

Microsoft® Exchange 2000 Server to Microsoft Exchange Server 2003 migration and consolidation — white paper



Executive summary.....	2
Overview.....	3
Test environment one—1,200 users.....	3
Test environment two—3,000 users.....	5
Best practice method for migration and server consolidation	7
Migration procedures.....	8
Setting up the environment	8
Preparing for the mailbox move.....	13
Moving the mailboxes	15
Decommissioning old servers.....	20
Impact of migration and consolidation on Exchange users	27
Mailbox move durations	28
LoadSim scores.....	29
Appendix A—Performance data.....	31
Appendix B—Reference configuration	32
For more information.....	35
Microsoft.....	35
Active Answers	35

Executive summary

This paper describes a best practice process for consolidating servers and storage in a multiserver Microsoft® Exchange 2000 Server environment by concurrently migrating to a single server Microsoft Exchange Server 2003 environment on a storage area network (SAN). The methodology described is commonly referred to as the “move mailbox” method. It includes installing a new Exchange 2003 server into an existing Exchange 2000 Administrative Group, using the Exchange 2003 move mailbox wizard to move the user mailboxes from the source Exchange 2000 server to the target Exchange 2003 server, and decommissioning the old servers.

The HP Customer Focused Testing (CFT) lab performed two Exchange 2000 Server to Exchange Server 2003 migration tests, which included concurrent server and storage consolidations. The two test scenarios were based on a typical deployment and map to an appropriate HP Storage array. The first scenario was based on the HP StorageWorks Modular Smart Array (MSA) 1000, which is an ideal entry-level SAN-based storage array and was tested with 1,200 users. The second scenario was based on the HP StorageWorks Enterprise Virtual Array (EVA) 3000, which is an appropriate entry-level array for a larger deployment and was tested with 3,000 users.

Each of these validated examples should be considered a “proof of concept.” Larger or smaller numbers of users in the deployment can be used as required, but the steps for migration and consolidation are the same. Highlighted test results include the following:

MSA1000 testing:

- The migration and consolidation to the MSA1000 was completed without incident, with 1,200 mailboxes totaling 24.57 GB of data moved in 7 hours and 21 minutes, which approximately equates to a migration rate of 3,343 MB per hour.
- During the mailbox migration to the MSA1000, each end user only experienced an average interruption of service of 1.48 minutes.
- The 95th percentile Load Simulation (LoadSim) score taken during mailbox migrations to the MSA1000 was 51, which means that during a move operation, the online users would have an average response time of 51 milliseconds to 95% of Exchange requests. A LoadSim score of less than 1,000 is considered passing.
- The average LoadSim score taken after each migration was 45, with a load of 1,200 users being simulated.

EVA3000 testing:

- The migration and consolidation to the EVA3000 was completed with 3,000 mailboxes, totaling 61.44 GB of data, moved in 20 hours and 12 minutes, which approximately equates to a migration rate of 3,042 MB per hour.
- During the mailbox migration to the EVA3000, each end user only experienced an average interruption of service of 1.44 minutes.
- The 95th percentile LoadSim score taken during mailbox move migrations to the EVA3000 was 59, which means that during a move operation, the online users would have an average response time of 59 milliseconds to 95% of Exchange requests. A LoadSim score of less than 1,000 is considered passing.
- The average LoadSim score taken after each migration was 40.3, with a load of 3,000 users being simulated.

Overview

HP conducted testing to show an Exchange 2000 Server to Exchange Server 2003 migration using the “move mailbox” method. The testing also demonstrated server and storage consolidation. The purpose of the testing was to show how customers can migrate from their multiserver Exchange 2000 Server environment to an Exchange Server 2003 environment using the MSA1000 for small organizations or the EVA3000 for larger organizations. Using the best practice process described in this paper, customers can successfully implement this solution in their Exchange environments.

Test environment one—1,200 users

In the first test, the original configuration included a single Microsoft Exchange organization that consisted of three HP ProLiant ML370 G3 servers. Each server supported 400 users, using internal storage, for a total of 1,200 users.

Each ProLiant ML370 G3 server configuration included:

- Dual Intel® Xeon™ 2.8-GHz processors
- 1 GB RAM
- Two internal SCSI disk drives (36 GB and 72 GB)
 - Exchange database stored on C (36 GB)
 - Exchange logs stored on L (72 GB)
- Microsoft Windows® 2000 Advanced Server Service Pack (SP) 4
- Microsoft Exchange 2000 Server SP3
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing

The target configuration for the first test included a single Exchange organization consisting of one HP ProLiant DL580 G2 Exchange server that would service all 1,200 users and use the MSA1000 for SAN storage. The target Exchange server was also configured to act as an Active Directory and Domain Name Server for the test environment.

The HP ProLiant DL580 G2 server configuration included:

- Four Xeon 1.9-GHz processors
- 4 GB RAM
- Two internal SCSI disk drives (36 GB)
- Two Emulex LP95 LP952 (FCA2101) host bus adapters (HBAs)
 - 5-4.82a16 driver
 - 3.82a1 firmware
- HP NC3143 Fast Ethernet network interface card
- Microsoft Windows Server 2003, Enterprise Edition SP1
- Microsoft Exchange Server 2003 SP1
- HP StorageWorks Secure Path 4.0c
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing
- Two HP StorageWorks SAN Switches 2/8 EL—3.12 firmware

The MSA1000 configuration included:

- Array A— 100 GB RAID 1+0, 36-GB 10,000-rpm disks, 20 disks, Selective Storage Presentation (SSP) enabled
- Array B— 100 GB RAID 1+0, 36-GB 10,000-rpm disks, 20 disks, SSP enabled
- Array A was used for database storage.
- Array B was used for transaction log storage.

Note

Storage planning that takes into account specific design goals must be done prior to any deployment. This is not intended to be a storage configuration recommendation.

Each of the three LoadSim client PC (HP Compaq DC5000 [model number PB483A]) configurations included:

- Intel Pentium® 4 3.0-GHz processor
- 0.5 GB memory
- HP GB adapter running at 100 MB
- Microsoft Windows XP
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing
- LoadSim 6.0.4612.0

Figure 1. 1,200-user MSA1000 configuration before and after migration and consolidation

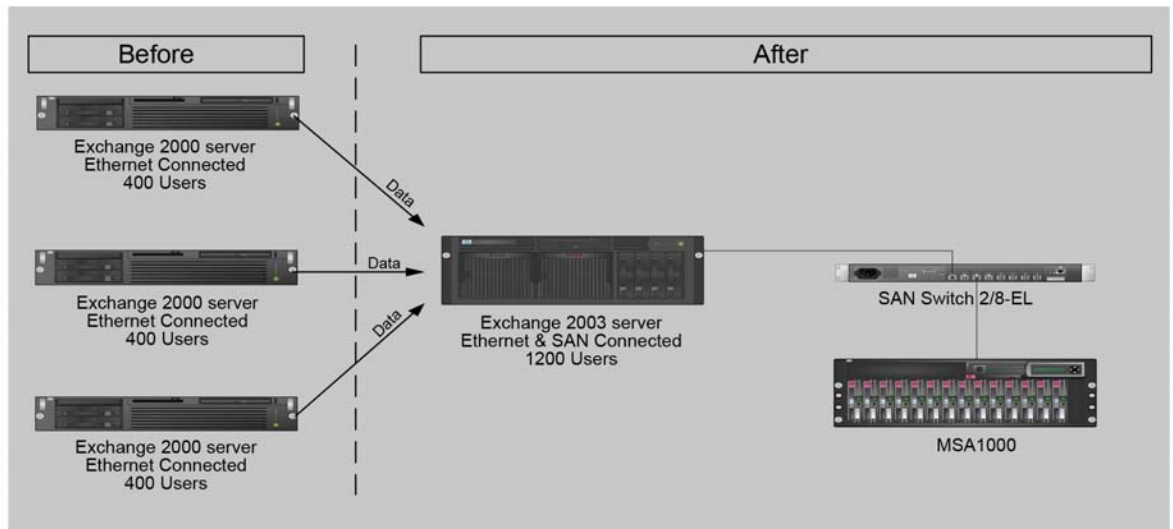


Table 1. Number of mailboxes on each server at various stages of the migration process

Server	Before migration	After first migration	After second migration	After third migration
ML370-1	400	0	0	0
ML370-2	400	400	0	0
ML370-3	400	400	400	0
Consolidated server/storage environment (DL580G2 and MSA1000)	0	400	800	1,200

Test environment two—3,000 users

The original configuration for the second test included a single Exchange organization consisting of three HP ProLiant ML370 G3 servers. Each server supported 1,000 users, using internal storage, for a total of 3,000 users.

