

NotesBench Disclosure Report
for
IBM® @server™ BladeCenter™
using
Lotus® Domino® Server 6.0
and
Red Hat Linux 7.3

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IBM Corporation



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Edition Notice

Executive Summary

The IBM® @server™ BladeCenter™ server demonstrated leadership performance running Lotus® Domino® Server Release 6.0 on Red Hat Linux 7.3. The results detailed in this report were obtained using the NotesBench R6 iNotes-Only workload.

Test Script	Maximum Users	NotesMark (tpm)	Ave. Response Time (sec)	\$/User	\$/NotesMark
R6 iNotes-Only	4,000	3,444	0.355	\$33.54	\$38.95

The BladeCenter server was configured with two 3.06GHz¹ Intel® Xeon™ DP processors, 4GB of PC2100 memory, and 29 hard disk drives. The Domino server contained more than 8,000 person documents in a single Domino partition. For complete configuration details, see Appendix A: Overall Test Setup and Software Versions.

The server under test supported an R6 iNotes-Only workload of 4,000 active mail users (see price/performance results above).

IBM's xSeries Server Performance Laboratory in Research Triangle Park, NC, conducted the benchmark in June, and KMDS Technical Associates, Inc., audited the results in July 2003.

NotesBench provides an objective method for evaluating the performance of different platforms running Lotus Domino Server. 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 was to provide customers with information on how to utilize the capability of the BladeCenter system as a Domino Server 6.0 mail server configured with a Fibre Channel Adapter for RAID-1 data redundancy.

¹ The BladeCenter HS20 with the 3.06GHz Xeon DP processor will be generally available September 26, 2003.

Test Methodologies

Test Setup and Hardware/Software Configuration

The BladeCenter system under test chassis contained one BladeCenter HS20 server module, which was configured with two 3.06GHz Xeon processors (512KB of ECC full-speed L2 write-back cache with Intel Hyper_Threading Technology), 4GB of PC2100 memory, one 40GB 7200 rpm EIDE hard drive, and one Fibre Channel Host Adapter that connected to a FAStT700 Fibre Channel Storage Server via a Fibre Channel switch. Two EXP700 Fibre Channel Enclosures, which each held fourteen 36.4GB 15K rpm Fibre Channel hard drives, were attached to the FAStT700. The internal IDE hard drive was used as boot disk. Two drives were configured as RAID-1 for Domino executable code and the Domino data directory. The rest of the drives were configured as two RAID-1E arrays, one composed of 12 drives and the other composed of 14 drives, were used for mail database storage. A more detailed description of the configuration is provided in Appendix A.

The network consisted of one LAN segment and used one 24-port Cisco Catalyst 3500-XL switch. An integrated gigabit Ethernet interface was used with a 4-port Gb switch.

The BladeCenter server ran Red Hat Linux 7.3 and Domino Server 6.0.

The Fibre Channel controller configuration value for Stripe Unit Size was set at 64KB. Write-back cache was enabled for the RAID-1 array.

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

R6 iNotes-Only Workload
Server_Max_Concurrent_Trans=300
NSF_DBcache_MaxEntries=5000
NSF_Buffer_Pool_Size_MB=256
MailLogToEventsOnly=1
Log_MailRouting=10
Log_Sessions=0
Server_Pool_Tasks=60
Max_Users=4000

In the Server-Configuration document, three mail.boxes were used for mail routing.

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

```
No_Force_Activity_Logging=1
Server_Show_Performance=1
Debug_Outfile=/home/notes/sut_info.txt
```

All Notes server tasks were disabled except Router and HTTP.

All Domino mail database files were located on the RAID-1E arrays and were mounted as directories /data1 and /data2. The Domino executable code, data directory, and mail database file links were located on the two-drive RAID-1 array and were mounted as directories /opt/lotus and /opt/sut.

Test Procedures

Several trial runs were conducted to attempt to exhaust at least one of the system resources: processor, memory or disk subsystem. System resource utilization was monitored using the standard Linux tool *vmstat*.

The 4,000 users were distributed over seven clients. The first six clients added 600 users and the last client added 400 users to the system under test. The test ran for 10 hours, including ramp-up. The actual ramp-up period from startup of child 1 to the point when all 4,000 users were reflected in the clients' result files was shown on the server console was approximately 3-1/2 hours. The test ran for more than 6 hours after ramp-up. During the test runs, the user load was verified using the client output (RES files).

By monitoring the clients' output (RES file) on the parent system, we confirmed steady state when the intended number of users was reached. We also used the *show stat Mail* 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.

To ensure that the test results were reproducible, all tests were repeated, and the results were compared and were found to be consistent.

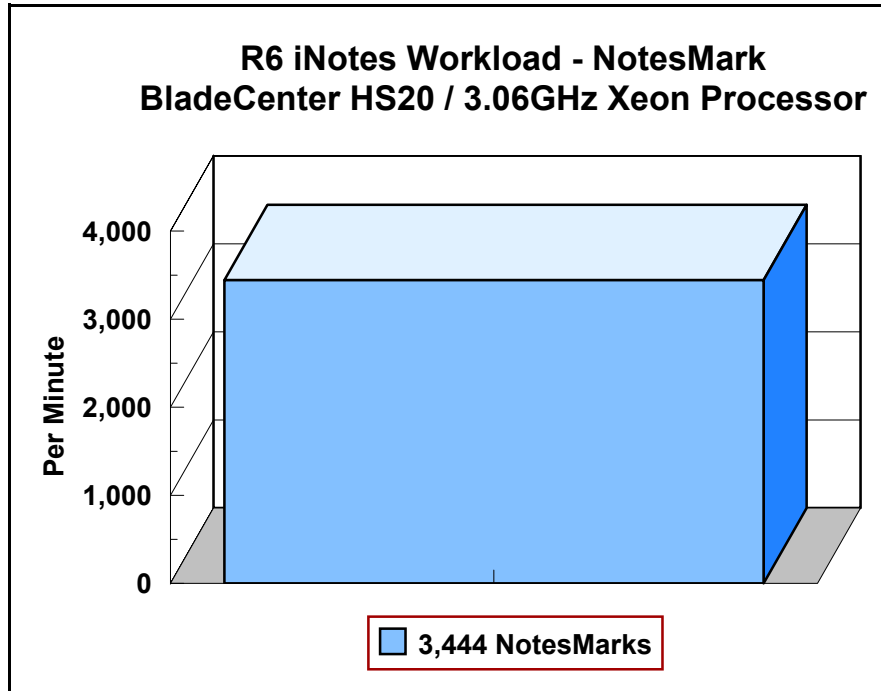
Other NotesBench Tests

IBM intends to continue conducting NotesBench measurements to further optimize and exploit the performance capability of the xSeries product line running Domino Server 6.0.

