failure warranty, and Compaq Service and Support Programs
- Integrated Management Display (IMD) (optional)
- Hot-Pluggable, redundant power supply (RPS) (optional)

Performance Test Results

Ziff-Davis WebBench 2.0 was used to measure web capacity performance on the Compaq ProLiant 1850R 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 upon (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 1850R Test Configuration

Hardware	1st Test Configuration	2nd Test Configuration
Processor	(1) 400MHz Pentium Pro w/ 512KB L2 cache	(2) 400 MHz Pentium Pro w/ 512KB L2 cache
Memory	128MB EDO Memory	256MB EDO Memory
Array Controller	Smart-2DH Array Controller (RAID 1)	Smart-2DH Array Controller (RAID 1)
Hard Drive	(2) 4.3 GB Hot-Pluggable Hard drives	(2) 4.3 GB Hot-Pluggable Hard drives
NIC	(2) TLAN 3.03 10/100 TX PCI UTP	(2) TLAN 3.03 10/100 TX PCI UTP
Software	Windows NT Server 4.0 with SP3	Windows NT Server 4.0 with SP3
	Internet Explorer 4.0	Internet Explorer 4.0
	Microsoft Option Pack (Typical install)	Microsoft Option Pack (Typical install)
	WebBench 2.0 workload tree with MS ASP file	WebBench 2.0 workload tree with 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 1850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

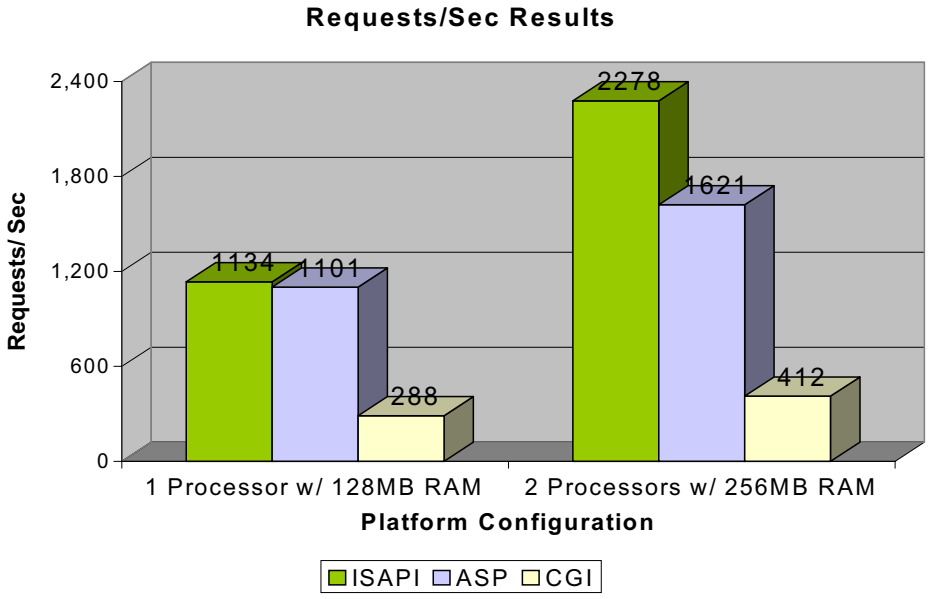

Figure 1. 70% Static 30% Dynamic Content Mix

The following are throughput performance test results for the Compaq ProLiant 1850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

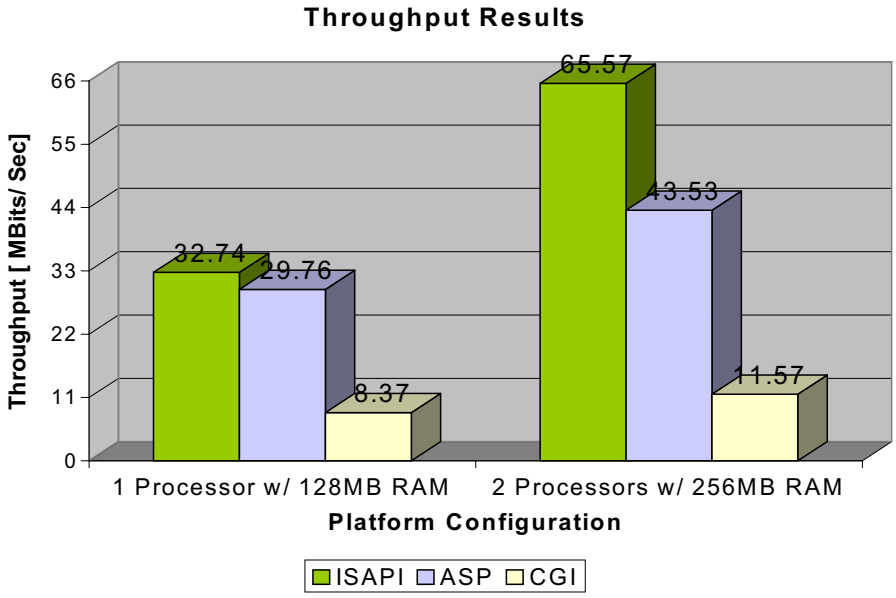

Figure 2. 70% Static 30% Dynamic Content Mix

The following are requests per second performance test results for the Compaq ProLiant 1850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

