

August 1998
ECG0560998

Prepared by Internet Solutions
Business Unit

Compaq Computer Corporation

Contents

Compaq ProLiant 850R	3
Key Features	3
Performance Test Results	4
Capacity Planning	7
WebBench 2.0	8
Power Performance.....	9
APPENDIX A:	
PERFORMANCE	10
Performance Data	11
APPENDIX B: REFERENCES ...	13

Microsoft Internet Information Server 4.0 on the Compaq ProLiant 850R

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 850R, using Ziff-Davis WebBench 2.0 web capacity analysis tool at Compaq Computer Corporation in Houston, Texas. With benchmark results of handling 71,971,200 transactions per day, the Compaq ProLiant 850R 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

The information in this publication is subject to change without notice and is provided "AS IS" WITHOUT WARRANTY OF ANY KIND. THE ENTIRE RISK ARISING OUT OF THE USE OF THIS INFORMATION REMAINS WITH RECIPIENT. IN NO EVENT SHALL COMPAQ BE LIABLE FOR ANY DIRECT, CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE OR OTHER DAMAGES WHATSOEVER (INCLUDING WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION OR LOSS OF BUSINESS INFORMATION), EVEN IF COMPAQ HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

The limited warranties for Compaq products are exclusively set forth in the documentation accompanying such products. Nothing herein should be construed as constituting a further or additional warranty.

This publication does not constitute an endorsement of the product or products that were tested. The configuration or configurations tested or described may or may not be the only available solution. This test is not a determination of product quality or correctness, nor does it ensure compliance with any federal state or local requirements.

Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.

Compaq, Contura, Deskpro, Fastart, Compaq Insight Manager, LTE, PageMarq, Systempro, Systempro/LT, ProLiant, TwinTray, ROMPaq, LicensePaq, QVision, SLT, ProLinea, SmartStart, NetFlex, DirectPlus, QuickFind, RemotePaq, BackPaq, TechPaq, SpeedPaq, QuickBack, PaqFax, Presario, SilentCool, CompaqCare (design), Aero, SmartStation, MiniStation, and PaqRap, registered United States Patent and Trademark Office.

Netelligent, Armada, Cruiser, Concerto, QuickChoice, ProSignia, Systempro/XL, Net1, LTE Elite, Vocalyst, PageMate, SoftPaq, FirstPaq, SolutionPaq, EasyPoint, EZ Help, MaxLight, MultiLock, QuickBlank, QuickLock, UltraView, Innovate logo, Wonder Tools logo in black/white and color, and Compaq PC Card Solution logo are trademarks and/or service marks of Compaq Computer Corporation.

Microsoft, Windows, Windows NT, Windows NT Server and Workstation, Microsoft SQL Server for Windows NT are trademarks and/or registered trademarks of Microsoft Corporation.

NetWare and Novell are registered trademarks and intraNetWare, NDS, and Novell Directory Services are trademarks of Novell, Inc.

Pentium is a registered trademark of Intel Corporation.

Copyright ©1998 Compaq Computer Corporation. All rights reserved. Printed in the U.S.A.

Microsoft Internet Information Server 4.0 on the Compaq ProLiant 850R
White Paper prepared by Internet Solutions Business Unit

First Edition (August 1998)
Document Number ECG0560998

Compaq ProLiant 850R

The Compaq ProLiant 850R offers superior performance, breakthrough reliability features, and unprecedented scalability capabilities while lowering total cost of ownership. It has received rave reviews and has been selected by PC Computing Magazine as their “Top Pick for Large Workgroup Server” in their *PC Computing A-List Awards (March 1998)*. Using the latest in processor and system technology, the Compaq ProLiant 850R delivers superior performance for a wide range of high-volume file, application, and database services. The Compaq ProLiant 850R 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 850R includes superior system management tools and migration capabilities to future processor technologies that reduce total cost of ownership.