Data

NotesMark Value for R6 iNotes Test

The BladeCenter server demonstrated that it can support 4,000 concurrent, active users with this workload. The NotesMark throughput value was 3,444. Average response time was 0.355 seconds. The test ran error-free for a period of more than 6 hours.



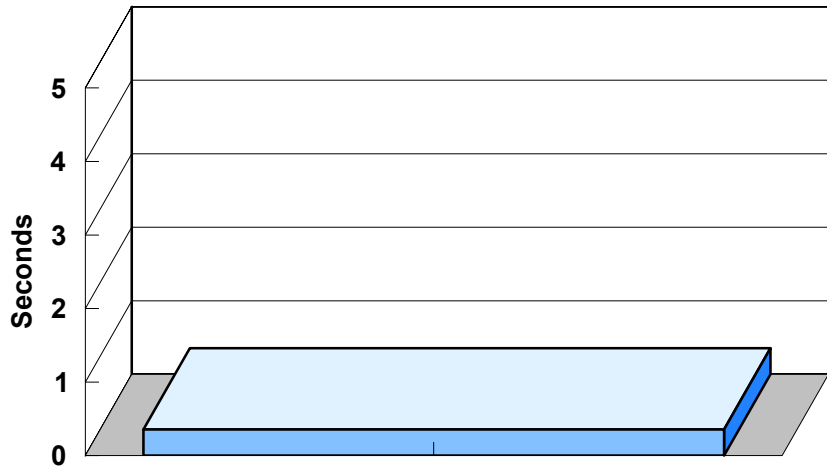
The iNotes Web Access workload executes Notes transactions that model a server for mail users who access mail via the Web. The resulting capacity metric for a server is the maximum number of users that can be supported before the average user response time becomes unacceptable.

The R6 iNotes workload, which models an active user sending, receiving, and deleting mail via a browser interface, also incorporates variable mail message sizes and attachments (50KB and 10MB). An average user executes the simulation script four times an hour. Each time the script is performed, it checks and retrieves mail messages. Each user sends a mail message to three recipients no more than 90 minutes. Within a 15-minute period, each user will read five documents and delete two documents. Messages sent by each user are delivered to the mail database of the other users on the System Under Test.

NotesNum Output for R6 iNotes Test

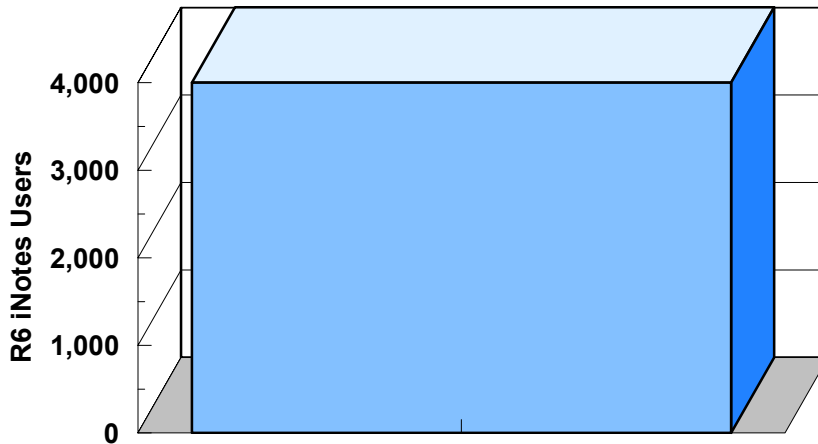
Min Start Time = 06/24/2003 10:58:44 AM Max Stop Time = 06/24/2003 08:50:45 PM
Total Test Errors = 0
Total Test Time = 35520 sec
Test Run: Users = 4000 NotesMark = 3444 Response Time = 355 msec (06/24/2003 01:59:00 PM to 02/20/2003 08:42:00 PM)

**R6 iNotes Workload - Average Response Time
BladeCenter HS20 / 3.06GHz Xeon Processor**



Average Response Time = 0.355 Seconds

**R6 iNotes Workload - Users
BladeCenter HS20 / 3.06GHz Xeon Processor**



4,000 iNotes Users

Analysis

When configured as described in this report, the BladeCenter server demonstrated that it can manage the intense resource usage during ramp-up to 4,000 concurrent R6 iNotes users with no errors at the clients. During the steady-state period on one of the successful 4,000-user runs, the average CPU utilization was 63.56 percent and the memory utilization was 99.72 percent.

The transaction logging option was not enabled for this audit run. When this option is enabled, we recommend placing the transaction logging directory on a dedicated disk that is attached to a less-busy logical drive to improve response time.

Conclusions

The test results demonstrate that the BladeCenter configured as described in this report can support up to 4,000 concurrent, active R6 iNotes users with a response time well below that permitted by the test criteria.

These results are based on running the BladeCenter 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

For the R6 iNotes test, eight driver systems were used. Seven systems were configured as child drivers 1 through 7; one system was used as the parent driver to control the run.

The configuration used for the driver systems follows:

Child drivers 1-7:

- Pentium III 500MHz with 512MB memory
- C: Partition (2GB - NTFS) - Windows 2000/SP3
- D: Partition (6.5GB - NTFS) - Notes 6.0 clients

Parent driver:

- Pentium III 500MHz with 512MB memory
- C: Partition (9GB - NTFS) - Windows 2000/SP3 and Notes 6.0 clients

Number of Server Platforms

One server platform, the BladeCenter HS20 with two 3.06GHz Xeon processors and 4GB of memory, was benchmarked.

The disk configuration used for the system under test follows:

- /: Single disk drive (40GB - IDE) - Red Hat Linux 7.3 (Boot Partition)
- /opt/lotus and /opt/sut: two-drive array (36.4GB - RAID-1) - Domino executables and Domino mail data subdirectory
- /data1: 14-drive array (231GB, RAID-1E) - Domino mail files
- /data2: 12-drive array (200GB, RAID-1E) - Domino mail files

Network

The network consisted of one segment. All child drivers, parents and SUT were connected to one of 24 ports on the Cisco Catalyst 3500-XL switch. A single integrated gigabit Ethernet interface in the BladeCenter server was used.