Each HP ProLiant ML370 G3 server configuration included:

- Dual Xeon 2.8-GHz processors
- 1 GB RAM
- Two internal SCSI disk drives (36 GB and 72 GB)
 - Exchange database stored on C (36 GB)
 - Exchange logs stored on L (72 GB)
- Windows 2000 Advanced Server SP4
- Exchange 2000 Server SP3
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing

The target configuration for the second test included a single Exchange organization consisting of one HP ProLiant DL580 G2 Exchange server, servicing 3,000 migrated users and using the EVA3000 for SAN storage.

The HP ProLiant DL580 G2 server configuration included:

- Four Xeon 2-GHz processors
- 4 GB RAM
- Two internal SCSI disk drives (36 GB)
- Two Emulex LP952 (FCA2101) HBAs
 - 5-4.82a16 driver
 - 3.82a1 firmware
- HP NC3143 Fast Ethernet network interface card
- Windows Server 2003, Enterprise Edition SP1
- Exchange Server 2003 SP1
- Secure Path 4.0c
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing

The EVA3000 (2C2D) configuration included:

- Twenty-eight 36-GB, 15,000-rpm disks
- Two disk groups
 - Database disk group, 14 disks
 - Transaction log disk group, 14 disks
- Virtual disks
 - Database disk, 200 GB, vRAID1
 - Transaction log disk, 200 GB, vRAID1

Note

Storage planning that takes into account specific design goals must be done prior to any deployment. This is not intended to be a storage configuration recommendation.

Each of the six LoadSim client PC (HP Compaq DC5000 [model number PB483A]) configurations included:

- Pentium 4 3.0-GHz processor
- 0.5 GB memory
- HP GB adapter running at 100 MB
- Windows XP
- Symantec Antivirus 9.0.0.338
 - File system Auto-Protect enabled
 - Microsoft Exchange Auto-Protect enabled during portions of testing
- LoadSim 6.0.4612.0

Figure 2. 3,000-user EVA3000 configuration before and after migration and consolidation

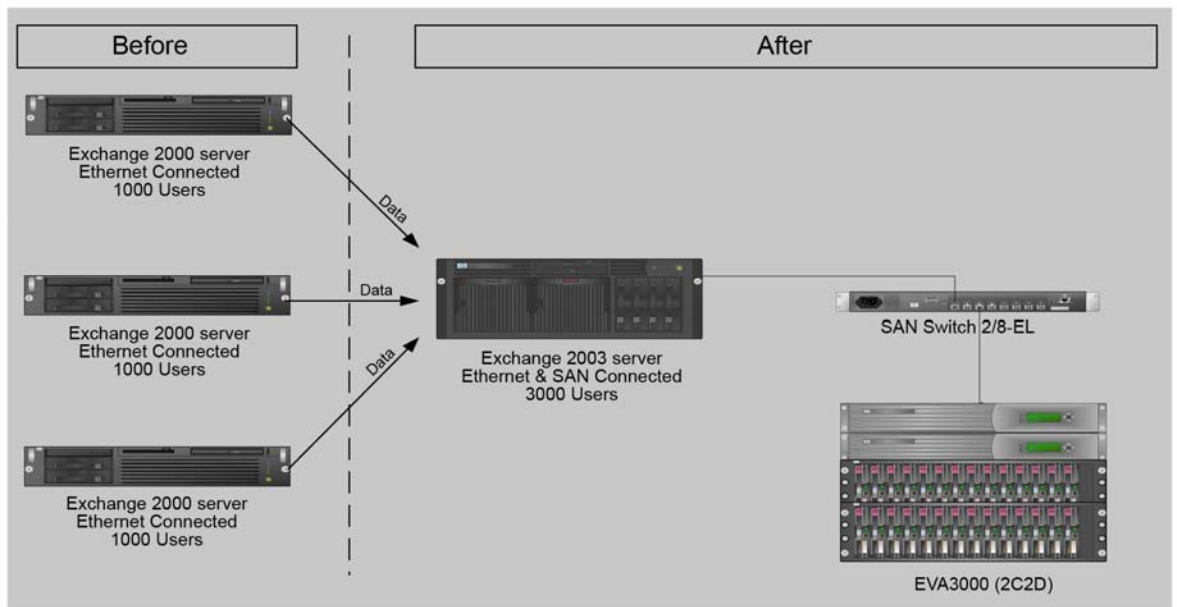


Table 2. Number of mailboxes on each server at various stages of the migration process

Server	Before migration	After first migration	After second migration	After third migration
ML370-1	1000	0	0	0
ML370-2	1000	1000	0	0
ML370-3	1000	1000	1000	0
Consolidated server/storage environment (DL580G2 and EVA3000)	0	1000	2000	3000

Best practice method for migration and server consolidation

The test method used for the migration and server consolidation included the following:

- Installing a new Microsoft Exchange 2003 server into an existing Exchange 2000 Administrative Group
- Using the Exchange 2003 move mailbox wizard to move user mailboxes from the source Exchange 2000 server to the target Exchange 2003 server
- Decommissioning the old Exchange servers

Note

This method is appropriate for a Microsoft Exchange 2000 Server to Exchange Server 2003 migration only. It is not intended for use when migrating from Exchange 5.5 or from mixed environments that include Exchange 5.5 because additional steps and considerations apply that are not addressed in this paper. For information about upgrading from Exchange 5.5, refer to <http://www.microsoft.com/technet/prodtechnol/exchange/2003/upgrade.mspx>.

The move mailbox method minimizes risk, provides an opportunity for testing and tuning the new system before putting the new server into production, and provides the benefit of minimal downtime to the end users. Because the new environment coexists with the old environment for the majority of the migration and consolidation, if there is a problem during the migration, a simple restore of the pre-migration databases to the old servers can easily be performed. This overlapping period also provides the benefit of allowing a burn-in period for the new environment. During this time, load simulation, performance benchmarking, and performance tuning can be done to optimize the new environment before it is put into production. Finally, because the move mailbox method only temporarily interrupts a user's service during the actual moving of that individual's mailbox, there is minimal service interruption for end users, which enables the administrator to keep users online during the migration process.

It also is not necessary to use other migration tools, such as the Exchange Profile Update tool (Exprofre.exe) to update client Microsoft Outlook profiles. Outlook profile updates occur automatically when users log in for the first time after a mailbox move, as long as the old server is online for a sufficient time that allows all users to log in at least one time after the move. Other Exchange functionality, such as Outlook Web Access and ActiveSync with pocket PC devices, will also become available after the update occurs.

Pfmigrate, a utility available in the Exchange CD support tools, may also be used to migrate public folders before decommissioning the old server. However, during testing, the public folder hierarchy

was manually replicated using Exchange System Manger. Additional information about using the pfmigrate utility can be found in the Microsoft Knowledge Base Article 822895—Overview of the Public Folder Migration tool at <http://www.microsoft.com>.

User load was simulated using the LoadSim standard Microsoft Messaging Benchmark (MMB2) profile. Load testing was conducted during each mailbox move period. Testing included measuring the effect of the move on the environment and, in particular, the response time for end user operations during a migration. Load was again applied after each mailbox move to benchmark the new configuration. Additional information regarding Microsoft's MMB2 standard can be found at <http://www.microsoft.com/exchange/techinfo/planning/2000/mmb2desc.asp>.

