NotesBench Disclosure Report

for

IBM Netfinity 3500 M10

with

Lotus Domino 5.02a for Windows NT 4.0

Submitted January 5, 2000

IBM Corporation

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Edition Notice

Executive Summary

Performance measurements using NotesBench were conducted with the IBM Netfinity* 3500 M10 (Model 8655-21Y) running Lotus** Domino** Server Release 5.02a on Microsoft** Windows** NT Server 4.0 with Service Pack 6.

Results for the IBM Netfinity 3500 M10, which were obtained using the NotesBench SMTPPOP3 test script, which executes Domino transactions that model a server for mail users at sites that rely on SMTP and POP3 mail for communication. Incoming mail is delivered using the POP3 protocol. Outgoing mail is delivered using the SMTP protocol.

The results for the SMTPPOP3 test script, along with R5Mail-Only results for the same hardware configuration, are summarized in the following table. The R5Mail-Only results are provided for information. Price/performance for the R5Mail-Only configuration are based on third-party pricing available at the time the report was published.

Test Script	Maximum Users	NotesMark (tpm)	Ave. Response Time (sec)	$/User	$/NotesMark
SMTPPOP3-Only	4,937	3,458	0.076	$3.53	$5.04
R5Mail-Only	3,000	4,162	0.308	$6.65	$4.79

The IBM Netfinity 3500 M10, configured with one 550MHz[1] Intel** Pentium** III processor, 768MB of memory, and two 18.2GB and ten 9.1MB[2] hard disk drives (configured as a RAID-1 array), supported an SMTPPOP3 workload of 4,937 active mail users. All configuration details are provided in Appendix A: Overall Test Setup and Software Versions.

IBM's Netfinity Server Performance Laboratory in Research Triangle Park, NC, conducted the benchmark in December 1999, and KMDS Technical Associates, Inc., audited the results in January 2000.

NotesBench provides an objective method for evaluating the performance of different platforms running Lotus Domino Server Release 5.0x. NotesBench generates a transactions-per-minute (tpm) throughput metric, called a NotesMark, for each test, along with a value for the maximum capacity (number of users) supported, and the average response time.

Benchmarking Objectives

The benchmark objective is to provide customers with information on the number of POP3 mail users supported on a Netfinity 3500 M10 hardware configuration using Lotus Domino Server Release 5.02a. Performance measurements on IBM Netfinity servers using NotesBench for the Domino Server Release 5.0x are ongoing.

Test Methodologies

Test Setup and Hardware/Software Configuration

The IBM Netfinity 3500 M10 system under test used one 550MHz Pentium III processor (512KB of L2 write-back cache); 768MB of memory, and two 18.2GB and ten 9.1MB 10K-rpm Wide Ultra SCSI hard disks. Three Netfinity ServeRAID-3L Ultra2 SCSI Adapters were used for this test. The system under test and the client driver systems were connected to the SUT through a single 100Mbps Ethernet LAN segment, using the TCP/IP network protocol. An IBM PC Server 320 system was used as the source driver (parent) system; IBM IntelliStation** M PRO systems were used as the client drivers.

The IBM Netfinity 3500 M10 system under test (SUT) ran Microsoft Windows NT Server Version 4.0 and Domino Server Release 5.02a. All clients used the SUT's Name and Address Book, which contained person documents for 10,000 POP3 mail recipients who were randomly selected by each active POP3 user. The SUT contained mail files for 5,000 POP3 users.

The following NOTES.INI parameters were modified as recommended in the NotesBench operator's manual:

SMTPPOP3 Workload
Mail_Number_Of_MailBoxes = 2
Log_MailRouting = 10
MailLogToEventsOnly = 1
NAMES = names.nsf

The following parameters were added to suppress database activity logging after long runs and to capture server console output:

No_Force_Activity_Logging = 1
Debug_Outfile = _\\nbtest1\lastrun\sutinfo.txt

All Domino server tasks were disabled except Router, SMTP, POP3 and LDAP.

All Domino mail data files were distributed across the E: and F: partitions. The Domino data and mail data link files were located on the D: partition.

The transaction logging option was not enabled for this audit run.

