

Exchange 2000 MAPI Messaging Benchmark (MMB2) Performance Result

Hardware: IBM @server x250
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 x250 was configured with four 900MHz Intel Pentium III 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 xSeries 250 provided a weighted 95th-percentile response time of 399 ms for 8,200 MMB2, with average send queue size of 80.8 and average CPU utilization of 94.7 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 intra-site
- Connectors, links and replication to remote Exchange sites

Test Results

Summary	
Supported Benchmark Load	8,200 MMB2s
Benchmark Profile	MAPI Messaging Benchmark 2 (MMB2)
Protocol	Exchange MAPI
Length of Steady State	4 Hours
Length of Test	8 Hours
<i>Unless otherwise noted, values listed below are averages over the entire 4-hour, steady-state period.</i>	
Transactions in total	
Total Messages Submitted	204,734
Total Message Recipients Delivered	759,498
Total Messages Sent	204,718
Ratio Message Recipients Delivered / Messages Submitted	3.71
Transaction Load (per hour)	
Messages Submitted / hour	51,059
Message Recipients Delivered / hour	189,414
Messages Sent / hour	51,055
Transaction Load (per Second)	
Message Opens/Sec	77.6
Folder Opens/Sec	33.8
RPC Read Bytes/Sec	182,765
RPC Write Bytes/Sec	1,337,149
Transaction Queues	
IS Send Queue Average Length	80.8
Processor Utilization	
System Processor Utilization (%)	94.7
System Processor Queue Length	14.3
System Context Switches/Sec	11,347
Process % CPU Time - Store	314
Process % CPU Time - Inetinfo	13.6
Exchange 2000 server is also domain controller? (yes/no)	Yes
Process % CPU Time – LSASS (on domain controller)	21.5
Memory Utilization	
Available Bytes	1950MB
Pages/Sec	3.89
Process Working Set Bytes - Store	1.26 GB
Process Virtual Bytes - Store	2.23GB
Logical Drive Utilization	
IS Database Disk Reads/Sec	1,380
IS Database Disk Writes/Sec	874
IS Database Average Disk Queue Length	2.4
IS Log Disk Reads/Sec	0
IS Log Disk Writes/Sec	837
IS Log Average Disk Queue Length	0.19

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	188
Send	469
Delete	110
Move	234
Submit	157
Weighted Total	399

Message Throughput

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

	Expected	Measured
Messages Submitted/MMB2/Day	51	49.8
Messages Delivered/MMB2/Day	185	184.8
Average Recipients per Message	3.6	3.71

- The standard MMB2 profile was used for testing

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 250	N/a
Processor	900MHz Pentium III	N/a
Number of Processors	4	N/a
Primary Cache	2MB	N/a
Secondary Cache	None	N/a
Other Cache	None	N/a
Memory	4GB SDRAM DIMMs	N/a
Disk Subsystem	1 x FASt500 Storage Server 76 x 9.1GB and 4 x 18.2GB disk drives in 8 EXP500 Storage Expansion units. 3 x 18.2GB internal disk drives	N/a
Disk Controllers	2 x IBM FASt Host Adapters. 1 x Integrated SCSI Adapter.	N/a
Other Hardware	2 Netfinity 10/100 Ethernet Adapters	N/a
Hardware Tunings	2 x (1+1) disk R0 for Exchange log files 2 x 38 disks R0 for 2 mail storage groups. Each group has two mail databases. Each database has 19 disks. OS and Exchange software are on one of the internal drives, system log files are stored on the second internal drive, and the pagefile on the third internal drive.	N/a
Comments		N/a
Mail Software		N/a
Vendor	Microsoft Corporation	N/a
Mail Server	Exchange Server 2000	N/a
Build\Release Version	Windows 2000 Advanced Server – Build 2195. Exchange 2000 Server – Enterprise Edition RTM Release.	N/a
Additional Software Tuning	None	N/a
OS Software		N/a
Operating System/Version	Microsoft Windows 2000 Advanced Server, Build 2195	N/a
Service Pack/Patch Info	SP1	N/a
File System Type	NTFS	N/a
Other Software		N/a
Network		N/a
Type of Network	Ethernet	N/a
Network Speed	100Mbps Full Duplex	N/a
MSL (sec)	120	N/a
Time-Wait (sec)	60	N/a

Load Generator Configuration

Number of Load Generators (LG)	7
Total Number of LG processes	7
Simulated Users/Process	1,100 on the first two children and 1,200 on other children.
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