Key Features

- 200MHz Pentium Pro Processor (Dual processor capability)
- 256 KB Level-2 cache per processor
- Unbuffered ECC EDO DIMM memory (Expandable to 512MB)
- Hot-Plug Drive Support
- Integrated Wide-Ultra SCSI-3 Controller
- Up to 18.2 GB internal storage and 509.6 GB external storage
- Integrated Netelligent 10/100 TX PCI UTP Controller
- 4 expansion slots (2 PCI, 1 ISA, and 1 shared PCI/ISA)
- Integrated Remote Console, and Automatic Server Recovery-2 (ASR-2)
- Support for Microsoft Cluster Server (MSCS) available with ProLiant Clusters
- Available in both Tower (800) and Rack (850R) form factors
- Compaq Insight Manager and SmartStart software support
- 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 850R 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 850R Test Configuration

Hardware	1 st Test Configuration	2 nd Test Configuration
Processor	(1) 200MHz Pentium Pro /w 256KB L2 cache	(2) 200 MHz Pentium Pro /w 256kb 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 Drive	(2) 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 850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

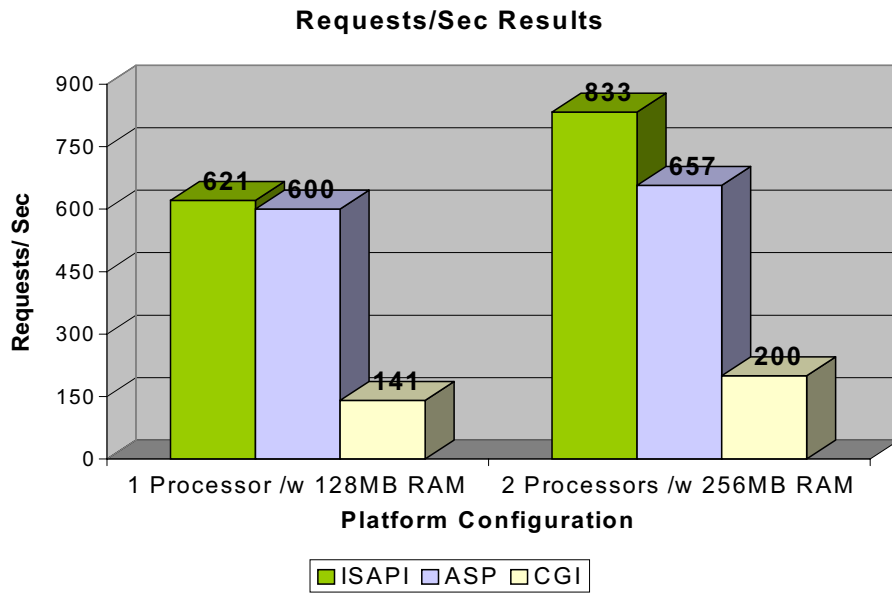


Figure 1. Request per Second Results on ProLiant 850R using 70% Static, 30% Dynamic Content Mix

The following are throughput performance test results for the Compaq ProLiant 850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