Migration procedures

Setting up the environment

1. Install Windows 2003 (or current) and any appropriate operating system updates onto a new, dedicated Exchange server.
2. Install and configure antivirus software.
3. Configure the new SAN, including all necessary storage and SAN infrastructure components, according to the appropriate storage device installation guide:

MSA1000

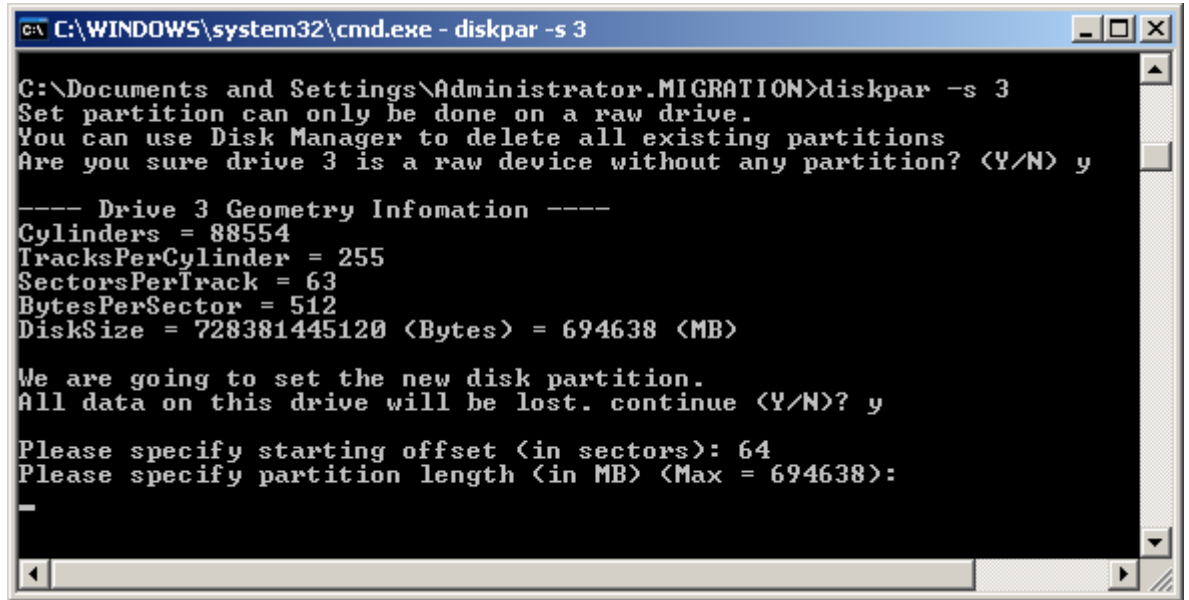
http://h20000.www2.hp.com/bizsupport/TechSupport/Resource.jsp?locale=en_US&taskId=115&prodSeriesId=377751&prodTypeId=12169

EVA3000

http://h20000.www2.hp.com/bizsupport/TechSupport/Resource.jsp?locale=en_US&taskId=115&prodSeriesId=315127&prodTypeId=12169

4. If using the EVA3000 as the SAN storage device, perform DiskPar on the virtual disks to avoid performance issues. See Figure 3. (This step is not necessary for the MSA1000.) Refer to "Windows applications may experience performance issues with EVA Virtual Disks during a heavy write load" at http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?objectID=PSD_OI040301_CW02&prodTypeId=12169&prodSeriesId=377751&locale=en_US.

Figure 3. Using the DiskPar utility to implement the fix for heavy write load disk performance

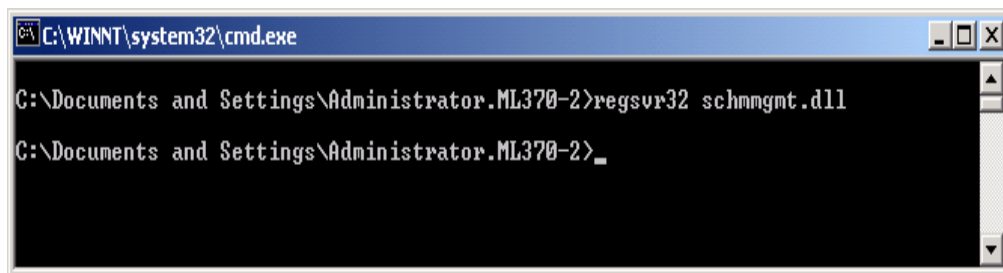


5. Add the new server to the domain.

Because this is a new Windows Server 2003 Domain Controller joining a Windows 2000 Active Directory, you must run "adprep" from a command prompt on the Schema Master to upgrade the Active Directory schema. (By default, the Schema Master is the first domain controller installed in the original environment.) Allow permissions to modify the Schema by first registering the Active Directory Schema plug-in and adding the plug-in into a Microsoft Management Console (MMC). The following figures show the process.

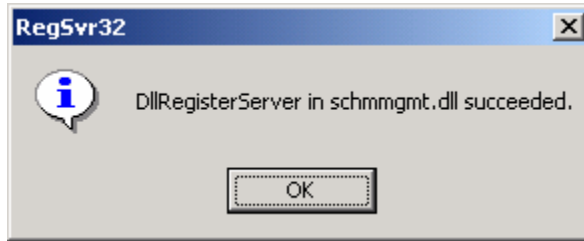
- a. Execute `regsvr32 schmmgmt.dll` from a command prompt. See Figure 4.

Figure 4



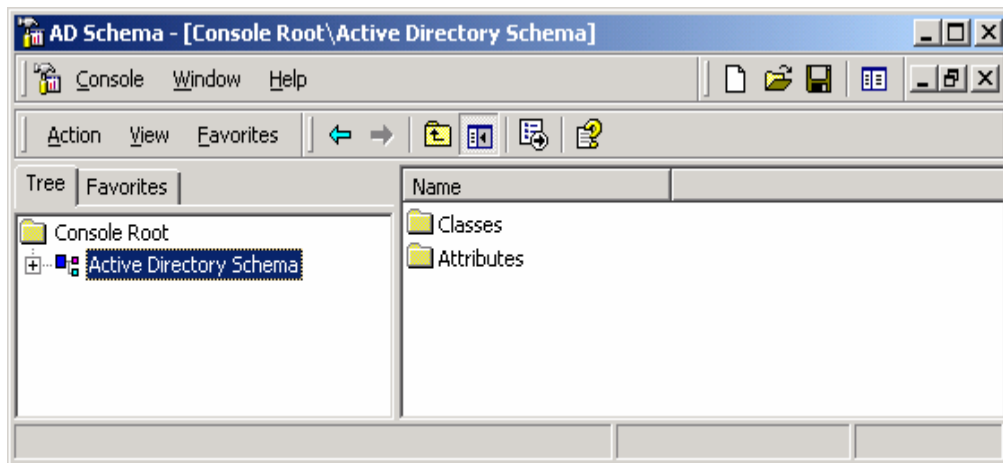
The following confirmation screen displays, as shown in Figure 5.

Figure 5



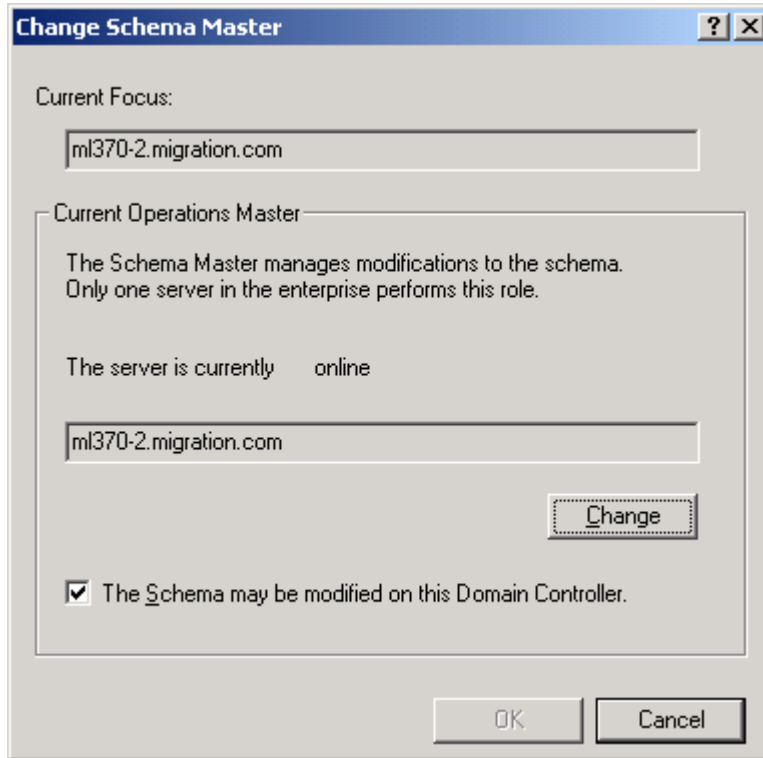
- b. Run the MMC. Enter `mmc` at the command prompt, and add the Active Directory Schema Plug-in to the console by right-clicking **Active Directory Schema** and selecting **Operations Master**. See Figure 6.

