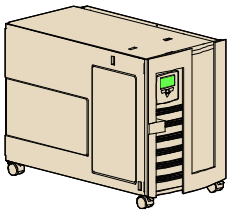
COMPAQ AND MICROSOFT DEMONSTRATE ENTERPRISE SCALABILITY WITH EXCHANGE SERVER 5.5

November 14, 1997

Internet Solutions
Business Unit

Compaq Computer
Corporation

Compaq ProLiant servers deliver proven performance for Microsoft Exchange Server customers



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*To demonstrate Microsoft Exchange Server 5.5 scalability, Compaq and Microsoft conducted tests in which **9,000** simultaneous MAPI Email users were supported on a Compaq ProLiant 6000. These tests were conducted at Compaq's Microsoft Competency Center located in Redmond, WA.*

Electronic Messaging and Collaborative applications are quickly becoming ubiquitous in the business world. As the world's largest supplier of Intel-based servers, Compaq is uniquely positioned to be a leader in Messaging and Collaborative platforms.

Microsoft Exchange Server has been the focal point of extensive development and testing by both Microsoft and Compaq. Throughout this activity, Compaq and Microsoft have worked together to optimize Microsoft Exchange Server performance on Compaq Server products.

Exchange Server 5.5 Scalability Demonstration Overview

The tests were conducted using Microsoft's LoadSim Tool. For this test, the LoadSim Medium MAPI canonical profile was chosen. The Medium MAPI profile reflects the task workload of a typical corporate Email user - including daily common mail tasks such as send, browse, read, forward as well as calendaring tasks and distribution list usage. The tests were conducted using recommended procedures from Microsoft for Exchange Server capacity testing. The tests were run for 8-hour periods using multiple LoadSim workload generation clients. At the conclusion of each test, the LoadSim score was measured. The LoadSim score represents a 95th percentile score of the measured test run. The score is reflected in milliseconds (ms). A LoadSim score of 1000ms or less is considered to be an acceptable response time for Email users utilizing Exchange Server's MAPI protocol. For the 9,000-user test the 95th percentile score was consistently well below 1000ms.

Compaq ProLiant 6000 Exchange Server Scalability Results

NUMBER OF USERS	**9,000**
95th PERCENTILE RESPONSE TIME SCORE	336 milliseconds (ms)
Total Messages Delivered (8-hour period)	695,298
PROTOCOL	Exchange MAPI
LoadSim Canonical Profile	Medium (Typical Corporate Mail User)
MICROSOFT EXCHANGE SERVER VERSION	5.5 (Build 1958)
PLATFORM	Compaq ProLiant 6000 (4) Intel Pentium Pro 200MHz – 1MB Cache; 3GB RAM (2) SMART-2/DH Array Controllers (18) 4.3GB Wide-Ultra SCSI Drives

LoadSim

The main tool used in generating the workload used in this scalability demonstration was the Microsoft Exchange Server Load Simulation utility called LoadSim. As its name implies, LoadSim is a tool for simulating a client user load on an Exchange Server. Its purpose is to enable a single Windows NT machine—called a LoadSim client—to simulate multiple Microsoft Exchange client users.

The operation of LoadSim users is governed by a LoadSim profile. This profile controls factors such as how long a LoadSim 'day' is, how many email messages to send in a day's time, how many times to open and read existing email, whether to use distribution lists, whether to use public folders, etc.

LoadSim creates a highly accurate simulation of reality. It mimics the full Microsoft Exchange Client in many respects. First, it uses .MSG files, the same format used by the Exchange Client. This guarantees that messages generated by LoadSim have the same properties as those sent by real users of the Exchange Client. Second, LoadSim uses the same MAPI remote procedure call (RPC) semantics as those used by the Client. Third, LoadSim registers MAPI change notifications in the same manner as they are registered by the Client. Finally, LoadSim even emulates the Microsoft Exchange Client list-box cache, which the Client uses for folder and message panes in the viewer when a user browses and selects messages on the server.

Compaq Delivers Enterprise Messaging Scalability and Reliability

When deploying messaging systems like Microsoft Exchange Server, one must consider not only the performance and capacity of the server but also the price/performance. Several competing hardware vendors offer platforms capable of supporting heavy user loads, but provide these systems at significantly higher cost. Compaq delivers leading performance on industry-standard platforms with lowest total cost of ownership.

