Exchange 2000 MAPI Messaging Benchmark (MMB2) Performance Result

Hardware: **IBM**@server **xSeries 350 Server**
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 work 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 xSeries 350 server was configured with four 700MHz Intel Pentium III Xeon processors and 4GB of memory. The default 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 350 provided a weighted 95th percentile response time of 195ms for **8,000 MMB2**, with average send queue size of 69 and average CPU utilization of 86 percent.

Results are based on 4 hours of steady-state running.

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	8,000 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	198,241
Total Message Recipients Delivered	725,742
Total Messages Sent	198,232
Ratio Message Recipients Delivered / Messages Submitted	3.66
Transaction Load (per hour)	
Messages Submitted / hour	49,608
Message Recipients Delivered / hour	181,612
Messages Sent / hour	49,606
Transaction Load (per Second)	
Message Opens/Sec	77.3
Folder Opens/Sec	33.2
RPC Read Bytes/Sec	182,397
RPC Write Bytes/Sec	1,279,630
Transaction Queues	
IS Send Queue Average Length	69
Processor Utilization	
System Processor Utilization (%)	86
System Processor Queue Length	8.27
System Context Switches/Sec	9,999
Process % CPU Time - Store	280
Process % CPU Time - Inetinfo	14
Exchange 2000 server is also domain controller? (yes/no)	YES
Process % CPU Time – LSASS (on domain controller)	22
Memory Utilization	
Available Bytes	2.37GB
Pages/Sec	2.15
Process Working Set Bytes - Store	1.12GB
Process Virtual Bytes - Store	2.07GB
Logical Drive Utilization	
IS Database Disk Reads/Sec	1,256
IS Database Disk Writes/Sec	759
IS Database Average Disk Queue Length	6.91
IS Log Disk Reads/Sec	0.000
IS Log Disk Writes/Sec	814
IS Log Average Disk Queue Length	0.16

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	140
Send	281
Delete	93
Move	172
Submit	125
Weighted Total	**195**

Message Throughput

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

	Expected	Measured
Messages Submitted/MMB2/Day	51	49.6
Messages Delivered/MMB2/Day	185	181.6
Average Recipients per Message	3.63	3.66

- The default MMB2 profile was used for testing

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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	IBM@server xSeries 350	N/a
Processor	Pentium III Xeon 700MHz	N/a
Number of Processors	4	N/a
Primary Cache		N/a
Secondary Cache	2MB (per processor)	N/a
Other Cache	None	N/a
Memory	4GB ECC ChipKill DIMM	N/a
Disk Subsystem	1 x FAStT500 Storage Server. 40 x 18.2GB disk drives in 4 FAStT EXP500 Storage Expansion Units. 1 x 18.2GB Internal disk drives.	N/a
Disk Controllers	2 x IBM FAStT Host Bus Adapters. 1 x Integrated Ultra160 SCSI	N/a
Other Hardware		N/a
Hardware Tunings	Assigned all cache on Storage controller to write operation. All others follow factory default settings.	N/a
Comments	Disk storage configuration: F: (1+1) disks RAID1 for Exchange Log File 1 G: (1+1) disks RAID1 for Exchange Log File 2 H&I: 2x18 disks RAID0 for Exchange Information Store files included two storage groups of two databases per storage group, and public folder database. All other files are stored on the single internal SCSI disk.	N/a
Mail Software		
Vendor	Microsoft Corporation	N/a
Mail Server	Exchange Server 2000	N/a
Build\Release Version	Enterprise Edition	N/a
Additional Software Tuning	None	N/a
OS Software		
Operating System\Version	Windows 2000 Advanced Server	N/a
Service Pack\Patch Info	SP2	N/a
File System Type	NTFS	N/a
Other Software		N/a
Network		
Type of Network	Ethernet	N/a
Network Speed	100 Mbps Full Duplex	N/a
MSL (sec)	120	N/a
Time-Wait (sec)	60	N/a

Load Generator Configuration

Number of Load Generators (LG)	4
Total Number of LG Processes	4
Simulated Users/Process	2,000
Model	IBM @server xSeries x330
Processor	Pentium III, 1GHz
Number of Processors	2
Memory	1GB
Network Controller	Integrated 10/100 Ethernet Controller
Operating System	Windows 2000 Advanced Server with SP2