Figure 6



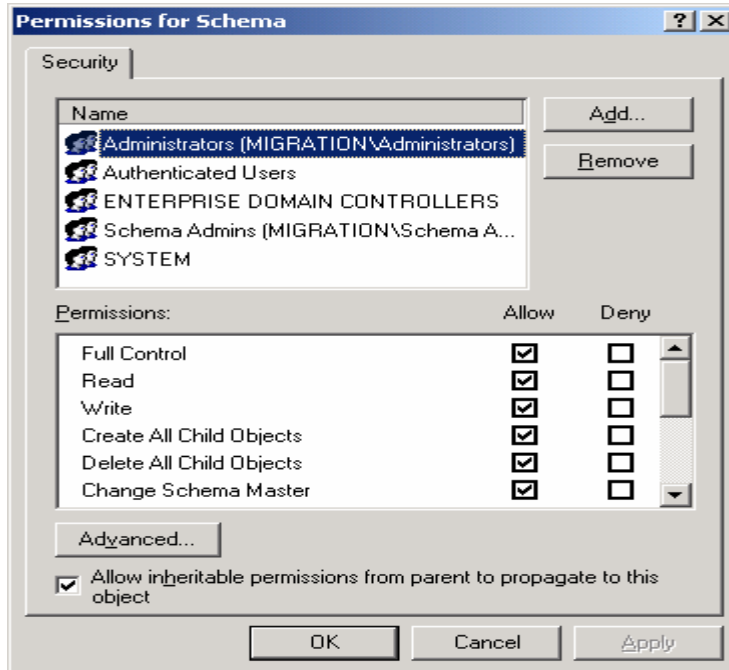
- c. Select the **The Schema may be modified on this Domain Controller** check box, as shown in Figure 7. Close the Change Schema Master window.

Figure 7



- d. Right-click **Active Directory Schema**, and choose permissions. Verify that allow full control is set to the account that is performing the action. See Figure 8.

Figure 8



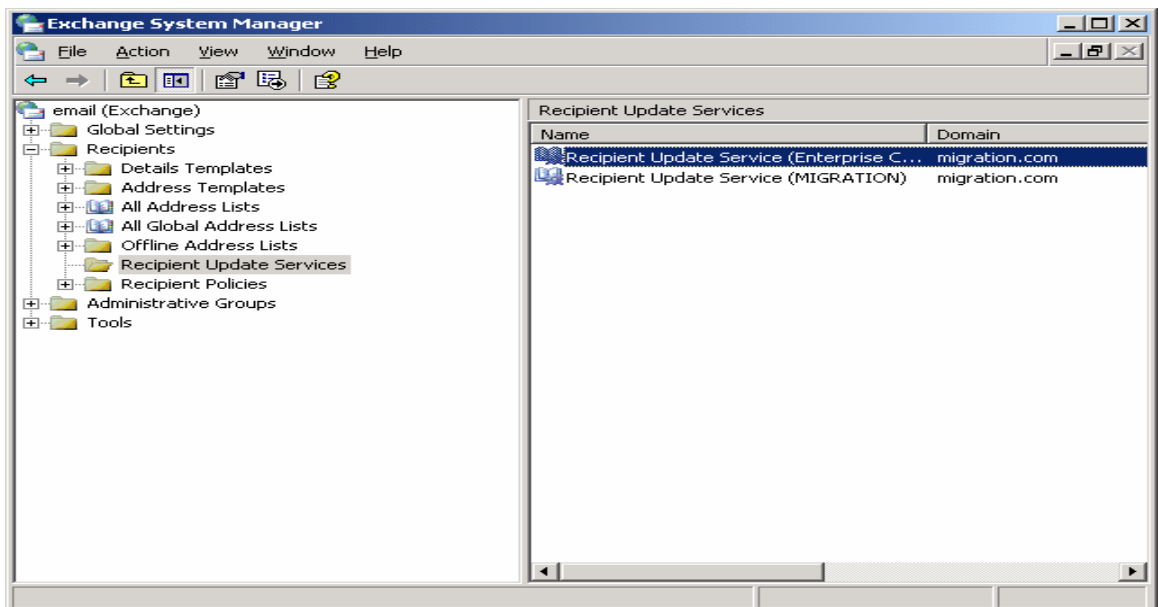
- e. Disconnect the current Schema Master and any other replicated domain controllers.
 - f. Run `adprep /forestprep` on the Schema Master. AdPrep is located in the Windows CD \i386 folder.
 - g. Run `adprep /domainprep` on the Schema Master.
 - h. Reconnect the Schema Master and any other replicated domain controllers.
 - i. Allow time for replication or force replication in Active Directory Sites and Services Console.
6. Follow the steps outlined in Microsoft Knowledge Base Article 278875 to update the schema using `adprep /forestprep` and `adprep /domainprep`
 7. Promote the new server to a domain controller.
 - a. On new server (DL580 G2), run `dcpromo` at a command prompt to promote the server to a Windows 2003 domain controller.
 - b. Install Active Directory using the existing domain option.
 - c. Allow time for replication or force replication.
 8. Install Exchange 2003 on the new server.
 - a. Install the required services (Simple Mail Transfer Protocol [SMTP], Network News Transport Protocol [NNTP], World Wide Web, ASP.net) that are necessary for any Exchange install.
 - b. Run Exchange 2003 `setup /forestprep`.
 - c. Run Exchange 2003 `setup /domainprep`.
 - d. Run Exchange 2003 `setup` (select the new server in an existing forest option).
 - e. Install Exchange service packs as necessary.
 9. Implement standard Exchange system performance tuning.
 - a. If the target Exchange server has 1 GB or more of physical memory installed, modify the `boot.ini` file to include `/3GB Switch` and `/USERVA=3030`. Refer to Microsoft Knowledge Base Article 328882—Exchange Memory Use and the `/3GB Switch`. For information on the `/USERVA=3030` switch, refer to "Allocating Memory by Using Boot.ini Switches" at <http://www.microsoft.com/exchange/techinfo/tips/memorytip01.asp>.

- b. Modify the system "HeapDecommitFreeBlockThreshold" Registry Key. Refer to Microsoft Knowledge Base Article 315407 for information on this registry setting.
10. Create a mailbox store on the new server.
11. Apply the same system, recipient, group, or security policies and limitations that were used in the old environment

Preparing for the mailbox move

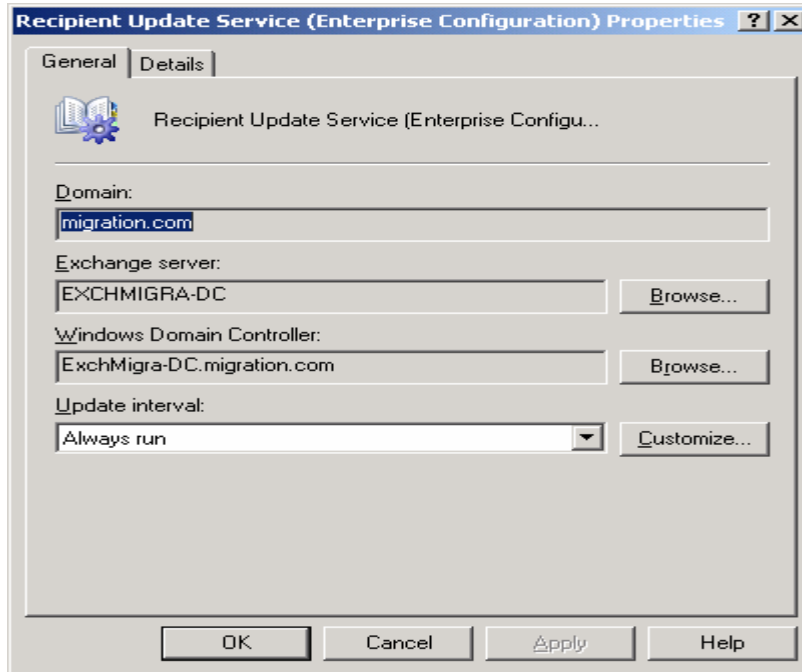
1. Advise users of the move and request them to clean their mailboxes by deleting unnecessary mail, using Microsoft Outlook aging tools, or both. The less data you must move, the more efficient the migration process will be. Additionally, reducing the mailbox database size streamlines the process if a restore of the original configuration is required.
2. Back up the existing exchange environment.
3. Change the default public store to be the new public store created on the 2003 server.
4. Use the PFMigrate utility to move public folders to the new environment. Information about using the PFMigrate utility can be found in Microsoft Knowledge Base Article 822895—Overview of the Public Folder Migration tool at <http://www.microsoft.com>.
5. Use Exchange System Manager to modify the Recipient Update Service to point to the new server.
 - a. In Exchange System Manager, expand the **Recipient Update Services** folder. Highlight the **Recipient Update Service**, and then right-click and select **properties**, as shown in Figure 9.