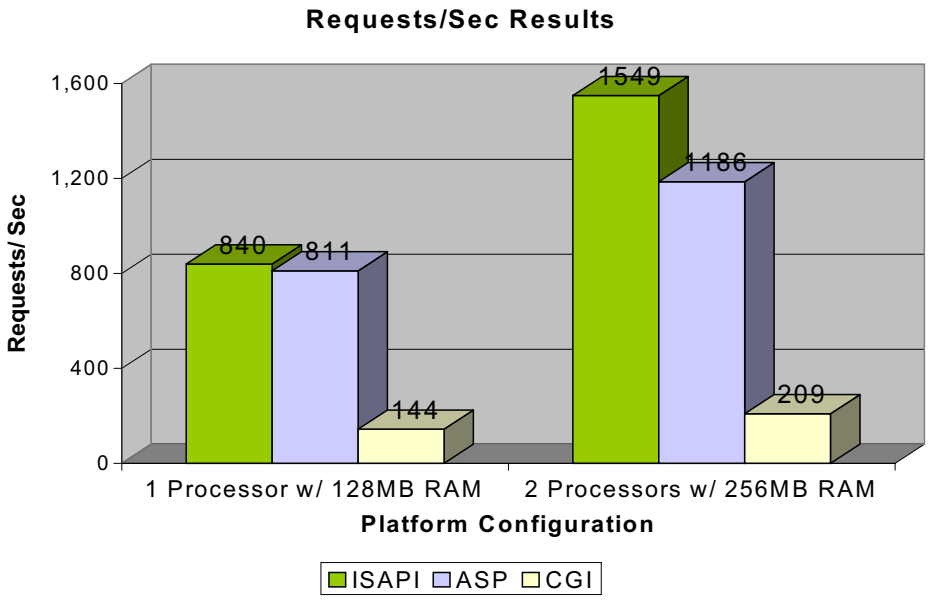

Figure 3. 30% Static 70% Dynamic Content Mix

The following are throughput performance test results for the Compaq ProLiant 1850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

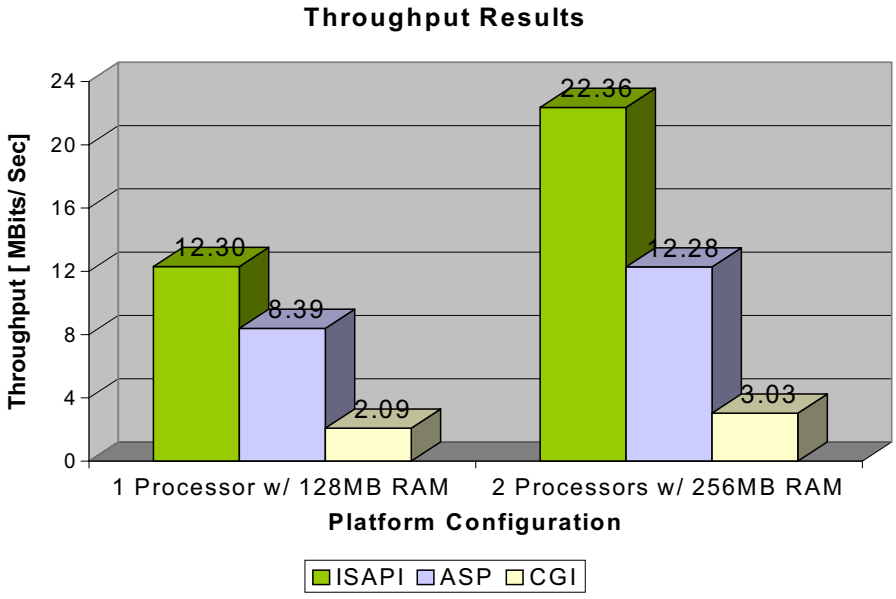

Figure 4. 30% Static 70% Dynamic Content Mix

Note: Please note that the Compaq ProLiant 1850R can support larger amounts of transactions per second and provide higher throughput. These results are solely based upon the specified server tested configurations only. Adding additional processors, changing RAID tolerance type, increasing memory, changing network configurations, 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, however, individualize their news, mail, FTP, and HTTP web sites 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. Additionally, different benchmark tools may produce different benchmark results. Benchmark results may vary depending upon the type of requests

sent to the server during testing, the complexity of the dynamic content request, and the size and configuration of the workload tree used. For example, performance testing using WebBench 1.1 and WebBench 2.0 will produce different performance results on the same server platform. Overall, 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 1850R. 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 file. 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 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 needs 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. Once done, a total of at least 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 run 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. For more information on Ziff-Davis WebBench 2.0, please refer to the WebBench 2.0 documentation at: (http://www.zdnet.com/zdbop/WebBench/WebBench.html)

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 in one's 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.