Test Procedures

Seventeen child drivers were used; 300 users were simulated in each of child drivers 1 through 15; 250 users were simulated in each of child drivers 16 and 17. The number of child drivers used and the number of users simulated by each child driver are defined by the "NumClientsN" parameters in the parent's NOTES.INI file. For each child driver, users' start times were staggered. Numerically by child driver they were, respectively, 8, 5, 8, 5, 8, 5, 8, 5, 8, 5, 8, 5, 8, 5, 8, 5 and 8 seconds, as defined in the "ThreadStagger" parameter for each child driver. The start time of each child driver was staggered to allow sufficient time for all users simulated by each child driver to be connected at the SUT and to allow the SUT to settle for at least 5 minutes before releasing the users from the each of the successive child drivers. The ramp-up time was approximately 4 hours.

Our experience shows that ramp-up time increases non-linearly as a function of the number of users simulated by a child driver. This effect becomes even more pronounced as the capacity of the server is approached. The NotesBench audit rules do not restrict the amount of time for ramp-up. Since we had a limited number of child drivers, the attempt to minimize ramp-up time was carried only far enough to ensure adequate benchmarking productivity. During the test runs, the tools used to determine steady state included Windows NT's PERFMON, the Notes Server SHOW command, and the child driver RES files.

To confirm steady state, we monitored the number of users, the number of transactions per minute, and pending mail at the SUT. We confirmed steady state when:

- The SUT Domino Server console sustained the peak user load
- Pending mail did not become backlogged, as verified by:
  - Inspection of the mail-routing log at the SUT after the test run ended
  - Server Mail statistics collected every 30 minutes throughout the test run.

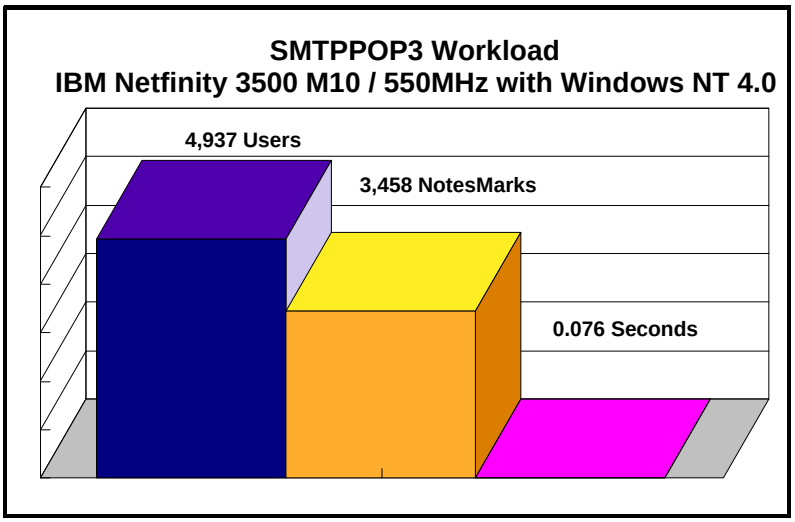
We also used the Show Stat SMTP command on the server to verify that at least 90 percent of the mail generated during the test period was delivered to the local mail databases during the test period. In fact, during the test period, the SUT Domino Server delivered more than 99.9 percent of the mail generated to the local mail databases.

Data

IBM Netfinity 3500 M10 Metrics for the SMTPPOP3 Mail Test

The Netfinity 3500 M10 server ran for a period of 8 hours and demonstrated that it can support 4,937 concurrent, active POP3 mail users. The NotesMark throughput value was 3,458. Average response time was 0.076 seconds.

The SMTPPOP3 workload executes Notes transactions that model a server for mail users at sites that rely only on mail for communication. The resulting capacity metric for an SMTPPOP3 mail server is the maximum number of users that can be supported before the average user response time becomes unacceptable.



The SMTPPOP3 test script models an active user who is sending and retrieving mail using the SMTP/POP3 protocol. The script contains an average of 10 minutes of waiting time; thus, an average user executes this script no more than six times per hour. For each iteration of the test script, there is a check and retrieval of POP3 mail messages. In sending messages, each user creates and sends a mail message to NumMessageRecipients no more frequently than every 20 minutes. Twenty percent of the users receive eighty percent of the mail messages sent.

Compared with the Domino R5Mail-Only workload, the SMTPPOP3 workload generates less data I/O at the system under test. All POP3 users access the name and address book, which resides on the SUT. All mail is delivered locally.