Figure 9



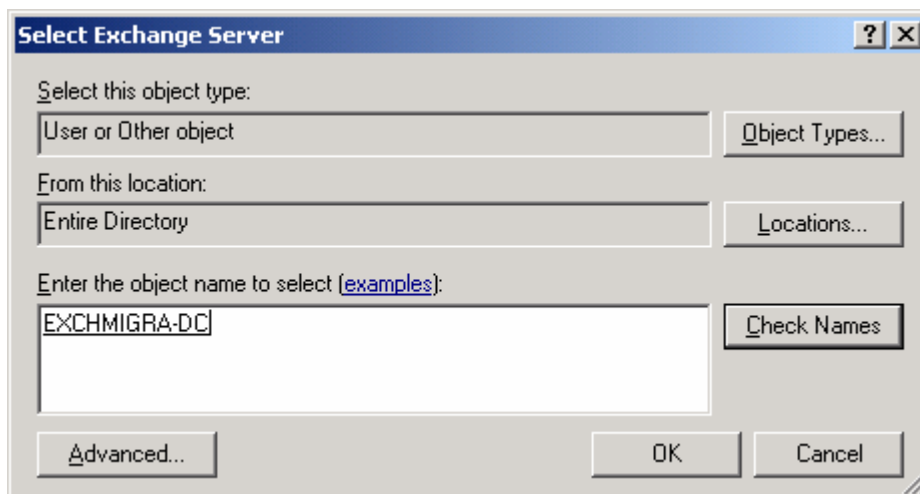
- b. In the Properties window, in the Exchange server field, select **Browse**, as shown in Figure 10.

Figure 10



- c. In the Enter the object name to select text box, highlight the name of the new Exchange 2003 server, and click **Check Names**. See Figure 11. If the name is accepted, click **OK**.

Figure 11



6. (Optional) Temporarily disable Exchange-aware antivirus programs. Testing showed that this action significantly improves migration time. Keep in mind that depending on the software used, there might be a performance impact when the antivirus program is re-enabled. During HP testing, re-enabling the antivirus software used did not significantly impact performance because the

Symantec software had the option to continue file system protection while disabling real-time scanning of email.

7. Temporarily turn on circular logging. In Exchange System Manager, this option is located in the storage group properties window. You must restart the Microsoft Exchange IS Service for this change to take effect.

NOTE

If you do not choose to use circular logging during the migration, for every gigabyte moved, an additional gigabyte is required for transaction logs. Verify that there is sufficient space for the transaction logging.

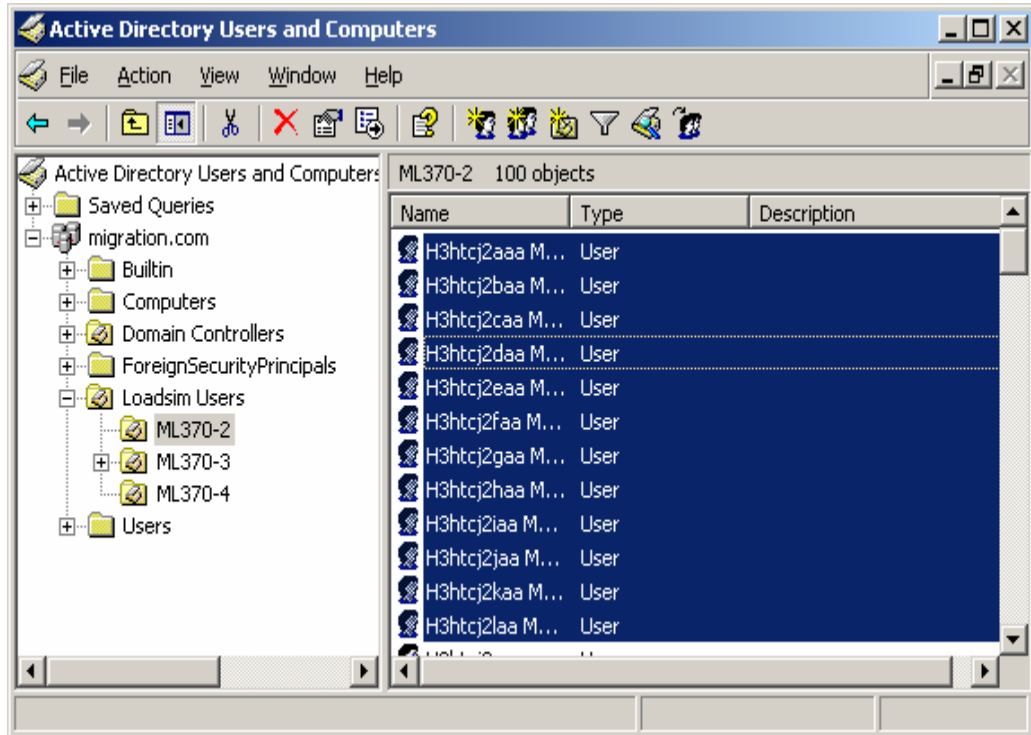
Another option is to perform incremental backups during the migration to truncate the log files. Keep in mind, however, that this option can have a negative impact on the write throughput performance on the target server.

Moving the mailboxes

It is important that the users' mailboxes are moved using Move Mailbox utility on the Exchange 2003 Server. The Move Mailbox utility has had significant improvements since the Exchange 2000 version, such as moving mailboxes in four streams at a time, improved error detection, and the ability to schedule the move. The following figures show the steps for using the Move Mailbox utility. In this test environment, the new Exchange 2003 server is also the Domain Controller; if this is not the case, the move mailbox utility can be started from the Exchange System Manager on the new server.

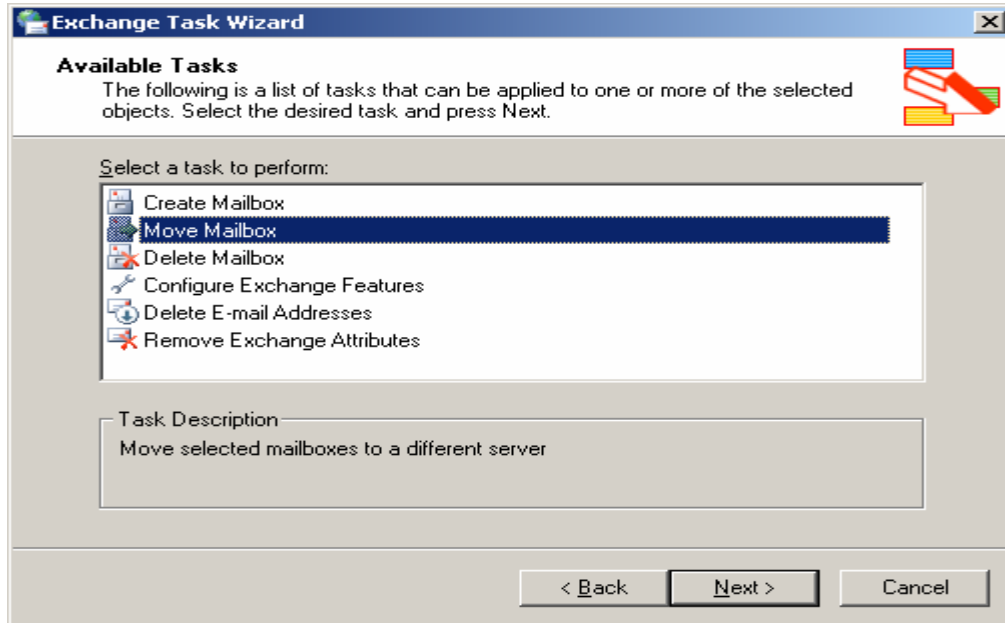
1. Start the Exchange Task wizard. In the Active Directory Users and Computers window, select users to be migrated. Right-click selected users, and select **Exchange tasks**.

