Exchange 2000 MAPI Messaging Benchmark (MMB2) Performance Result

Hardware: **IBM @server xSeries 235**
Software: **Exchange 2000 Enterprise Server**
Test Profile: **MAPI Messaging Benchmark**

The new MAPI Messaging Benchmark (MMB2) measures throughput in terms of a specific profile of user actions, executed over an 8-hour working day.

This benchmark is different from the "Medium User" setting that was used with Exchange 5.5 in that the rate of client requests is significantly greater for this MMB2 profile.

Results should be interpreted as a benchmark for messaging throughput and should *not* be confused with deployment recommendations. Factors such as backup/restore, topology and other issues should be considered when planning a deployment. For information on how MMB2 results differ from deployment and configuration information, see Benchmark vs. Production Configuration Disclosure Note below.

Summary of Results

The IBM @server x235 was configured with two 2.8GHz Intel Xeon processors and 4GB of memory. The Microsoft LoadSim MMB2 profile was used, which represents the tasks typically performed by a corporate e-mail user. During the 4-hour steady state, the x235 provided a weighted 95th-percentile response time of 186 ms for 9,800 MMB2, with average send queue size of 56.3 and average CPU utilization of 83 percent.

Benchmark vs. Production Configuration Disclosure Note

This test measures the messaging throughput of a single-server, single-site topology. Its purpose is to measure the maximum throughput of a Microsoft Exchange Server on this hardware configuration. This can provide a benchmark for comparing hardware and/or software products, **but cannot be used as a deployment guide for production environments.** For deployment-specific information, contact a Microsoft or IBM representative.

The MMB2 benchmark does not account for:

- Usage profiles that do not match that of the Load Simulator MAPI Medium profile
- Per-user storage and per-server backup requirements
- Fault-tolerance requirements
- Workloads other than MAPI private folder access, including Public Folder, NNTP, POP3 and other e-mail interfaces
- Multiple Exchange Server deployments, in which additional resources are required to forward mail intrasite
- Connectors, links and replication to remote Exchange sites

Test Results

Summary	
Supported Benchmark Load	9,800 MMB2s
Benchmark Profile	MAPI Messaging Benchmark 2 (MMB2)
Protocol	Exchange MAPI
Length of Steady State	4 Hours
Length of Test	8 Hours
Unless otherwise noted, values listed below are averages over the entire 4-hour, steady-state period.	
Transactions in Total	
Total Messages Submitted	252,065
Total Message Recipients Delivered	921,948
Total Messages Sent	251,998
Ratio Message Recipients Delivered / Messages Submitted	3.66
Transaction Load (per Hour)	
Messages Submitted / Hour	62,798
Message Recipients Delivered / Hour	229,698
Messages Sent / Hour	62,782
Transaction Load (per Second)	
Message Opens / Second	96.3
Folder Opens / Second	40.8
RPC Read Bytes / Second	214,206
RPC Write Bytes / Second	1,587,695
Transaction Queues	
IS Send Queue Average Length	56.3
Processor Utilization	
System Processor Utilization (%)	83
System Processor Queue Length	8.8
System Context Switches / Second	13,952
Process % CPU Time - Store	265
Process % CPU Time - InetInfo	16.5
Exchange 2000 server is also domain controller? (Yes/No)	Yes
Process % CPU Time – LSASS (on Domain Controller)	26.3
Memory Utilization	
Available Bytes	1.806GB
Pages / Second	1.15
Process Working Set Bytes – Store	1.298GB
Process Virtual Bytes – Store	1.991GB
Logical Drive Utilization	
IS Database Disk Reads / Second	1,686
IS Database Disk Writes / Second	876
IS Database Average Disk Queue Length	8.9
IS Log Disk Reads / Second	0
IS Log Disk Writes / Second	605
IS Log Average Disk Queue Length	0.164

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Descriptive Terms

Messages Submitted

Submit calls made by clients. This equates to total messages sent by users.

Messages Sent

Messages that the Store sends to the categorizer in InetInfo (SMTP Service in particular). [1]

Message Recipients Delivered

Separate mailboxes that messages have been delivered to.

Message Opens/Sec

Messages accessed for reading per second.

Folder Opens/Sec

Folders opened for browsing per second.

RPC Read Bytes/Sec

Bytes read from clients, sent via RPCs.

RPC Write Bytes/Sec

Bytes written to clients, sent via RPCs.

IS Send Queue Average Length

Send Queue Size is the number of messages in the private information store's send queue.

Response Times (Latencies)

Client Actions	95th Percentile Response Time (in Milliseconds)
Read	203
Send	188
Delete	63
Move	110
Submit	94
Weighted Total	**186**

Message Throughput

Summary of the MMB2 profile for an 8-hour day:

	Expected	**Measured**
Messages Submitted / MMB2 / Day	51	51.3
Messages Delivered / MMB2 / Day	185	187.5
Average Recipients per Message	3.63	3.66

- <List Any Modifications to the default profile – NONE >

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[1] All messages – even MAPI messages – are sent to the categorizer, as this replaces the MTA for all but communication via X.400, with an Exchange 5.5 server.

Server Configuration

Hardware	Exchange Server	Domain Controller (if remote)
Vendor	International Business Machines Corporation	N/a
Model	xSeries 235	N/a
Processor	2.8GHz Intel Xeon Processor	N/a
Number of Processors	2, with Hyper-Threading Enabled	N/a
Primary Cache	N/a	N/a
Secondary Cache	512KB	N/a
Other Cache	N/a	N/a
Memory	4GB DDR DIMMs	N/a
Disk Subsystem	78 x 18.2GB in 7 EXP300 Storage Expansion units 3 x 36.4GB internal disk drives	N/a
Disk Controllers	5 x Mylex eXtremeRAID 2000 controllers 1 x Integrated SCSI Adapter	N/a
Other Hardware	1 Imbedded Gig-bit Ethernet Controller	N/a
Hardware Tunings	2 x 7 disks R0 for Exchange log files 4 x 16 disks R0 for 4 mail databases 3 internal disks configured for OS, Exchange software, page files and system log files	N/a
Comments	N/a	N/a
Mail Software		N/a
Vendor	Microsoft Corporation	N/a
Mail Server	Exchange Server 2000	N/a
Build\Release Version	Enterprise Edition + SP3	N/a
Additional Software Tuning	None	N/a
OS Software		N/a
Operating System/Version	Microsoft Windows 2000 Advanced Server	N/a
Service Pack/Patch Info	SP3	N/a
File System Type	NTFS	N/a
Other Software	N/a	N/a
Network		N/a
Type of Network	Ethernet	N/a
Network Speed	1 Gigabit Full Duplex	N/a
MSL (Seconds)	120	N/a
Time-Wait (Seconds)	60	N/a

Load Generator Configuration

Number of Load Generators (LG)	8
Total Number of LG processes	8
Simulated Users / Process	1,225
Model	IBM Netfinity 4000R
Processor	650MHz Pentium II
Number of Processors	2
Memory	512MB
Network Controller	Integrated 10/100 Ethernet Controller
Operating System	Microsoft Windows 2000 Server