NotesNum Output for SMTPPOP3 Test

Min Start Time = 12/17/99 01:01:54 PM Max Stop Time = 12/18/99 03:42:44 AM
Total Test Errors = 15
Total Test Time = 52860 sec
Test Run: Users = 4937 NotesMark = 3458 Response Time = 76 msec (12/17/99 06:05:00 PM to 12/18/99 03:20:00 AM)

Errors, which were generated during ramp-up, were POP3 authentication errors that caused those users to be dropped from running the workload as prescribed in the NotesBench script.

Analysis

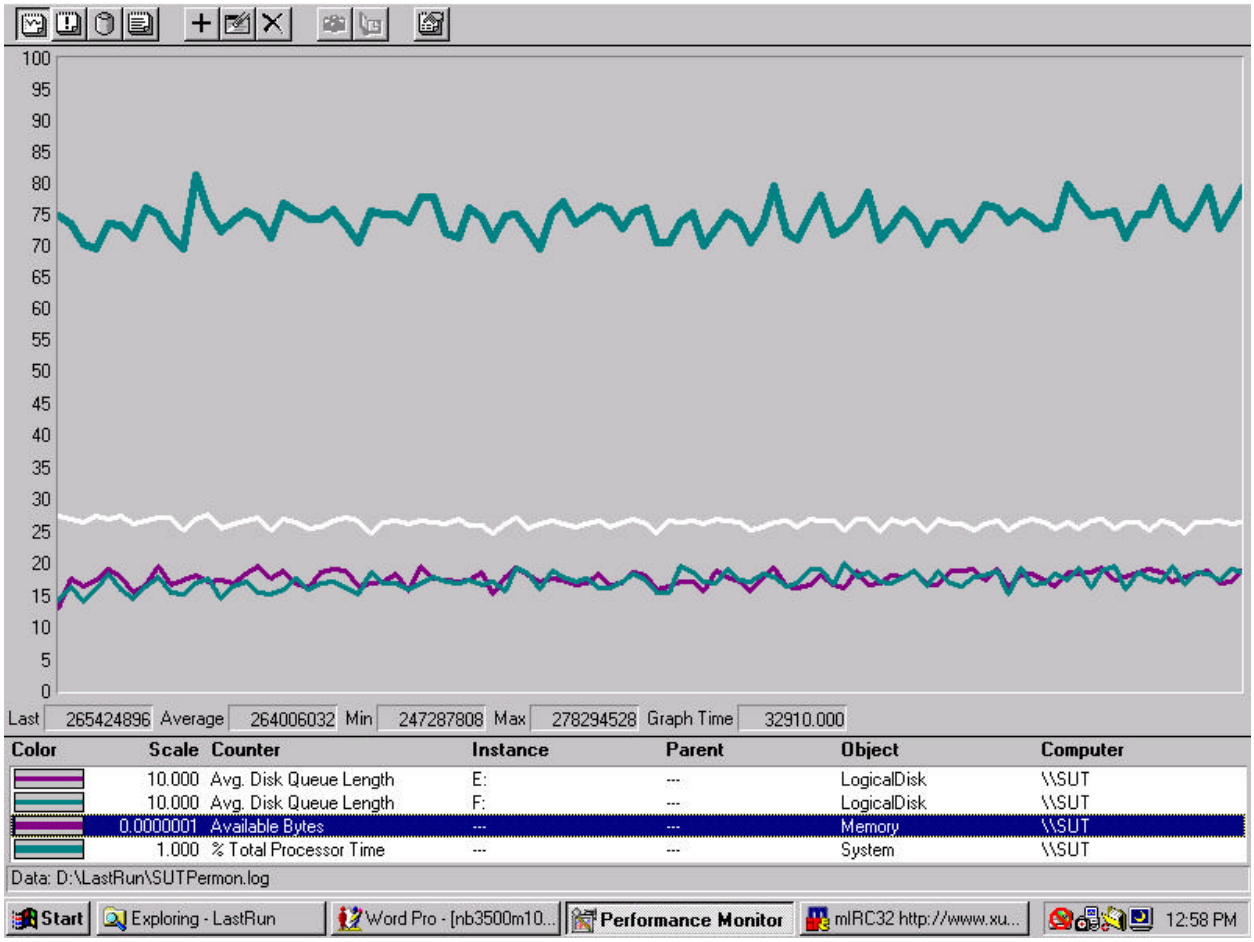
The following table shows PERFMON data that was collected for the audit test run during steady state.