Figure 12



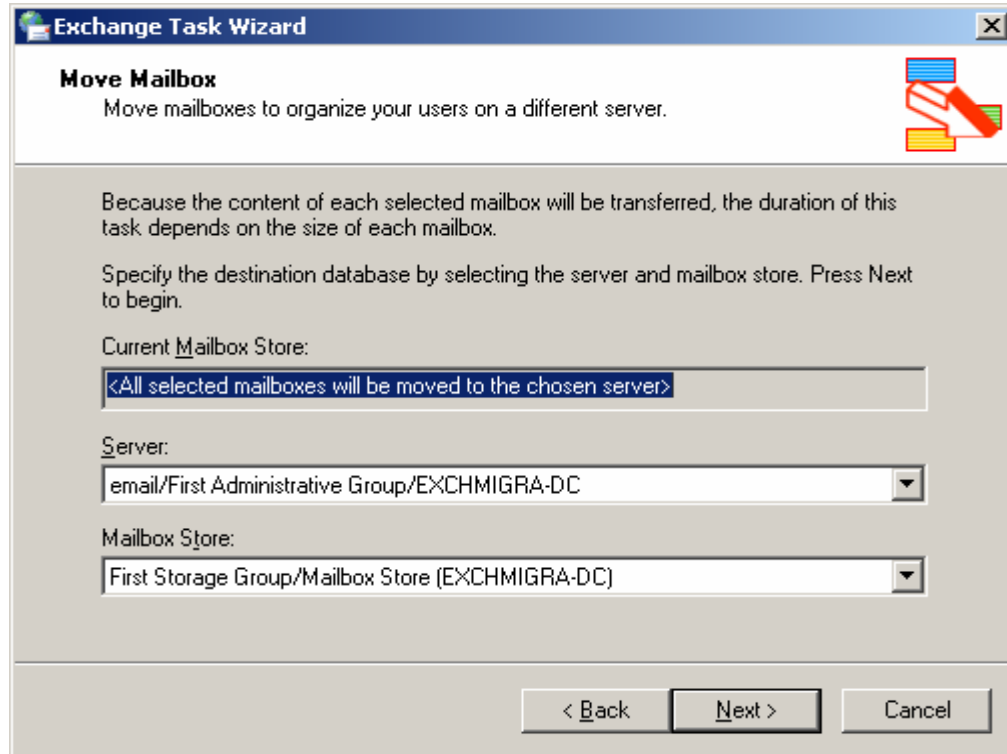
2. In Exchange Task Wizard, select **Move Mailbox** (see Figure 13), and then click **Next**.

Figure 13



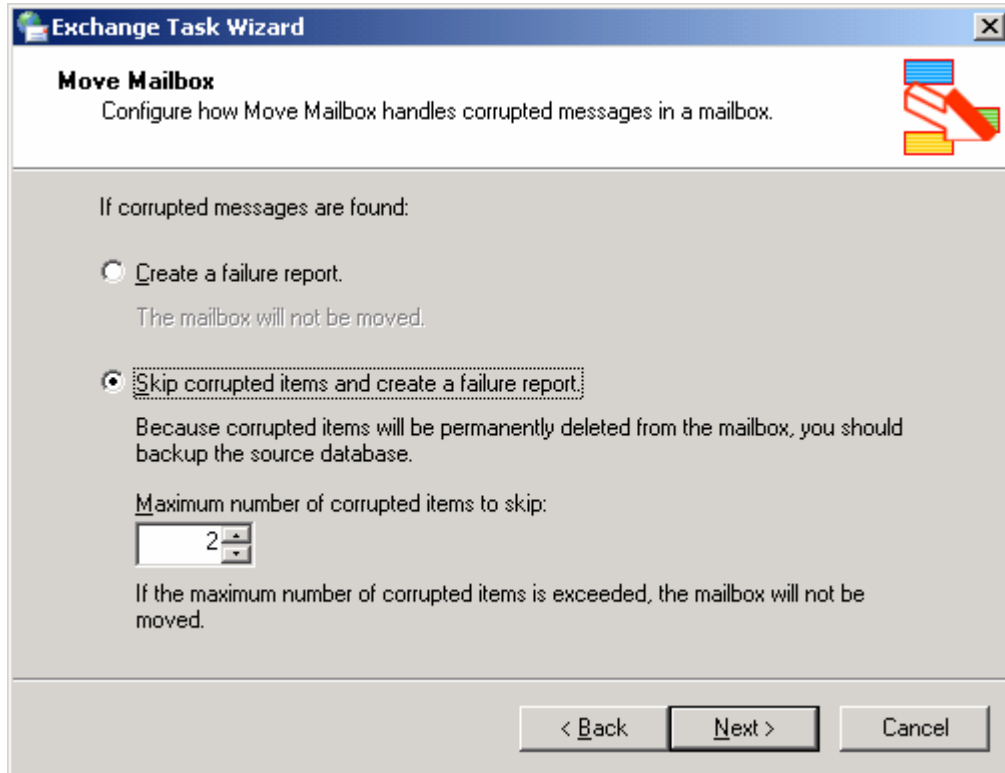
3. Select the new server in the drop-down lists, and then click **Next**.

Figure 14



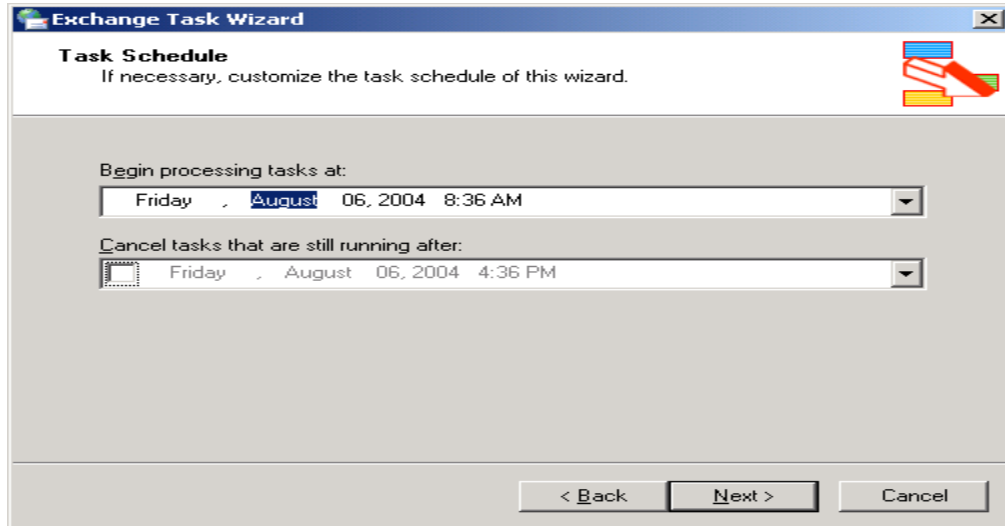
4. Select **Skip corrupted items and create a failure report**, and then click **Next**.

Figure 15



5. Select a time for the mailbox move, as shown in Figure 16. A period of least activity would be best, such as off hours. Keep in mind that individual users' mailboxes are taken offline during the move operation and will become available again when the individual mailbox move is complete. The move mailbox time varies, depending on network connectivity. See "Mailbox move durations" for move duration time experienced during testing.

Figure 16



6. Click **Finish**.

Decommissioning old servers

Decommissioning the old servers requires three steps. Be sure you follow these steps in sequential order.

1. Moving key roles and services
2. Moving existing connectors
3. Uninstalling old servers

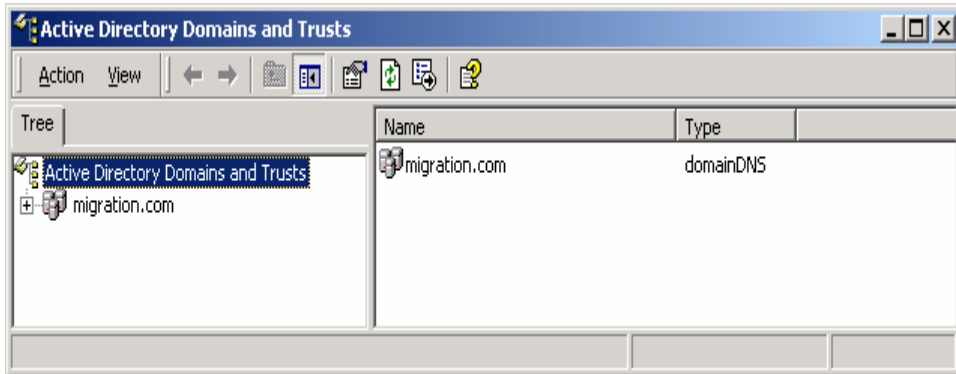
If the server was a Domain Controller and held any of the following roles, it moved to the new server before you can decommission the old servers:

- Domain Naming Master
- Schema Master
- RID Master
- Infrastructure Master
- PDC Emulator
- Global Catalog

To move these roles and services:

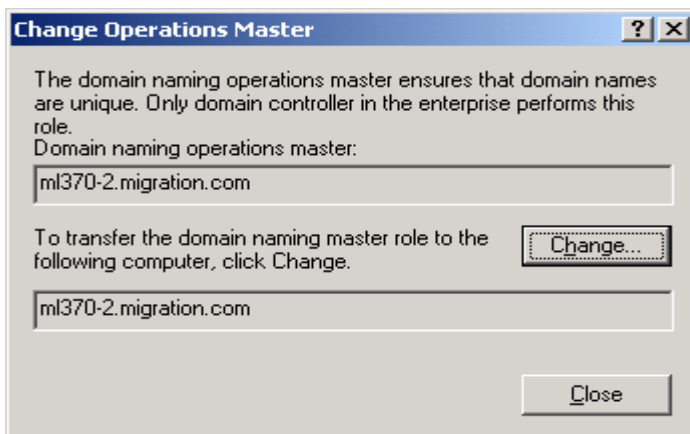
1. Make the new server the Domain Naming Master.
 - a. Right-click **Active Directory Domains and Trusts**, as shown in Figure 17, and select **Operations Master**.