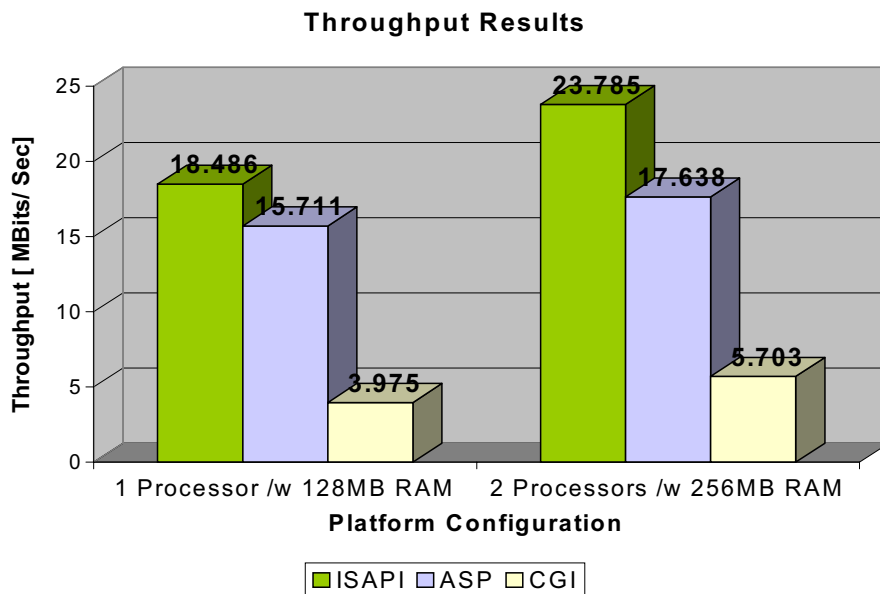


Figure 2. Throughput Results on ProLiant 850R using 70% Static, 30% Dynamic Content Mix

The following are requests per second performance test results for the Compaq ProLiant 850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

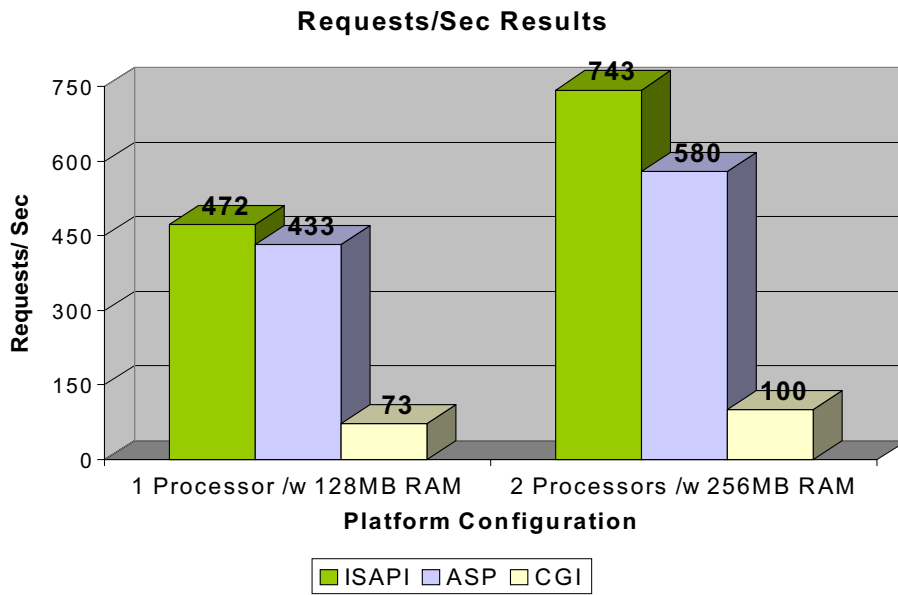


Figure 3. Requests per Second Results on ProLiant 850R using 30% Static 70% Dynamic Content Mix

The following are throughput performance test results for the Compaq ProLiant 850R. Results are based upon Ziff-Davis WebBench 2.0 standard workload request file.