Steady-State Values	Domino Data in RAID-1
Maximum Concurrent POP3 Users	4,937
Average CPU Utilization	75%
Average Memory Used * 1	539MB
Average Page File Usage	1.600
Average Physical Disk Queue Length	1.72
Remaining Disk Space	5%

Average Memory Used is computed by subtracting the Average Available Bytes of Memory measured by PerfMon from the installed memory of 768MB. During steady state, all users ran error-free for more than 8 hours before the controller client performed an orderly stop of the run.

The audit test run was set for 5,000 users; however, due to errors generated by the NotesBench SMTPPOP3 test script during ramp-up, only 4,937 POP3 users were obtained. During previous experimental test runs, we observed that the number of users obtained could vary by as much as -5 percent.

Steady-state activity for the audit run is shown in the screen capture below.



Conclusions

These NotesBench results demonstrate that the Netfinity 3500 M10 (Model 8655-21Y) can support 4,937 POP3 users. The results obtained are based on running the IBM Netfinity 3500 M10 as a dedicated Domino server; the addition of other application workloads will affect the number of users supported as well as the response time. Achieving optimum performance in a customer environment is highly dependent upon selecting adequate processor power, memory and disk storage as well as balancing the configuration of that hardware and appropriately tuning the operating system and Domino software.

Statement by Auditor

The original “Lotus NotesBench Test Results Report Certification Letter” was signed by Daryl K. Thompson, NotesBench Auditor for KMDS Technical Associates, Inc., and is on file at IBM.

Appendix A: Overall Test Setup and Software Versions

Number of Client Systems

Eighteen driver systems were used. Seventeeen of those systems were configured as client driver systems and one as the parent (source driver).

The client drivers were IBM IntelliStation M PRO systems, each configured with one 400MHz Pentium II processor. Each client driver was configured with 256MB of memory, one 8.4GB hard disk, and one IBM 10/100 Ethernet PCI Adapter.

The disk configuration used for the client systems is as follows:

C: Partition (786MB - NTFS) - Windows NT Workstation 4.0
D: Partition (7.2GB - NTFS) - Notes client 5.02a

Number of Server Platforms

One server platform, the IBM Netfinity 3500 M10 with one 550MHz Pentium III processor and 768MB of memory, was benchmarked.

The disk configuration used for the system under test is as follows:

- C: Partition (4GB - NTFS) - Windows NT Server Version 4.0 (boot partition) and Domino 5.02a executables
- D: Partition (13.5GB - NTFS) - Domino 5.02a data and mail link files
- E: Partition (21.5GB - NTFS) - Actual NotesBench mail files
- F: Partition (21.5GB - NTFS) - Actual NotesBench mail files

Network

A single 100Mbps Ethernet LAN segment was used to connect all systems.

Software Versions

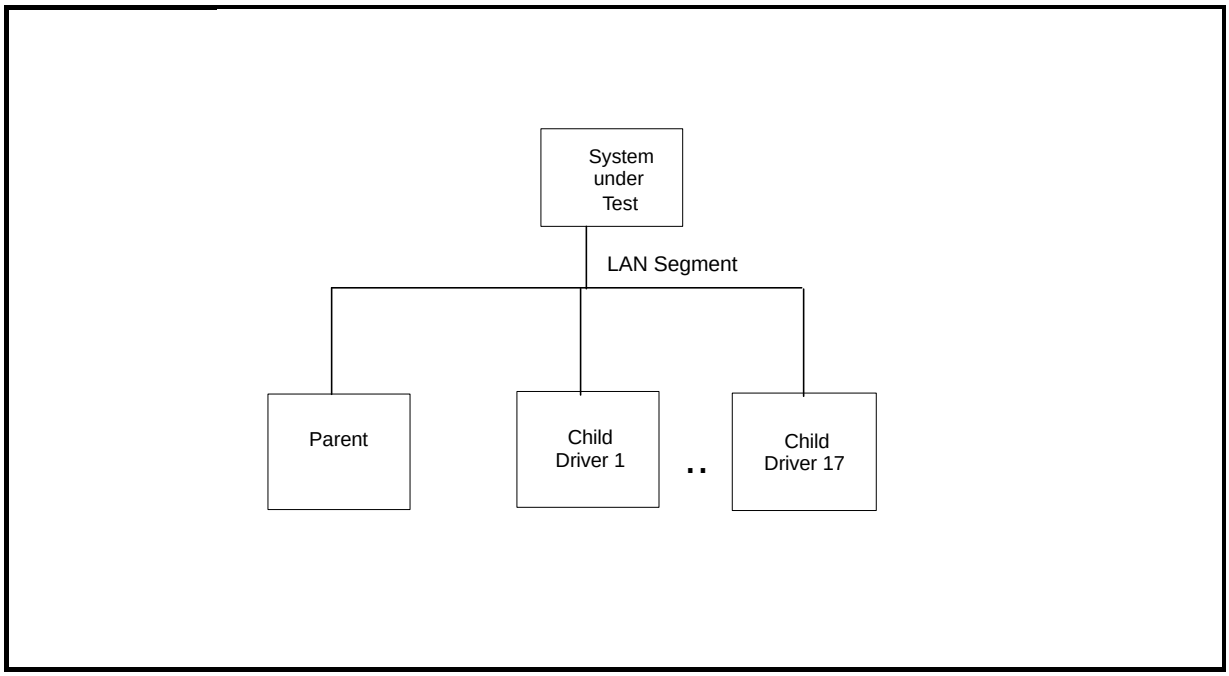
Software versions used on the system under test were as follows:

- Microsoft Windows NT Server 4.0 with Service Pack 6
- Lotus Domino Server Release 5.02a
- NotesBench Version 5.02 - Windows/32, released November 12, 1999

Software versions used on the child drivers were as follows:

- Microsoft Windows NT Workstation 4.0 with Service Pack 6
- Lotus Notes Client Release 5.02a for Windows NT Workstation 4.0
- NotesBench Version 5.02 - Windows/32, released November 12, 1999

Test Setup Diagram



Details of Configuration

System Under Test	Child Drivers 1-17	Parent Source Driver
IBM Netfinity 3500 M10	IBM IntelliStation M PRO	IBM PC Server 320
1 x 550MHz Pentium III	1 x 400MHz Pentium II	1 x 100MHz Pentium Pro
768MB Memory	256MB Memory	128MB Memory
10 x 9.1MB Drives 2 x 18.2GB	1 x 8.4GB Drive	1 x 4.51GB Drive
3 x ServeRAID-3L Ultra2 SCSI Adapter		
Integrated Ethernet 10/100 PCI Controller	IBM 100/10 Ethernet PCI Adapter	IBM 100/10 Ethernet PCI Adapter
Windows NT Server 4.0 with Service Pack 6	Windows NT Workstation 4.0 with Service Pack 6	Windows NT 4.0 Workstation with Service Pack 6

Appendix B: System Configurations

Server under Test	
System	IBM Netfinity 3500 M10
Processor	1 x 550MHz Pentium III Processor
Memory	768MB
Cache	512KB L2 Write-Back Cache
Disk Controller	3 x Netfinity ServeRAID-3L Ultra2 SCSI Adapter
Disk Drive	10 x 9.1MB 10K Hard Disk Drives (10 drives contained two RAID-1 arrrays), 2 x 18.2GB 10K Hard Disk Drives (2 drives contained one RAID-1 array, including the boot drive)
Network Interface Adapter	Integrated Ethernet 10/100 Controller
I/O	PCI Bus
Operating System	Microsoft Windows NT Server 4.0 with Service Pack 6
Notes	Lotus Domino Server Release 5.02a for Windows NT Server 4.0
NotesBench	NotesBench Version 5.02 - Windows/32, released November 12, 1999

Clients 1-17	
System	IBM IntelliStation M PRO
Processor	1 x 400MHz Pentium II Processor
Memory	256MB
Disk Drive	1 x 8.4GB
Network Interface Adapter	1 x 10/100 Ethernet PCI Adapter
I/O	PCI Bus
Operating System	Microsoft Windows NT Workstation 4.0 with Service Pack 6
Notes	Notes Client Release 5.02a for Windows NT Workstation 4.0
NotesBench	NotesBench Version 5.02 - Windows/32, released November 12, 1999

Parent Source Driver	
System	IBM PC Server 320
Processor	1 x 100MHz Pentium Pro Processor
Memory	128MB
Disk Drive	1 x 4.51GB
Network Interface Adapter	IBM 10/100 Ethernet PCI Adapter
I/O	PCI Bus
Operating System	Microsoft Windows NT Workstation 4.0 with Service Pack 6
Notes	Notes Client Release 5.02a for Windows NT Workstation 4.0
NotesBench	NotesBench Version 5.02 - Windows/32, released November 12, 1999

Appendix C: Operating System Parameters

The following registry variables were changed from their default values as shown:

HKEY_LOCAL_MACHINE/System/CurrentControlSet/Control/PriorityControl\Win32PrioritySeparation: REG_DWORD:0