Software Versions

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

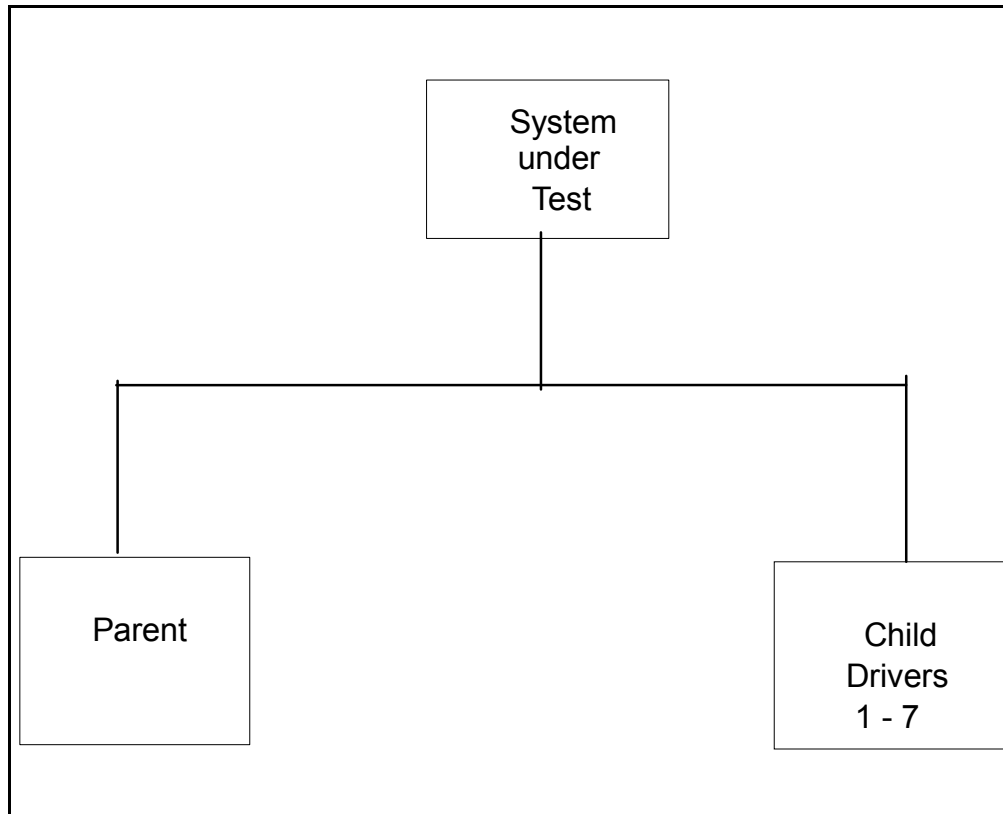
- Red Hat Linux 7.3
- Lotus Domino Server Release 6.0 for Linux

Software versions used on the child and parent drivers were as follows:

- Microsoft Windows 2000 Professional for child drivers and Windows 2000 Server for the parent system

- Lotus Domino Client Release 6.0 for Windows 2000
- NotesBench Version 6.0 - Windows/32

Test Setup Diagram



Appendix B: System Configuration

Server under Test	
System	BladeCenter HS20
Processor	2 x 3.06GHz Xeon Processor
Memory	4GB
Cache	512KB ECC Full-Speed L2 Cache per Processor
RAID Controller	Fibre Channel Host Adapter
Disk Drive	1x 40GB IDE, 28 x 36.4GB 15K rpm Fibre Channel (configured as one 14-drive RAID-1E array, one 12-drive RAID-1E array, and one 2-drive RAID-1 array)
Network Interface	Embedded 10/100/1000Mbps Ethernet controller
I/O	Fibre Channel switch and Gb Ethernet switch
Operating System	Red Hat Linux 7.3
Notes	Lotus Domino Server Release 6.0 for Linux

Parent Source Driver and Child Drivers 1 - 7	
System	IBM IntelliStation M Pro
Processor	1 x 500MHz Pentium III
Memory	512MB
Disk Drive	1 x 9.1GB
Network Interface	Embedded 10/100 Ethernet Controller
I/O	PCI Bus
Operating System	Microsoft Windows 2000 Professional with Service Pack 3
Notes	Lotus Domino Client Release 6.0 for Windows 2000
NotesBench	NotesBench Version 6.0 - Windows/32

Appendix C: Operating System Parameters

The Linux kernel used for this benchmark was 2.4.18-3bigmem. The following non-default parameter settings were added:

/etc/sysctl.conf

```
kernel.shmmni=8192
kernel.sem=250 32000 32 1024
```

/etc/security/limits.conf

```
Notes soft nfile 419730
Notes hard no file 419430
Notes soft nproc 8192
Notes hard nproc 8192
```

/etc/fstab

```
Add noatime to attribute flag to /opt, /data1, /data2
```

/etc/pam.d/login

```
Session required /lib/security/pam_limits.so
```

/home/notes/.bash_profile

```
Ulimit -n 419430
Ulimit -s 512
Export Notes_PRIVATE_DPOOLSIZE=1000000
```

The following glibc source file was modified and rebuilt:

```
/usr/src/redhat/SOURCES/glibc-2.2.5/linuxthreads/sysdeps/unix/sysv/linux/bits/local_lim.h,
```

Original line: #define PTHREADS_THREADS_MAX 1024

New line: #define PTHREADS_THREADS_MAX 8192

The new glibc library was using by the following steps:

```
cd /usr/src/redhat/BUILD/glibc-2.2.5/build-i386-linux/linuxthreads
mkdir /home/notes/lib
cp libpthread.so /home/notes/lib/libpthread.so.domino
cd ../rt
cp librt.so /home/notes/lib/librt.so.domino
cd /home/notes/lib
ln -s /home/notes/lib/libpthread.so.domino libpthread.so.0
ln -s /home/notes/lib/librt.so.domino librt.so.1/
chown notes.notes *
```

A script (*go*, in the `/opt/lotus/bin` directory) was created to load the new library before test:

```
LD_PRELOAD_SAV=$LD_PRELOAD
LD_PRELOAD=/home/notes_user/lib/libpthread.so.0:/home/notes_user/lib/librt.so.1:$LD_PRELOAD
export LD_PRELOAD
/opt/lotus/bin/server
LD_PRELOAD=$LD_PRELOAD_SAV
export LD_PRELOAD
```