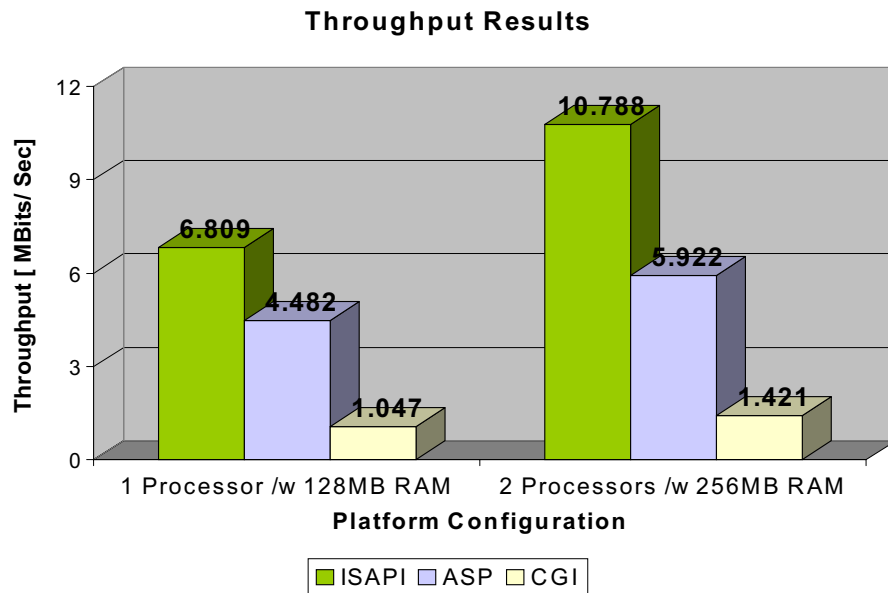


Figure 4. Throughput Results on ProLiant 850R using 30% Static, 70% Dynamic Content Mix

Note: The Compaq ProLiant 850R can support larger amounts of transactions per second and provide higher throughput. These results are based solely upon the specified server tested configurations only. 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,

performance testing using 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 850R. 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 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.

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 all these other 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	<u>Compaq ProLiant 850R</u>	NT Server 4.0 /w SP3
	1 st Test:	Internet Explorer 4.0
	1 Processor (200MHz) /w 128MB RAM	Microsoft Option Pack (Typical Installation)
	2 nd Test:	WebBench 2.0 Workload tree /w Microsoft ASP file
	2 Processors (200MHz) /w 256MB RAM	
(1) Controller	<u>Compaq ProLiant 1500</u>	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	<u>Compaq ProLiant 850R</u>	NT Workstation 4.0 /w SP3
	1 Processor (200MHz) /w 32MB RAM	Internet Explorer 4.0
		WebBench 2.0 Client
(2) Network Repeater	<u>Compaq Netelligent 1224</u>	
	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 128MB RAM)

Table 3. WebBench 2.0 Summary

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	620	2,408,993	471	889,823
	ISAPI #2	621	2,422,957	472	891,009
	ISAPI #3	621	2,408,939	472	892,433
	ISAPI #4	615	2,399,384	472	891,983
	ISAPI #5	620	2,408,390	470	890,839
ASP	ASP #1	600	2,059,333	430	585,238
	ASP #2	596	2,054,389	430	586,892
	ASP #3	599	2,059,001	433	587,452
	ASP #4	596	2,049,984	433	587,232
	ASP #5	598	2,060,893	433	586,389
CGI	CGI #1	135	519,820	73	136,893
	CGI #2	139	520,832	73	137,199
	CGI #3	141	521,027	73	137,231
	CGI #4	140	520,830	73	137,222
	CGI #5	141	521,009	73	136,983

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 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	829	3,109,823	740	1,403,892
	ISAPI #2	830	3,118,392	743	1,414,020
	ISAPI #3	831	3,110,128	740	1,410,923
	ISAPI #4	833	3,117,594	743	1,410,938
	ISAPI #5	831	3,108,239	741	1,418,290
ASP	ASP #1	657	2,311,793	579	774,899
	ASP #2	655	2,309,434	580	775,239
	ASP #3	650	2,298,239	580	776,098
	ASP #4	652	2,298,329	580	776,267
	ASP #5	655	2,310,983	579	776,094
CGI	CGI #1	195	745,389	100	180,834
	CGI #2	197	745,984	97	185,893
	CGI #3	199	747,092	95	184,343
	CGI #4	199	747,118	100	186,297
	CGI #5	200	747,451	98	186,093

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 850R

<http://www.compaq.com/products/servers/ProLiant850r/index.html>

Compaq ProLiant 850R: QuickSpecs

<http://www.compaq.com/products/servers/ProLiant850r/quickspecs.html>

Compaq ProLiant 850R: Features

<http://www.compaq.com/products/servers/ProLiant850r/features.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>