HKEY_LOCAL_MACHINE/System/CurrentControlSet/Control/SessionManager/MemoryManager/LargeSystemCache: REG_DWORD:0

Appendix D: NOTES.INI Settings

NOTES.INI Files for the System under Test

```
[Notes]

Directory=d:\Domino\Data
KitType=2
SetupDB=Setup.nsf
UserName=Jackal
CompanyName=Wacko
NotesProgram=C:\Domino
InstallType=3
;=================NotesBench's Parameters==========================
Mail_Number_Of_MailBoxes=2
;Max_Users=10000
;NSF_DBcache_Maxentries=10000
;Server_Pool_Tasks=100
;Server_Max_Concurrent_Trans=1000
MAILLOGTOEVENTSONLY=1
;LOG_SESSIONS=0
LOG_MAILROUTING=10
;SERVER_SHOW_PERFORMANCE=1
;MAILUSEPROCESSES=0
;MAILUSETHREADS=1
NAMES=names.nsf
No_Force_Activity_Logging=1
DEBUG_OUTFILE=\\NBTEST1\Lastrun\sutinfo.txt
;================================================================
CONSOLE_Lotus_Domino_Server=80 45 7 54 81 722 496
WinNTIconPath=d:\Domino\Data\W32
Timezone=5
DST=1
$$HasLANPort=1
WWWDSP_SYNC_BROWSERCACHE=0
WWWDSP_PREFETCH_OBJECT=0
EnablePlugins=1
Preferences=-2147480463
AltNameLanguage=en
ContentLanguage=en-US
WeekStart=1
ViewWeekStart=2
NavWeekStart=2
XLATE_CSID=52
SPELL_LANG=1033
Region=en-US
Passthru_LogLevel=0
Console_LogLevel=2
VIEWIMP1=Lotus 1-2-3 Worksheet,0,_IWKSV,,.WKS,.WK1,.WR1,.WRK,.WK3,.WK4,,4,
VIEWIMP3=Structured Text,0,_ISTR,,.LTR,.CGN,.STR,,1,
VIEWIMP4=Tabular Text,0,_ITAB,,.PRN,.RPT,.TXT,.TAB,,1,
VIEWEXP1=Lotus 1-2-3 Worksheet,0,_XWKS,,.WKS,.WK1,.WR1,.WRK,,4,
VIEWEXP3=Structured Text,0,_XSTR,,.LTR,.CGN,.STR,,1,
VIEWEXP4=Tabular Text,1,_XTAB,,.LTR,.RPT,.CGN,.TAB,,1,
EDITIMP1=ASCII Text,0,_ITEXT,,.TXT,.PRN,.C,.H,.RIP,,1,
EDITIMP2=MicrosoftWord RTF,0,_IRTF,,.DOC,.RTF,,2,
EDITIMP3=Lotus 1-2-3 Worksheet,0,_IWKSE,,.WKS,.WK1,.WR1,.WRK,.WK3,.WK4,,4,
EDITIMP4=Lotus PIC,0,_IPIC,,.PIC,,8,
EDITIMP5=CGM Image,0,_IFL,,.GMF,.CGM,,8,
EDITIMP6=TIFF 5.0 Image,0,_ITIFF,,.TIF,,18,
EDITIMP7=BMP Image,0,_IBMP,,.BMP,,18,
EDITIMP8=Ami Pro,0,_IW4W,W4W33F/V0,.SAM,,2,
EDITIMP9=HTML File,0,_IHTML,,.HTM,.HTML,,1,
EDITIMP17=WordPerfect 5.x,0,_IW4W,W4W07F/V1,.DOC,.WPD,,2,
EDITIMP21=WordPro 96/97,0,_IW4W,W4W12F/V0,.LWP,,2,
EDITIMP22=PCX Image,0,_IPCX,,.PCX,,18,
EDITIMP28=Binary with Text,0,_ISTRNGS,,.*,,1,
EDITIMP29=WordPerfect 6.0/6.1,0,_IW4W,W4W48F/V0,.WPD,.WPT,.DOC,,2,
EDITIMP30=Excel spreadsheet,0,_IW4W,W4W21F/V4C,.XLS,,4,
EDITIMP31=Word for Windows,0,_IW4W,W4W49F/V0,.DOC,,2,
EDITIMP32=GIF Image,0,_IGIF,,.GIF,,18,
EDITIMP33=JPEG Image,0,_IJPEG,,.JPG,,18,
EDITEXP1=ASCII Text,2,_XTEXT,,.TXT,.PRN,.C,.H,.RIP,,1,
EDITEXP2=MicrosoftWord RTF,2,_XRTF,,.DOC,.RTF,,4,
EDITEXP3=CGM Image,2,_XCGM,,.CGM,.GMF,,8,
EDITEXP4=TIFF 5.0 Image,2,_XTIFF,,.TIF,,18,
```