Appendix D: NOTES.INI Settings

NOTES.INI for Server

```
[Notes]
Directory=/opt/sut
KitType=2
UserName=
CompanyName=
NotesProgram=/opt/lotus/notes/60000/linux
ASPInstall=0
CleanupScriptPath=/opt/lotus/notes/latest/linux/nsd.sh -batch
FaultRecovery_Build=Build V60_09252002
DSTLAW=4,1,1,10,-1,1
SHARED_MAIL=0
DisableLDAPOnAdmin=1
Passthru_LogLevel=0
Console_LogLevel=2
DefaultMailTemplate=mail6.ntf
Preferences=32
ServerTasks=Router,HTTP
;ServerTasks=Update,Replica,Router,AMgr,AdminP,CalConn,Sched,HTTP
;ServerTasksAt1=Catalog,Design
;ServerTasksAt2=UpdAll
;ServerTasksAt3=Object Info -Full
;ServerTasksAt5=Statlog
Timezone=5
DST=1
MailType=0
$$HasLANPort=1
TCPIP=TCP, 0, 15, 0
Serial1=XPC,1,15,0,
Serial2=XPC,2,15,0,
Ports=TCPIP,TCPIP
DisabledPorts=Serial2,Serial1
LOG_REPLICATION=1
LOG_SESSIONS=0
KeyFilename=/opt/sut/server.id
CertifierIDFile=/opt/sut/cert.id
MailServer=CN=sut/O=ibm
NAMELOOKUP_TRUST_DIRCAT=0
PhoneLog=2
Log=log.nsf, 1, 0, 7, 40000
ServerKeyFileName=server.id
Domain=ibm
Admin=CN=administrator/O=ibm
TemplateSetup=6010
Setup=6023
ServerSetup=6010
CleanSetup=1
ServerName=sut/ibm
ServerNameNative=02C302C37375742F69626D
FormulaTimeout=120
NSF_QUOTA_METHOD=2
TRANSLOG_AutoFixup=1
TRANSLOG_UseAll=0
TRANSLOG_Style=0
TRANSLOG_Performance=2
TRANSLOG_Status=0
ServerController=0
```



```

FaultRecovery=0
MTEnabled=0
EventSetup=600
WebAdminSetup=600
DominoConfigLevel=1
;=====
server_show_performance=1
mailuseprocesses=1
Log_mailRouting=10
maillogtoeventsonly=1
;DBMaxEntries=2000
Max_users=5000
NSF_DBCache_MaxEntries=5000
Server_Pool_Tasks=60
Server_max_Concurrent_Trans=300
No_Force_Activity_Logging=1
NSF_Buffer_Pool_Size_MB=256
Update_No_Fulltext=1
MailCompactDisabled=1
Debug_OutFile=/opt/run/sut_info.txt
;=====
CONSOLE_LOG_ENABLED=1

```

NOTES.INI for Child 1

[Notes]

```

Directory=D:\Notes\data
KitType=1
InstallType=2
;=====
NthIteration=6
Tmp=Notestmp
;MaxSessions=100
;NumAddLocalReplica=1
;NumDeleteLocalReplica=1
;NumStampLocalReplica=1
;NumUpdateLocalReplica=1
NormalMessageSize=10000
NumMessageRecipients=3
NumMailNotesPerUser=100
;AttachmentSize=500000
;LargeMessageSize=32000
NodeName=nchild1
;MailTemplate=mail50.ntf
;=====iNotes=====
MailTemplate=sut!!iNotes60.ntf
;NBiNotes=1
;HTTPNABView=$People/M
WebAuthenticationOff=0
WebPreferencesOff=1
WebDebugOn=0
HTTPHost=sut.ibm.com
RecipientDomain=ibm.com
Domail=ibm.com
;=====
USESERVERNAB=1
ResultsDirectory=\\parent1\c$\results
DEBUG_OUTFILE=\\parent1\c$\results\res1
;NumNotesLocalReplica=90
;NumSharedNotes=900

```

```

ThreadStagger=1.5
;nopause=1
;
=====
;
=====
FaultRecovery_Build=Build V60_09252002
CONSOLE_LOG_ENABLED=1
DSTLAW=4,1,1,10,-1,1
UPDATE_TIMER=06/22/2003 08:57:58 PM
SUDIALOG_ON=0
Timezone=5
DST=1
MailType=0
$$HasLANPort=1
WWWDSP_SYNC_BROWSERCACHE=0
WWWDSP_PREFETCH_OBJECT=0
EnableJavaApplets=1
EnablePlugins=1
Preferences=-2147480463
AltNameLanguage=en
ContentLanguage=en-US
WeekStart=1
ViewWeekStart=2
NavWeekStart=1
XLATE_CSID=52
SPELL_LANG=1033
SPELL_PREFERENCES=0
Region=en-US
DatePickerDirection=0
Passthru_LogLevel=0
Console_LogLevel=2
VIEWIMP1=Lotus 1-2-3,0,_IWKSV,,123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
VIEWIMP2=Structured Text,0,_ISTR,,CGN,.LTR,.STR,,1,
VIEWIMP3=Tabular Text,0,_ITAB,,PRN,.RPT,.TAB,.TXT,,1,
VIEWIMP4=vCard,0,_IVCRD,,VCF,,1,
VIEWEXP1=Lotus 1-2-3,0,_XWKS,,123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
VIEWEXP2=Structured Text,0,_XSTR,,CGN,.LTR,.STR,,1,
VIEWEXP3=Tabular Text,1,_XTAB,,CGN,.LTR,.RPT,.TAB,,1,
VIEWEXP4=vCard 2.1,0,_XVCRD,,VCF,,1,
VIEWEXP5=vCard 3.0,0,_XVCRD3,,VCF,,1,
EDITIMP1=ASCII Text,0,_ITEXT,,C,.H,.PRN,.RIP,.TXT,,1,
EDITIMP2=Binary with Text,0,_ISTRNGS,,*,1,
EDITIMP3=BMP Image,0,_IBMP,,BMP,,18,
EDITIMP4=CGM Image,0,_IFL,,CGM,.GMF,,8,
EDITIMP5=GIF Image,0,_IGIF,,GIF,,18,
EDITIMP6=HTML File,0,_IHTML,,HTM,.HTML,,1,
EDITIMP7=JPEG Image,0,_IJPEG,,JPG,,18,
EDITIMP8=Lotus 1-2-3,0,_IW4W,_IWKSE,.123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
EDITIMP9=Lotus PIC,0,_IPIC,,PIC,,8,
EDITIMP10=Lotus Word Pro,0,_IW4W,,LWP,,2,
EDITIMP11=Microsoft Excel,0,_IW4W,,XLS,,4,
EDITIMP12=Microsoft RTF,0,_IW4W,_IRTF,.DOC,.RTF,,2,
EDITIMP13=Microsoft Word,0,_IW4W,,DOC,,2,
EDITIMP14=PCX Image,0,_IPCX,,PCX,,18,
EDITIMP15=TIFF 5.0 Image,0,_ITIFF,,TIF,,18,
EDITIMP16=WordPerfect 5.x,0,_IW4W,,DOC,.WPD,,2,
EDITIMP17=WordPerfect 6.0/6.1,0,_IW4W,,DOC,.WPD,.WPT,,2,
EDITEXP1=ASCII Text,2,_XTEXT,,C,.H,.PRN,.RIP,.TXT,,1,
EDITEXP2=CGM Image,2,_XCGM,,CGM,.GMF,,8,
EDITEXP3=Microsoft RTF,2,_XRTF,,DOC,.RTF,,4,
EDITEXP4=TIFF 5.0 Image,2,_XTIFF,,TIF,,18,
EDITEXP5=vCard 2.1,0,XVCRD,,VCF,,1,