Another important consideration is the mission-critical nature of collaborative applications and messaging within your organization. While it is possible to support 9,000 users on a single server, the trade-off may result in a loss of productivity when this single potential point of failure is unavailable. The question is not whether you can support thousands of users on a single system, but whether it is always prudent to do so. Exchange Server 5.5 and Compaq ProLiant Clusters address this important issue. Microsoft has added support for Microsoft Cluster Server (MSCS) to Exchange Server 5.5. With Microsoft Cluster Server deployed on Compaq ProLiant Clusters, enterprise messaging customers can achieve both the scalability and reliability that is required in this environment.

Compaq has invested heavily in collaborative and messaging applications. Microsoft Exchange Server has been optimized and integrated for Compaq servers and provided on Compaq SmartStart. SmartStart allows users of Exchange Server to integrate with confidence by facilitating the installation of Exchange Server on Compaq servers without errors. Another area of significant investment is the Internet Solutions Business Unit at Compaq. This group supports applications like Exchange Server and ensures their optimal performance and integration on Compaq servers. Compaq has numerous engineering resources working on site at Microsoft with various Windows NT and BackOffice groups like the Exchange Server team to ensure tightly coupled integration and superior performance on Compaq servers. For enterprise collaborative application and messaging deployments, Compaq is the clear choice.

APPENDIX A: TEST DISCLOSURE

Test Bed Configuration

LoadSim Clients	Configuration
Network type (10Base T, Token Ring, etc.)	100 Base-TX
Number and type of clients	(20) 5/166, 128MB RAM (500 users each)
Number and type of hubs/concentrators (full duplex, switching, etc.)	Compaq Netelligent 5708 Switch and Netelligent 2624 Hub
Number of clients/segment	10
Client CPU type and speed in percentages	166 MHz Pentiums or better
Client network controller broken down by percentages	Compaq Netelligent 10/100
Client network software name and version (drivers, protocols, redirector)	Microsoft Windows NT Workstation 4.0 + SP3 TCP/IP
Size of any client network cache	None
Network controller software	Compaq Netelligent 10/100 driver
LoadSim version	5.5

PROLIANT 6000 HARDWARE CONFIGURATION

(4) Pentium Pro/200 – 1MB Cache

3GB RAM

(2) SMART-2/DH Array Controllers

OS/Pagefile: (2) 4.3-GB Drives – RAID1

Exchange Log Files: (2) 4.3-GB Drives – RAID1

Exchange DS/MTA Files: (2) 4.3-GB Drives – RAID1

Exchange Information Store Files: (12) 4.3-GB Drives – RAID5

Compaq Netelligent (100BaseTX)

Windows NT Server v4.0 Enterprise Edition + SP3

Default LoadSim Canonical User Profiles

There are three pre-configured profiles built into LoadSim: **Light**, **Medium**, and **Heavy**. Their characteristics are detailed in the Table.

LoadSim USER ATTRIBUTE	ATTRIBUTE DETAIL	LIGHT	MEDIUM	HEAVY
TEST DURATION	Length of a day (hours)	8	8	8
READING MAIL	New mail (times/day)	12	12	12
	Existing mail (times/day)	5	15	20
AFTER READING MAIL	% of Reply	5%	7%	15%
	% of Reply All	3%	5%	7%
	% of Forward	5%	7%	7%
	% of Move	20%	20%	20%
	% of Copy	0%	0%	0%
	% of Delete	40%	40%	40%
	% of Do nothing	27%	21%	11%
DISTRIBUTION LISTS	Minimum size	2	2	2
	Maximum size	20	20	20
	Average size	10	10	10
	Distribution Lists per site	30	30	30
	Cover 100% of users (no overlap)	Yes	Yes	Yes
ATTACHMENTS	% to Run/Load Mail Attachment (if one exists)	25%	25%	25%
INBOX SIZE	Inbox Size Limit (# messages)	20	125	250
SENDING MAIL	New mail (times/day)	2	4	6
	Save a copy in Sent Mail Folder?	Yes	Yes	Yes
	Number of random recipients	3	3	3
	% of time to add a Distribution List	30%	30%	30%
	Message Priority	Normal	Normal	Normal
	Delivery Receipt?	No	No	No
	Read Receipt?	No	No	No