EDITEXP5=Ami Pro,2,_XW4W,W4W33T/V0,.SAM,,2,
EDITEXP14=WordPerfect 5.1,2,_XW4W,W4W07T/V1,.DOC,,2,
EDITEXP21=WordPerfect 6.0,2,_XW4W,W4W48T/V0,.DOC,,2,
EDITEXP22=WordPerfect 6.1,2,_XW4W,W4W48T/V1,.WPD,.WPT,.DOC,,2,
EDITEXP23=Word for Windows 6.0,2,_XW4W,W4W49T/V0,.DOC,,2,
DDETimeout=10
NAMEDSTYLE0=030042617369630000000000000000000000000000000000000000000000000000001010100000A000000000000100A0050A0000006400A
0050A000000000000000000000000000000000000000000000000000000000000000000000000000000009404000000000000
NAMEDSTYLE0_FACE=Default Sans Serif
NAMEDSTYLE1=030042756C6C6574000000000000000000000000000000000000000000000000001010100000A0000000000000008070A00000064000
8070A0000000000000000000000000000000000000000000000000000000000000000000000000000000049404000000000000
NAMEDSTYLE1_FACE=Default Sans Serif
NAMEDSTYLE2=0300486561646C696E650000000000000000000000000000000000000000000000010101010B0C000000000000100A0050A0000006400
A0050A0000000000000000000000000000000000000000000000000000000000000000000000000000000009404000000000000
NAMEDSTYLE2_FACE=Default Sans Serif
MailTemplate=mail50.ntf
ServerTasks=Router,SMTP,POP3,LDAP
TCPIP=TCP, 0, 15, 0
Ports=TCPIP
LOG_REPLICATION=1
LOG_SESSIONS=1
KeyFilename=Admin.id
CertificateExpChecked=Admin.id 12/17/99
CertifierIDFile=d:\Domino\Data\cert.id
MailServer=CN=SUT/O=NotesBench
ServerKeyFileName=server.id
Domain=Notesbench
Admin=CN=Admin/O=NotesBench
TemplateSetup=59
Setup=60
ServerSetup=50
DESKWINDOWSIZE=-4 -4 808 580
MAXIMIZED=1
CleanSetup=1
PhoneLog=2
Log=log.nsf, 1, 0, 7, 40000
TRANSLOG_AutoFixup=1
TRANSLOG_UseAll=0
TRANSLOG_Style=0
TRANSLOG_Performance=2
TRANSLOG_Status=0
MTEnabled=0
DefaultMailTemplate=mail50.ntf
SCHEDULE_VERSION=3
ECLSetup=3
WinNTIconCommonConfig=Universal
WinNTIconSize=2
WinNTIconPos=2
WinNTIconHidden=1
WinNTIconRect=0 0 0 24
FileDlgDirectory=A:\
ShowCertifierRecoveryWarning_d:\Domino\Data\cert.id=0
SERVERS_FRAME_PERCENT=20
MONITOR_SCALE=1
ADMINWINDOWSIZEWIN=16 12 768 558
ADMINMAXIMIZED=0
AdminSetup=502
$MIMESaveFormat=132
$headlineDisableHeadlines=0
EmptyTrash=0
MIMEPromptMultilingual=1
MIMEMultilingualMode=1
EnableJavaApplets=0
EnableActiveXInBrowser=1
EnableJavaScript=1
EnableJavaScriptErrorDialogs=1
EnableLiveConnect=1
ShowAccelerators=1
DisableImageDithering=1
AdminLastServer=SUT/NotesBench

Appendix E: Network Configuration

The standard TCP/IP stack provided by Microsoft Windows NT Server 4.0 was used.

In the system under test, the network adapter speed was changed from the default ‘Auto’ to 100Mbps. This forced the Duplex Mode to ‘Half’.