```


AltCalendar=0
MIMEPromptMultilingual=1
MIMEMultilingualMode=1
QuotePrefix=>
QuoteLineLength=70
EnableActiveXInBrowser=1
EnableJavaScript=1
EnableJavaScriptErrorDialogs=1
EnableLiveConnect=1
BackgroundPrinting=1
ShowAccelerators=1

NOTES.INI for Parent Source Driver

[Notes]

Directory=C:\notes\data
KitType=1
InstallType=2

```
-----  
;  
;  
;   Begin Notesbench variables for parent 1  
;  
;   *****  
;   *****  
NodeName=parent1  
  
Runtime=600  
;ChildStagger=1,1;20,2;22,3;23,4  
ChildStagger=1,1;30,2-7;33,8  
NumClients1=600  
NumClients2=600  
NumClients3=600  
NumClients4=600  
NumClients5=600  
NumClients6=600  
NumClients7=400  
NumClients8=500  
NumClients9=600  
NumClients10=800  
NumClients11=800  
NumClients12=500  
NumClients13=500  
NumClients14=500  
NumClients15=500  
NumClients16=500  
NumClients17=500  
NumClients18=500  
NumClients19=500  
NumClients20=500  
ResultsDirectory=c:\results  
DEBUG_OUTFILE=c:\results\notesnum_sut.txt  
;-----End  
;   *****  
;   Multirun Variables  
;   *****  
; ProbeIntervalDelay=wait after end of one run before starting next  
; ProbeWaitTime=wait to start Probe (default=15mins)  
; ProbeRunTime=#minutes probe will collect stats  
;;Probe_Interval=2800,2900,3000  
;;ProbeIntervalDelay=30
```

```

;;ProbeWaitTime=30
;;ProbeRunTime=180
; ProbeRunTime=2 because we want 240 minutes of runtime after ramp-up
; without overhead of PROBE
; Next line cause command 'show stat' to execute on SUT console
; before start of each multi-run and when ramped up for that run
; Mail statistics required for audit at ramp-up and before ramp-down
;;ProbeTestIncrementCMD=show stat mail
;;ProbeTestIncrementCMD=show stat database
;;NBTestReset=1
*****
;
;       Server.Planner Variables
*****
;;CPDatabase=c:\notesb3\data\Server.Planner.nsf
;;SUTMachineID=Teton600
;-----End
;-----End
FaultRecovery_Build=Build V60_09252002
CONSOLE_LOG_ENABLED=1
DSTLAW=4,1,1,10,-1,1
UPDATE_TIMER=06/22/2003 09:03:34 PM
SUDIALOG_ON=0
Timezone=5
DST=1
MailType=0
$$HasLANPort=1
WWWDSP_SYNC_BROWSERCACHE=0
WWWDSP_PREFETCH_OBJECT=0
EnableJavaApplets=1
EnablePlugins=1
Preferences=-2147480463
AltNameLanguage=en
ContentLanguage=en-US
WeekStart=1
ViewWeekStart=2
NavWeekStart=1
XLATE_CSID=52
SPELL_LANG=1033
SPELL_PREFERENCES=0
Region=en-US
DatePickerDirection=0
Passthru_LogLevel=0
Console_LogLevel=2
VIEWIMP1=Lotus 1-2-3,0,_IWKSV,,123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
VIEWIMP2=Structured Text,0,_ISTR,,CGN,.LTR,.STR,,1,
VIEWIMP3=Tabular Text,0,_ITAB,,PRN,.RPT,.TAB,.TXT,,1,
VIEWIMP4=vCard,0,_IVCRD,,VCF,,1,
VIEWEXP1=Lotus 1-2-3,0,_XWKS,,123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
VIEWEXP2=Structured Text,0,_XSTR,,CGN,.LTR,.STR,,1,
VIEWEXP3=Tabular Text,1,_XTAB,,CGN,.LTR,.RPT,.TAB,,1,
VIEWEXP4=vCard 2.1,0,_XVCRD,,VCF,,1,
VIEWEXP5=vCard 3.0,0,_XVCRD3,,VCF,,1,
EDITIMP1=ASCII Text,0,_ITEXT,,C,.H,.PRN,.RIP,.TXT,,1,
EDITIMP2=Binary with Text,0,_ISTRNGS,,*,1,
EDITIMP3=BMP Image,0,_IBMP,,BMP,,18,
EDITIMP4=CGM Image,0,_IFL,,CGM,.GMF,,8,
EDITIMP5=GIF Image,0,_IGIF,,GIF,,18,
EDITIMP6=HTML File,0,_IHTML,,HTM,.HTML,,1,
EDITIMP7=JPEG Image,0,_IJPEG,,JPG,,18,
EDITIMP8=Lotus 1-2-3,0,_IW4W,_IWKSE,.123,.WK1,.WK3,.WK4,.WKS,.WR1,.WRK,,4,
EDITIMP9=Lotus PIC,0,_IPIC,,PIC,,8,

```


ReplDefFullDocs=1
ReplDefPartDocsLimit=0
ReplDefPartDocsLimitAmt=40
ReplDefPartAtchLimit=0
ReplDefPartAtchLimitAmt=40
ReplDefFullText=0
ReplDefEncrypt=1
ReplDefEncryptType=2
ReplDefReplImmed=1
\$headlineDisableHeadlines=0
PromptForLocation=0
EmptyTrash=0
UNICODE_Display=1
AltCalendar=0
MIMEPromptMultilingual=1
MIMEMultilingualMode=1
QuotePrefix=>
QuoteLineLength=70
EnableActiveXInBrowser=1
EnableJavaScript=1
EnableJavaScriptErrorDialogs=1
EnableLiveConnect=1
BackgroundPrinting=1
ShowAccelerators=1

Appendix E: Network Configuration

The standard TCP/IP stack provided by Red Hat Linux 7.3 was used.

