

Exchange 2000 MAPI Messaging Benchmark (MMB2) Performance Result

Hardware: IBM @server BladeCenter HS20
Software: Exchange 2000 Enterprise Server with SP2
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, refer to the note below on Benchmark vs. Production Configuration.

Summary of Results

The IBM BladeCenter HS20 was configured with two Intel 2.4GHz Xeon processors and 4GB of memory. The default Microsoft Loadsim MMB2 profile was used, which represented the tasks typically performed by a corporate email user. During the 4-hour steadystate, the BladeCenter HS20 provided a weighted 95th percentile response time of 186ms for **8,700 MMB2**, with average send queue size of 66 and average CPU utilization of 83%.

Results based on four 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 not matching 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 | 8,700 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 entire 4-hour steady-state period. | |
| Transactions in Total | |
| Total Messages Submitted | 211,254 |
| Total Message Recipients Delivered | 769,912 |
| Total Messages Sent | 211,016 |
| Ratio Message Recipients Delivered / Messages Submitted | 3.64 |
| Transaction Load (per Hour) | |
| Messages Submitted / Hour | 52,784 |
| Message Recipients Delivered / Hour | 192,371 |
| Messages Sent / Hour | 52,725 |
| Transaction Load (per Second) | |
| Message Opens / Second | 82.0 |
| Folder Opens / Second | 42.1 |
| RPC Read Bytes / Second | 193,862 |
| RPC Write Bytes / Second | 1,555,323 |
| Transaction Queues | |
| IS Send Queue Average Length | 66 |
| Processor Utilization | |
| System Processor Utilization (%) | 83.1 |
| System Processor Queue Length | 8 |
| System Context Switches / Second | 10,072 |
| Process % CPU Time – Store | 269 |
| Process % CPU Time – InetInfo | 16.4 |
| Exchange 2000 server is also domain controller? (Yes/No) | Yes |
| Process % CPU Time – LSASS (on domain controller) | 25.7 |
| Memory Utilization | |
| Available Bytes | 2.427GB |
| Pages / Second | 0.636 |
| Process Working Set Bytes - Store | 1.338GB |
| Process Virtual Bytes - Store | 2.071GB |
| Logical Drive Utilization | |
| IS Database Disk Reads / Second | 647 + 667 |
| IS Database Disk Writes / Second | 343 + 379 |
| IS Database Average Disk Queue Length | 2.2 + 2.0 |
| IS Log Disk Reads/Sec | 0 + 0 |
| IS Log Disk Writes/Sec | 261 + 257 |
| IS Log Average Disk Queue Length | 0 + 0 |

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 | 141 |
| Send | 265 |
| Delete | 78 |
| Move | 125 |
| Submit | 94 |
| Weighted Total | 186 |

Message Throughput

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

| | Expected | Measured |
|--------------------------------|-----------------|-----------------|
| Messages Submitted/MMB2 / Day | 51 | 48.6 |
| Messages Delivered/MMB2 / Day | 185 | 177 |
| Average Recipients per Message | 3.6 | 3.64 |

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

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 | |
| Model | BladeCenter HS20 | |
| Processor | Intel 2.4 GHz Xeon | |
| Number of Processors | 2 | |
| Primary Cache | Xeon DP Micro-op | |
| Secondary Cache | 512 KB | |
| Other Cache | None | |
| Memory | 4GB PC2100 ECC DDR DIMM | |
| Disk Subsystem | 2 x 20 disks R0 for mail databases 2 x 3 disks R0 for log volumes 1 x 3 disks R0 for Exch, SMTP, AD and 1 x 40GB internal disk for OS and page | |
| Disk Controllers | One IBM TotalStorage FAStT700 Storage Server One HS20 FC Expansion Card | |
| Other Hardware | One IBM BladeCenter with One Gigabit Ethernet switch module One FC switch module | |
| Hardware Tunings | FAStT700 write cache enabled. | |
| Comments | | |
| Mail Software | | |
| Vendor | Microsoft Corporation | N/a |
| Mail Server | Exchange Server 2000 | N/a |
| Build/Release Version | Enterprise Edition + SP2 | N/a |
| Additional Software Tuning | /3GB | N/a |
| OS Software | | |
| Operating System\Version | Microsoft Windows 2000 Advanced Server | |
| Service Pack / Patch Info | SP2 | |
| File System Type | NTFS | |
| Other Software | None | |
| Network | | |
| Type of Network | Ethernet | |
| Network Speed | 1000/100/10 | |
| MSL (sec) | 120 | |
| Time-Wait (sec) | 60 | |

Load Generator Configuration

| | |
|---------------------------|---|
| # of Load Generators (LG) | 4 |
| Total # of LG processes | 4 |
| Simulated Users/Process | 2,175 |
| Model | IBM xSeries 330 |
| Processor | 1.4GHz Pentium III |
| # of Processors | 2 |
| Memory | 768MB |
| Network Controller | Integrated 10/100 Ethernet Controller |
| Operating System | Microsoft Windows 2000 Advanced Server with SP2 |