Under the ‘Advanced’ configuration option, the following three parameters were changed from their default values to double the default value:

- Coalesce Buffers
- Receive Buffers
- Transmit Control Block

At the destination servers, under ‘Advanced’ configuration options for the Ethernet adapter, the following three parameters were changed from their default values to double their default values:

- Coalesce Buffers
- Receive Buffers
- Transmit Control Block

Appendix F: Guidelines for Information Usage

This report is intended for IBM Business Partners, customers, and IBM marketing and technical support personnel. The report may be distributed in accordance with the requirements stated in the Edition notice.

Appendix G: Pricing

The table provides the IBM Estimated Reseller Price to end users for the U.S. only. Actual Reseller prices may vary, and prices may also vary by country. Prices are subject to change without notice. For additional information and current prices, contact your local IBM representative.

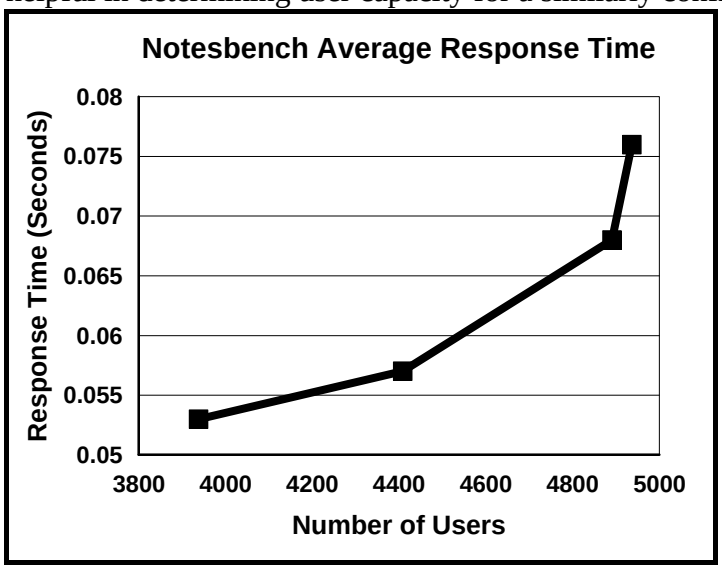
Item Description	Order Number	Qty	IBM Estimated Reseller Unit Price	Extended IBM Estimated Reseller Price
IBM Netfinity 3500 M10	8655-21Y	1	$1,769	$1,769
1 x 550MHz / 512KB L2 Cache Pentium III Processor				
1 x 64MB ECC DIMM				
Integrated 10/100Mbps Ethernet PCI Controller				
Netfinity ServeRAID-3L Ultra2 SCSI Adapter	01K7364	3	785	2,355
256MB SDRAM ECC DIMM	01K1132	3	699	2,097
Netfinity 18.2GB Wide Ultra SCSI Hard Disk	36L9807	2	1,025	2,050
Netfinity 9.1MB 10K Wide Ultra SCSI Hard Disk	36L9806	10	585	5,850
Netfinity EXP15 Rack Storage Expansion Enclosure	35202RU	1	2,419	2,419
IBM G42 14” (13.2” Viewable) Color Monitor	654000N	1	209	209
Software				
Windows NT Server 4.0	227-01025	1	685	685
Lotus Domino Server Release 5.0 included on ServerGuide* with IBM Netfinity 3500 M10 at no charge		1	0	0
Total System Price				$17,434

Appendix H: Optional (Vendor-Defined Information)

This report provides a sizing aid for a single mail-server installation in which the majority of users use a Notes client while a small number of employees access their mail via an SMTP/POP3 client. For this type of environment, we recommend that the server be optimized for Notes mail, as it was for the results documented in this report.

The SMTPPOP3 mail runs were made on the same Netfinity 3500 M10 hardware configuration used for an R5Mail-Only report published in September 1999. For the experimental test runs using SMTPPOP3, we used the same hardware configuration and software optimization as was used for the R5Mail-only audited run. For the SMTPPOP3 audit test run,we reduced the memory from 1GB to 768MB to achieve better price/performance.

The average response time of 0.076 seconds for the 4,937 POP3 users is well below the audit requirement of 5 seconds. The graph shows a fairly linear increase in the user response time as the system load increases to 4,891 users. Understanding the effect of increased system load on response time can be helpful in determining user capacity for a similarly configured system.



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Notes

[1] MHz only measures microprocessor internal clock speed, not application performance. Many factors affect application performance.

[2] When referring to hard disk capacity, GB equals one billion bytes. Total user-accessible capacity depends on operating environment.