In the world 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 must the web server platform be capable of handling high loads of daily transactions and delivering them at exceptional speed, it must also be easy to manage, capable in 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, including these other factors included, Compaq is clearly the best choice for all your enterprise needs.

APPENDIX A: PERFORMANCE TEST DISCLOSURE

Table 2. Test Configuration and Software

Testbed Item	Configuration	Software
(1) Server	Compaq ProLiant 1850R	NT Server 4.0 with SP3
	1st Test:	Internet Explorer 4.0
	1 Processor (400MHz) with 128MB RAM	Microsoft Option Pack (Typical Installation)
	2nd Test:	WebBench 2.0 Workload tree with Microsoft ASP file
	2 Processors (400MHz) with 256MB RAM	
(1) Controller	Compaq ProLiant 1500	NT Workstation 4.0 with SP3
	1 Processor (166MHz) with 64MB RAM	Internet Explorer 4.0
		Microsoft Excel 7.0
		WebBench 2.0 Controller
(24) Clients	Compaq ProLiant 850R	NT Workstation 4.0 with SP3
	1 Processor (200MHz) with 32MB RAM	Internet Explorer 4.0
		WebBench 2.0 Client
(2)Network Repeater	Compaq Netelligent 1224	
	10Base-T / 100Base-TX	

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

Performance Data Disclosure

WebBench 2.0 Summary.

Table 3. Test Configuration #1 (1 processor with 128MB RAM

Dynamic Type	Mix Type	70% Static-30% Dynamic		30% Static-70% Dynamic	
		Requests/Sec	Throughput [Bytes/Sec]	Requests/ Sec	Throughput [Bytes/Sec]
ISAPI	ISAPI #1	**1,134**	**4,2910,80**	**840**	**1,612,427**
	ISAPI #2	1,115	4,210,479	840	1,610,292
	ISAPI #3	1,110	4,198,734	837	1,605,892
	ISAPI #4	1,110	4,198,229	836	1,600,153
	ISAPI #5	929	3,486,484	836	1,600,091
ASP	ASP #1	**1,101**	**3,901,353**	**811**	**1,100,294**
	ASP #2	1,097	3,897,239	805	1,090,035
	ASP #3	1,078	3,858,927	802	1,087,504
	ASP #4	1,067	3,780,693	800	1,087,461
	ASP #5	1,065	3,780,023	785	1,084,289
CGI	CGI #1	**288**	**1,097,557**	**144**	**273,617**
	CGI #2	284	1,056,739	144	270,823
	CGI #3	283	1,055,892	143	270,819
	CGI #4	276	1,001,013	141	257,329
	CGI #5	263	950,963	141	247,347

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

Table 4. Test Configuration #2 (2 processors with 256MB RAM)

Dynamic Type	Mix Type	70% Static-30% Dynamic		30% Static-70% Dynamic	
		Requests/Sec	Throughput [Bytes/Sec]	Requests/ Sec	Throughput [Bytes/Sec]
ISAPI	ISAPI #1	**2,278**	**8,594,787**	**1,549**	**2,930,930**
	ISAPI #2	2,275	8,592,389	1,548	2,929,920
	ISAPI #3	2,274	8,590,001	1,548	2,928,876
	ISAPI #4	2,274	8,589,235	1,547	2,927,029
	ISAPI #5	2,270	8,588,237	1,547	2,924,860
ASP	ASP #1	**1,621**	**5,705,873**	**1,186**	**1,609,227**
	ASP #2	1,620	5,700,829	1,174	1,594,313
	ASP #3	1,616	5,698,200	1,165	1,576,704
	ASP #4	1,615	5,682,839	1,148	1,563,950
	ASP #5	1,606	5,648,510	1,112	1,499,649
CGI	CGI #1	**412**	**1,516,299**	**209**	**397,443**
	CGI #2	411	1,516,200	209	397,308
	CGI #3	411	1,516,186	209	397,295
	CGI #4	411	1,516,158	208	397,275
	CGI #5	410	1,515,967	205	395,892

Note: Server CPU usage for all benchmarks results are 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 1850R

http://www.compaq.com/products/servers/ProLiant1850R/index.html

Compaq ProLiant 1850R: Product Description

http://www.compaq.com/products/servers/ProLiant1850R/description.html

Compaq ProLiant 1850R: QuickSpecs

http://www.compaq.com/products/servers/ProLiant1850R/quickspecs.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