EXCHANGE SERVER SCALABILITY SUMMARY *(cont.)*

LoadSim USER ATTRIBUTE	ATTRIBUTE DETAIL	LIGHT	MEDIUM	HEAVY
		Weight	Weight	Weight
NEW MAIL MESSAGE CONTENT Text-only, no attachment	1K body (ups1K.msg)	90	60	50
	2K body (ups2K.msg)	0	16	10
	4K body (ups4K.msg)	0	4	5
NEW MAIL MESSAGE CONTENT 1K mail body, with attachment	10K attachment (ups10Kat.msg)	10	5	10
	Embedded bitmap object (upsBMobj.msg)	0	2	5
	Word attachment (upsWDatt.msg)	0	2	5
	Excel attachment (upsXLatt.msg)	0	4	5
	Embedded Excel object (upsXLobj.msg)	0	2	10
SCHEDULE+ CHANGES	Changes per day	1	5	10
	Update Free/Busy information?	No	No	No
	Average Schedule File Size	22K	22K	22K
PUBLIC FOLDERS	Folder activity	None	None	None
CALCULATED DAILY LOAD (based on these defaults)	TOTAL MAIL RECEIVED PER DAY	22.94	66.30	118.89
CALCULATED DAILY LOAD (based on these defaults)	TOTAL MAIL SENT PER DAY	4.70	14.18	30.67
	Mail sent as New mail	2.00	4.00	6.00
	Mail sent as a Reply	1.05	3.76	13.03
	Mail sent as a Reply to All	0.60	2.67	5.82
	Mail sent as a Forward	1.05	3.76	5.82
CALCULATED DAILY LOAD	AVG. # RECIPIENTS FOR EACH MESSAGE	4.88	4.68	3.88

Performance Data (measured during test run at steady state)

ITEM/COUNTER	MEASUREMENT/RESULTS
Average CPU Utilization (%)	59.14%
Average Context Switches/Sec	2971
Processor Queue Average Length	1.81
IS Send Queue Average Length	1.83
MTA Work Queue Average Length	0.889
Available Bytes	524MB
Pages/Sec	0.001
STORE Working Set Bytes	2.1GB
STORE Virtual Bytes	2.6GB
IS Database Volume Average Disk Queue Length	9.46
IS Log Volume Average Disk Queue Length	0.042
MTA/DS Files Volume	0.007
OS/Pagefile Volume Disk Queue Length	0.000
IS Database Volume Avg. Read I/Os sec	179.60
IS Database Volume Avg. Write I/Os sec	123.48
IS Log Volume Avg. Write I/Os sec	93.20
Avg. CPU % - STORE	191.92% (400% max)
Avg. CPU % - DS	12.90% (400% max)
Avg. CPU % - MTA	13.45% (400% max)
IS Avg. Table Opens/sec	122.82
Avg. RPCs./sec	406.80
Message Recipients Delivered	695,298

NOTE 1: Performance results measured using Microsoft NT Performance Monitor. Measurements were obtained by measuring averages for the period of steady-state test activity (i.e. after 9,000 users were successfully logged on).

NOTE 2: Process CPU % measurements were taken using the CAPAT100PERCENT = 0 registry parameter. This allows analysis of true per process CPU % on multiprocessor systems.

APPENDIX B: RELATED DOCUMENTS

These documents are available on the Compaq web site. The URL address for all the documents is http://www.compaq.com/support/techpubs/whitepapers/_____.html.

Disk Subsystem Performance and Scalability,

URL: ECG0250997

Performance of Exchange Server 5.0 on Compaq ProLiant 6000-class Servers,

URL: ECG0520897

Performance of Exchange Server 4.0 on Compaq ProLiant Servers,

URL: 444A0696

8-Way Technology and the Compaq ProLiant 7000,

URL: ECG0501097

Configuring Compaq RAID Technology for Database Servers,

URL: http://www.compaq.com/support/techpubs/technotes/184206-1.html

Compaq SMART-2 Array Controller Technology,

URL: 667A0697

Compaq Pentium Pro Processor-based Servers,

URL: 308A0496

Configuring the Compaq ProLiant 5000 Server for Peak Performance,

URL: 679A0697

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Compaq and Microsoft Demonstrate Enterprise Messaging Scalability with Microsoft Exchange Server 5.5
First Edition (November 1997)