Figure 17



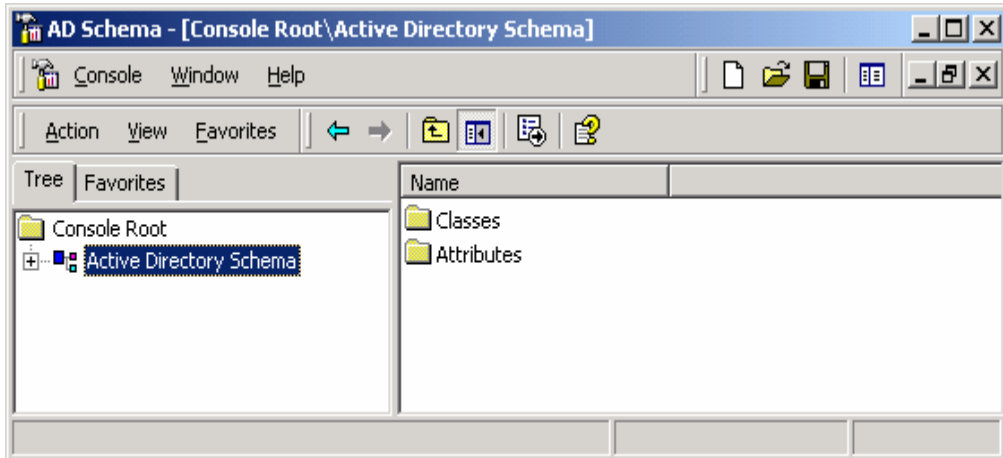
- b. Click **Change**, and select the new server as the Domain Naming Operations Master.

Figure 18



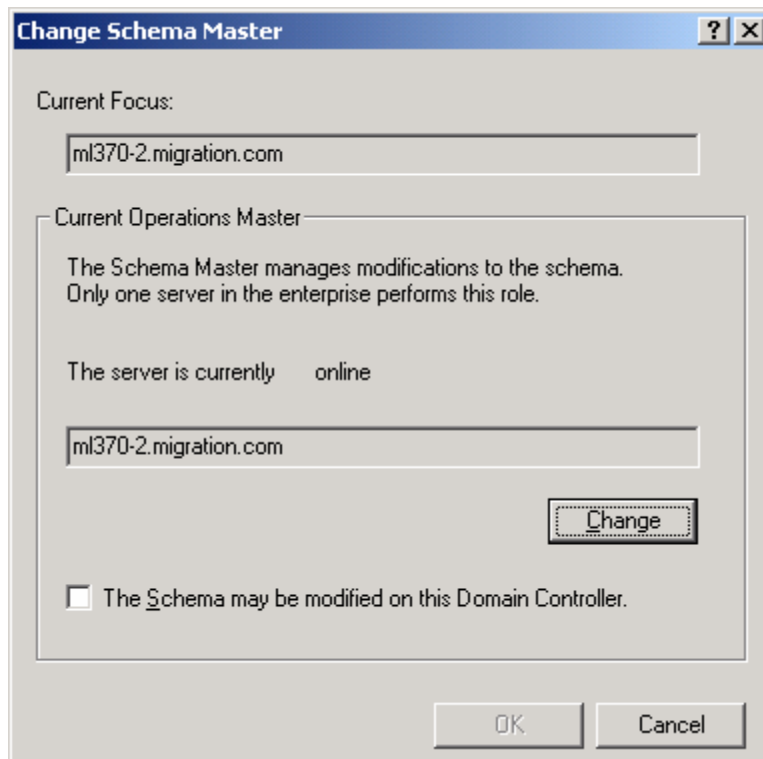
2. Make the new server the Schema Master.
 - a. Open the console containing the Schema plug-in that was installed in step 5 of the "Setting up the environment" section.

Figure 19



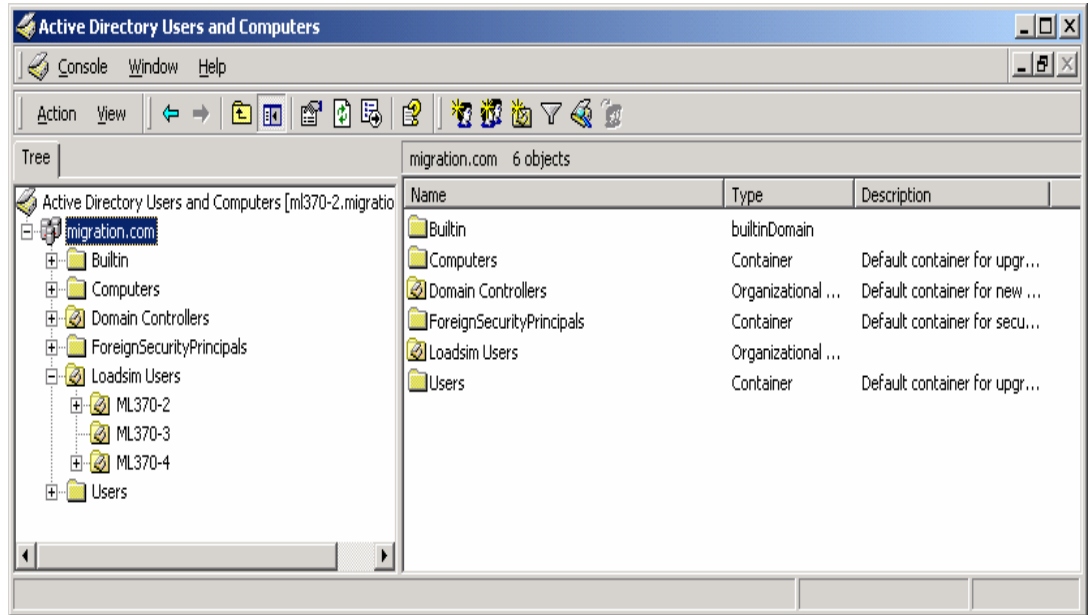
- b. Right-click **Active Directory Schema**, and select **Operations Master**. Click **Change**, and select the name of the new server.

Figure 20



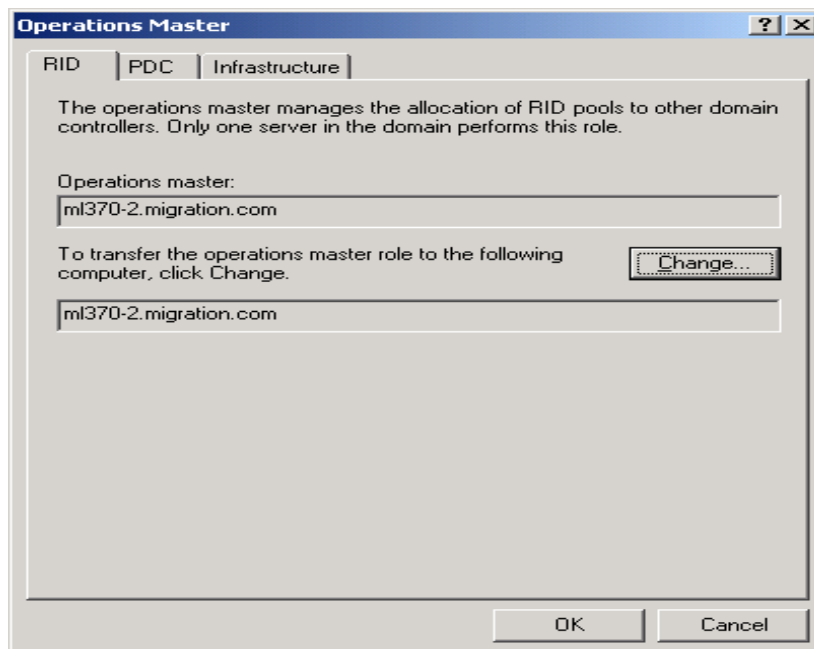
3. Make the new server the RID Master, Infrastructure Master, and PDC Emulator.
 - a. In Active Directory Users and Computers, right-click **migration.com**, and then select **Operations Masters**.