The default settings of the embedded Full Duplex 10/100/1000 Mbps Ethernet controller in the system under test were used.

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 List Price for the U.S. only. Actual 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 List Price	Extended Price
IBM eServer BladeCenter Chassis With one management module	8677-11X	1	\$2,789	\$2,789
1200W Power Supply Module	48P7052	1	999	999
4-port Gb Ethernet Switch Module	48P7054	1	2,199	2,199
2-Port Fibre Channel Switch Module	48P7062	1	24,999	24,999
IBM eServer BladeCenter Server HS20 With one 3.06GHz Xeon DP processor, two 256MB DIMMs, one dual-gigabit Ethernet controller	8832-31X	1	3,229	3,229
3.06GHz Xeon DP Processor	73P9074	1	1,117	1,117
TotalStorage FC2-133 Host Adapter	24P0960	1	1,485	1,485
1GB PC2100 DDR SDRAM RDIMM Memory	33L5039	4	659	2,636
36.4GB 15K Fibre Channel Hard Disk Drives	06P5772	28	1,115	31,220
40GB 7200rpm EIDE Drive	22P7157	1	129	129
IBM TotalStorage FAStT700 Fibre Channel Storage Server	1742-1RU	1	46,499	46,499
IBM TotalStorage FAStT EXP700 Storage Expansion Enclosure	1740-1RU	2	6,000	12,000
E54 15" (13.8" Viewable) Color Monitor	633147N	1	129	129
Software				
Red Hat Linux 7.3		1	115	115
Lotus Domino D6 Enterprise Server (List Price per Processor)		2	2,308	4,616
Total System Price				\$134,161

Appendix H: Vendor-Defined Information

None.

Appendix I: Domino “Show Statistics” Output

```
> sh stat
Database.DAFailoverCount = 0
Database.DARefreshServerInfoCount = 0
Database.DAReloadCount = 0
Database.Database.BufferPool.Maximum.Megabytes = 256
Database.Database.BufferPool.MM.Reads = 26
Database.Database.BufferPool.MM.Writes = 1
Database.Database.BufferPool.Peak.Megabytes = 255
Database.Database.BufferPool.PerCentReadsInBuffer = 93.37
Database.DbCache.CurrentEntries = 2
Database.DbCache.HighWaterMark = 4003
Database.DbCache.Hits = 420099
Database.DbCache.InitialDbOpens = 427782
Database.DbCache.Lookups = 7838059
Database.DbCache.MaxEntries = 5000
Database.DbCache.OvercrowdingRejections = 0
Database.ExtMgrPool.Peak = 65,406
Database.ExtMgrPool.Used = 148
Database.FreeHandleStack.FreeHandleStackHits = 9900364
Database.FreeHandleStack.HandleAllocations = 9912336
Database.FreeHandleStack.MissRate = 0
Database.LDAP.NAMELookupBindFailures = 0
Database.LDAP.NAMELookupBinds = 0
Database.LDAP.NAMELookupBytesReceived = 0
Database.LDAP.NAMELookupEntries = 0
Database.LDAP.NAMELookupFailures = 0
Database.LDAP.NAMELookupTotal = 0
Database.LDAP.NAMELookupTotalLookupTime = 0
Database.NAMELookupCacheCacheSize = 14,505,688
Database.NAMELookupCacheHashSize = 1,171,362
Database.NAMELookupCacheHits = 90,181
Database.NAMELookupCacheLookups = 612,753
Database.NAMELookupCacheMaxSize = 16,777,216
Database.NAMELookupCacheMisses = 514,553
Database.NAMELookupCacheNoHitHits = 8,019
Database.NAMELookupCachePool.Peak = 16,777,216
Database.NAMELookupCachePool.Used = 16,772,128
Database.NAMELookupCacheResets = 0
Database.NAMELookupMisses = 12,050
Database.NAMELookupTotal = 612763
Database.NAMELookupTotalLookupTime = 2,417.91
Database.NIFPool.Peak = 1,048,576
Database.NIFPool.Used = 599,072
Database.NSFPool.Peak = 95,420,416
Database.NSFPool.Used = 331,808
Database.NSF.ClusterHashTable.EntriesWithSameIndex = 0
Database.NSF.ClusterHashTable.FreedEntriesOnCleanup = 0
Database.NSF.ClusterHashTable.HashedEntries = 0
Database.NSF.ClusterHashTable.HashIsFull = 0
Database.NSF.ClusterHashTable.MissedHashHits = 0
Database.NSF.ClusterHashTable.SuccessfulHashHits = 0
Database.NSF.Replicate.NotesMergedBack = 0
Database.NSF.Replicate.NotesReceived = 0
Database.NSF.Replicate.NotesReopened = 0
Database.NSF.Replicate.NotesSent = 0
Database.NSF.SignatureCache.Hits = 1
Database.NSF.SignatureCache.Tries = 2
Database.RM.Sys.Logged = Disabled
```

Disk.Fixed = 6
Disk.Remote = 0
Disk./boot.Free = 69,329,920
Disk./boot.Size = 95,548,416
Disk./boot.Type = ext3
Disk./data1.Free = 190,830,436,352
Disk./data1.Size = 248,359,624,704
Disk./data1.Type = ext3
Disk./data2.Free = 159,561,031,680
Disk./data2.Size = 214,726,692,864
Disk./data2.Type = ext3
Disk./dev/shm.Free = 2,049,224,704
Disk./dev/shm.Size = 2,049,224,704
Disk./dev/shm.Type = tmpfs
Disk./opt.Free = 32,843,821,056
Disk./opt.Size = 35,788,611,584
Disk./opt.Type = ext3
Disk./Free = 34,126,045,184
Disk./Size = 39,282,688,000
Disk./Type = ext3
Domino.Cache.Database.HitRate = 31.9699912001346
Domino.Cache.Design.Count = 128
Domino.Cache.Design.DisplaceRate = 11.2377647511195
Domino.Cache.Design.HitRate = 88.7608147862016
Domino.Cache.Design.MaxSize = 128
Domino.Cache.Forms View Summary.Count = 1
Domino.Cache.Forms View Summary.DisplaceRate = 0
Domino.Cache.Forms View Summary.HitRate = 100.000162203224
Domino.Cache.FormsCache.Count = 0
Domino.Cache.FormsCache.MaxSize = 256
Domino.Cache.iNote WA Forms file.Count = 1
Domino.Cache.Note Cache.HitRate = 0
Domino.Cache.Session.Count = 0
Domino.Cache.Session.MaxSize = 1,000
Domino.Cache.SkinGroupsCache.Count = 0
Domino.Cache.SkinGroupsCache.MaxSize = 256
Domino.Cache.User.Count = 4,000
Domino.Cache.User.DisplaceRate = 0
Domino.Cache.User.HitRate = 99.8027905142237
Domino.Cache.User.MaxSize = 5,000
Domino.Command.CopyToFolder = 0
Domino.Command.CreateDocument = 0
Domino.Command.DeleteDocument = 0
Domino.Command.DeleteDocuments = 0
Domino.Command.EditDocument = 747323
Domino.Command.GetOrbCookie = 0
Domino.Command.MoveToFolder = 0
Domino.Command.Navigate = 0
Domino.Command.OpenAbout = 0
Domino.Command.OpenAgent = 0
Domino.Command.OpenCssResource = 0
Domino.Command.OpenDatabase = 0
Domino.Command.OpenDocument = 1114254
Domino.Command.OpenElement = 23972
Domino.Command.OpenFileResource = 0
Domino.Command.OpenForm = 0
Domino.Command.OpenHelp = 0
Domino.Command.OpenIcon = 0
Domino.Command.OpenImageResource = 0
Domino.Command.OpenJavascriptLib = 0
Domino.Command.OpenNavigator = 0

Domino.Command.OpenPreferences = 0
Domino.Command.OpenServer = 0
Domino.Command.OpenView = 0
Domino.Command.ReadForm = 0
Domino.Command.Redirect = 0
Domino.Command.RemoveFromFolder = 0
Domino.Command.RequestCert = 0
Domino.Command.SaveDocument = 0
Domino.Command.SearchDomain = 0
Domino.Command.SearchSite = 0
Domino.Command.SearchView = 0
Domino.Command.Total = 2027824
Domino.Command.Unknown = 0
Domino.Config.ActiveThreads.Max = 100
Domino.Config.ActiveThreads.Min = 20
Domino.Config.AllowDirectoryLinks = 1
Domino.Config.Directory.CGI = /opt/sut/domino/cgi-bin
Domino.Config.Directory.HTML = /opt/sut/domino/html
Domino.Config.Directory.Icons = /opt/sut/domino/icons
Domino.Config.Directory.JavaRoot = /opt/sut/domino/java
Domino.Config.DNSLookup = 0
Domino.Config.EnforceAccess = 0
Domino.Config.HomeURL = /homepage.nsf?Open
Domino.Config.HostName = sut.ibm.com
Domino.Config.Image.Format = GIF
Domino.Config.Image.Interlaced = 1
Domino.Config.Log.Access = access
Domino.Config.Log.Error = error
Domino.Config.Log.Filter =
Domino.Config.Log.TimeStamp = 0
Domino.Config.PortNumber = 80
Domino.Config.PortStatus = 1
Domino.Config.SSL.KeyFile = /opt/sut/keyfile.kyr
Domino.Config.SSL.PortNumber = 443
Domino.Config.SSL.Status = 0
Domino.Config.Timeout.CGI = 5
Domino.Config.Timeout.IdleThread = 0
Domino.Config.Timeout.Input = 2
Domino.Config.Timeout.Output = 20
Domino.Config.URLpath.CGI = /cgi-bin
Domino.Config.URLpath.Icons = /icons
Domino.Config.URLpath.JavaRoot = /domjava
Domino.Config.URLpath.Servlet = /servlet
Domino.Config.View.Lines = 30
Domino.Config.WelcomePage = default.htm
Domino.Requests.Per1Day.Peak = 2,026,800
Domino.Requests.Per1Day.PeakTime = 06/24/2003 21:00:54 EDT
Domino.Requests.Per1Day.Total = 2,026,800
Domino.Requests.Per1Hour.Peak = 236,895
Domino.Requests.Per1Hour.PeakTime = 06/24/2003 14:23:53 EDT
Domino.Requests.Per1Hour.Total = 0
Domino.Requests.Per1Minute.Peak = 4,576
Domino.Requests.Per1Minute.PeakTime = 06/24/2003 14:02:49 EDT
Domino.Requests.Per1Minute.Total = 0
Domino.Requests.Per5Minute.Peak = 21,877
Domino.Requests.Per5Minute.PeakTime = 06/24/2003 14:07:33 EDT
Domino.Requests.Per5Minute.Total = 0
Domino.Requests.Total = 2,026,901
Domino.ThreadPool.average = 65536
Domino.ThreadPool.max = 458752
Domino.Threads.Active.Peak = 83

Http.Accept.ConnectionsAccepted = 2028300
Http.Accept.ConnectionsDenied = 0
Http.Accept.ConnectionsRefused = 0
Http.Accept.Errors = 0
Http.Accept.Polls = 2198687
Http.Accept.PollTimeouts = 170386
Http.Accept.ServerBusy = 0
Http.CurrentConnections = 0
Http.MaxConnections = 2000
Http.Workers = 100
Http.Worker.Total.BytesRead = 1,065,341,559
Http.Worker.Total.BytesWritten = 40,663,978,152
Http.Worker.Total.Cgi.Requests = 0
Http.Worker.Total.Cgi.RequestTime = 0
Http.Worker.Total.Dsapi.Requests = 0
Http.Worker.Total.Dsapi.RequestTime = 0
Http.Worker.Total.File.Requests = 0
Http.Worker.Total.File.RequestTime = 0
Http.Worker.Total.Http.Requests = 0
Http.Worker.Total.Http.RequestTime = 0
Http.Worker.Total.IdleSessionTimeouts = 3571982
Http.Worker.Total.InputTimeouts = 0
Http.Worker.Total.Notes.Requests = 2028300
Http.Worker.Total.Notes.RequestTime = 338,389,982
Http.Worker.Total.OutputTimeouts = 0
Http.Worker.Total.RequestsProcessed = 2028300
Http.Worker.Total.TotalRequestTime = 338,389,982
Mail.AverageDeliverTime = 1
Mail.AverageServerHops = 0
Mail.AverageSizeDelivered = 49
Mail.CurrentByteDeliveryRate = 0
Mail.CurrentByteTransferRate = 0
Mail.CurrentMessageDeliveryRate = 0
Mail.CurrentMessageTransferRate = 0
Mail.DBCacheEntries = 0
Mail.DBCacheHits = 49567
Mail.DBCacheReads = 162503
MAIL.Dead = 0
Mail.Delivered = 160868
Mail.DeliveredSize.100KB_to_1MB = 6718
Mail.DeliveredSize.10KB_to_100KB = 56590
Mail.DeliveredSize.1KB_to_10KB = 75896
Mail.DeliveredSize.1MB_to_10MB = 379
Mail.DeliveredSize.Under_1KB = 21285
Mail.Deliveries = 162470
Mail.DeliveryThreads.Active = 0
Mail.DeliveryThreads.Max = 11
Mail.DeliveryThreads.Total = 11
Mail.Domain = IBM
MAIL.Hold = 0
Mail.Mailbox.AccessConflicts = 0
Mail.Mailbox.Accesses = 67868
Mail.Mailbox.AccessWarnings = 748
Mail.Mailbox.CurrentAccesses = 0
Mail.Mailbox.MaxConcurrentAccesses = 3
Mail.Mailbox.Opens = 0
Mail.MaximumDeliverTime = 5
Mail.MaximumServerHops = 1
Mail.MaximumSizeDelivered = 9767
Mail.MinimumDeliverTime = 1
Mail.MinimumServerHops = 1

Mail.MinimumSizeDelivered = 1
Mail.PeakByteDeliveryRate = 629329
Mail.PeakMessageDeliveryRate = 6
Mail.PeakMessageDeliveryTime = 06/24/2003 14:14:42 EDT
Mail.PeakMessagesDelivered = 361
Mail.PeakTotalBytesDelivered = 37759777
Mail.TotalKBDelivered = 7,144,640
Mail.TotalPending = 0
Mail.TotalRouted = 160868
Mail.TotalRouted.NRPC = 160868
Mail.TransferThreads.Concurrent.Highest = 0
Mail.TransferThreads.Concurrent.Max = 5
Mail.TransferThreads.Max = 11
Mail.TransferThreads.Total = 0
MAIL.Waiting = 0
MAIL.WaitingForDIR = 0
MAIL.WaitingForDNS = 0
MAIL.WaitingRecipients = 0
Mem.Allocated = -339930218
Mem.Allocated.Process = -748177188
Mem.Allocated.Shared = 408246970
Mem.Availability = Plentiful
Mem.PhysicalRAM = 2147483647
NET.GroupCache.Hits = 53
NET.GroupCache.Misses = 4
NET.GroupCache.NumEntries = 4,002
NET.GroupCache.Size = 261,624
NET.GroupCache.Used = 229,986
NET.Log.sut/ibm.PeakUnwrittenEntries = 3
NET.Log.sut/ibm.UnwrittenEntries = 2
NET.TCPIP.BytesReceived = 99,421
NET.TCPIP.BytesSent = 3,628,792
NET.TCPIP.Sessions.Established.Incoming = 155
NET.TCPIP.Sessions.Established.Outgoing = 0
NET.TCPIP.Sessions.Limit = 65535
NET.TCPIP.Sessions.LimitMax = 65535
NET.TCPIP.Sessions.LimitMin = 10
NET.TCPIP.Sessions.Peak = 4
NET.TCPIP.Sessions.Recycled = 0
NET.TCPIP.Sessions.Recycling = 0
Server.Administrators = CN=adminimator/O=ibm
Server.Administrators.Access = CN=adminimator/O=ibm
Server.Administrators.FullAccess = CN=adminimator/O=ibm
Server.AvailabilityIndex = 100
Server.AvailabilityThreshold = 0
Server.BootID = 5309632
Server.BusyTimeQuery.ReceivedCount = 0
Server.CPU.Count = 4
Server.ElapsedTime = 19:52:45
Server.ExpansionFactor = 1
Server.MailBoxes = 3
Server.Monitor.Start = 06/24/2003 10:45:20 EDT
Server.Name = CN=sut/O=ibm
Server.OpenRequest.MaxUsers = 0
Server.OpenRequest.Restricted = 0
Server.Path.Configfile = /opt/sut/notes.ini
Server.Path.Data = /opt/sut
Server.Path.Executable = /opt/lotus/notes/latest/linux/
Server.Ports = TCPIP,TCPIP
Server.PoweredBy = Notes
Server.Sessions.Dropped = 0

Server.SharedMail = 0
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:44 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:45 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:54 EDT]
Server.Task = Router: Searching for mail to deliver: [06/24/2003 20:56:48 EDT]
Server.Task = HTTP Server: Listen for connect requests on TCP Port:80: [06/25/2003 06:38:04 EDT]
Server.Task = Router: Idle: [06/25/2003 06:38:04 EDT]
Server.Task = Event Monitor: Idle: [06/25/2003 06:38:05 EDT]
Server.Tasks = 30
Server.Task.DB = Database Server: Idle: [06/25/2003 06:38:05 EDT]
Server.Time.Start = 06/24/2003 10:45:20 EDT
Server.Title =
Server.Trans.PerMinute = 0
Server.Trans.PerMinute.Peak = 15
Server.Trans.PerMinute.Peak.Time = 06/24/2003 11:48:52 EDT
Server.Trans.Total = 219
Server.Users = 0
Server.Users.5MinPeak = 1
Server.Users.5MinPeakTime = 06/24/2003 10:55:25 EDT
Server.Users.Active = 0
Server.Users.Active15Min = 0
Server.Users.Active1Min = 0
Server.Users.Active30Min = 0
Server.Users.Active3Min = 0
Server.Users.Active5Min = 0
Server.Users.Peak = 3
Server.Users.Peak.Time = 06/24/2003 13:24:14 EDT
Server.Version.Notes = Release 6.0
Server.Version.Notes.BuildNumber = 190
Server.Version.OS = Linux 2.4.18-3smp #1 SMP Thu Ap
Stats.Time.Current = 06/25/2003 06:39:01 EDT
Stats.Time.Start = 06/24/2003 10:44:56 EDT
340 statistics found

First Edition - July 2003

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