Figure 21



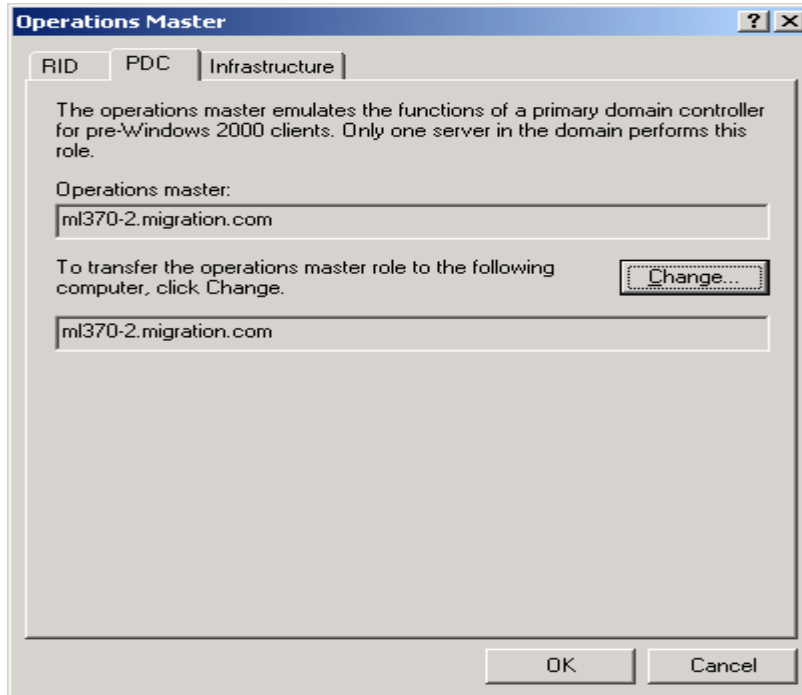
- b. Select the **RID** tab, and change the RID Master to new the server.

Figure 22



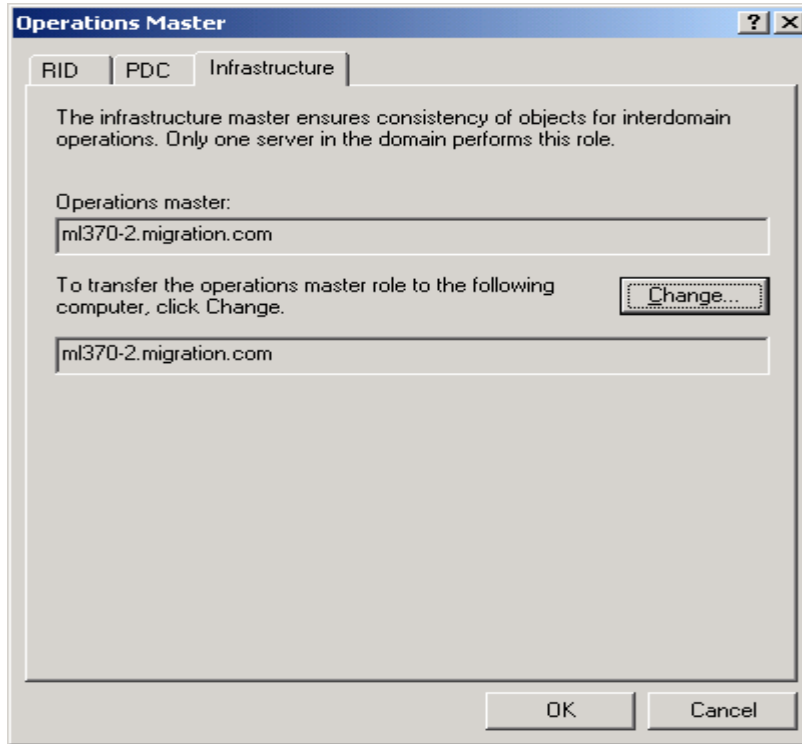
- c. Select the **PDC** tab, as shown in Figure 23. Change the PDC Master to the new server.

Figure 23



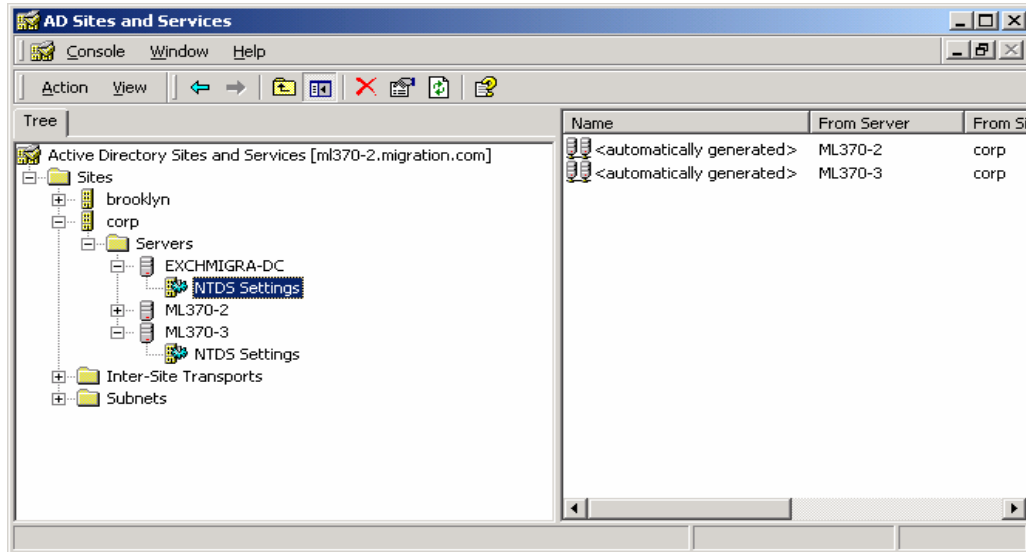
- d. Select **Infrastructure** tab. Change the Infrastructure Master to the new server, and select **OK**.

Figure 24



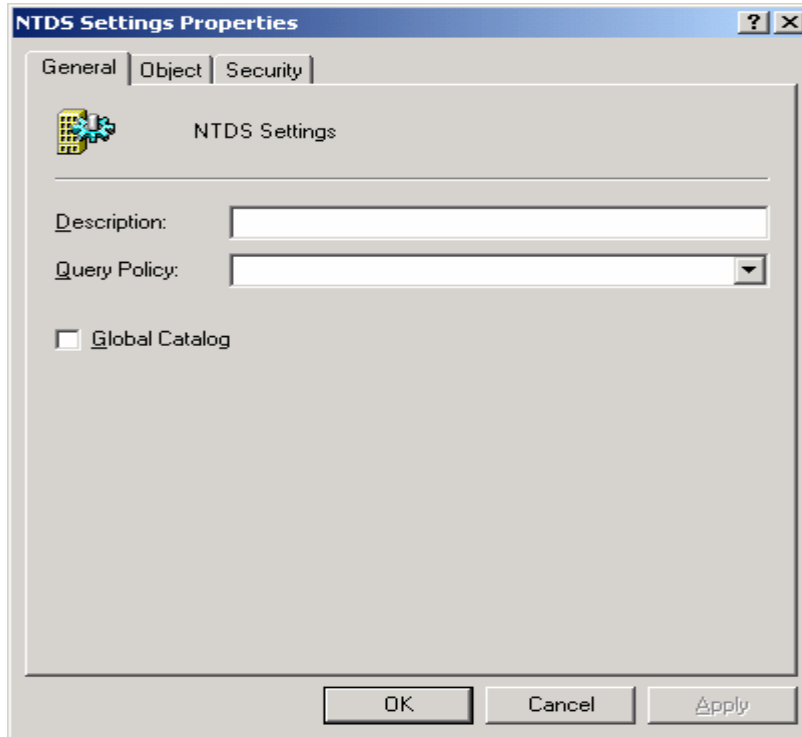
4. Configure the new server to become a Global Catalog.
 - a. Open the Active Directory Sites and Services console.
 - b. Expand **Sites and Servers** until you see the new server.
 - c. Right-click **NTDS Settings**, and select the **Properties** box.

Figure 25



- d. In the NTDS Properties window, select the **Global Catalog** checkbox so that the server can become a Global Catalog server.

Figure 26



This completes the key roles and services transfer.

5. Move existing connectors to the new Exchange server using Exchange System Manager. (It is important to note that two Exchange 2000 components, the Microsoft Mail connector and the cc:Mail connector are not supported in Exchange 2003. If these connectors are in use and are still required, it will be necessary to leave at least one Exchange 2000 Server in the environment to provide these services.)
6. Leave the old Exchange server up and running long enough to allow all users to connect to their new mail server at least once. As long as the old server is available when users attempt to connect, users will be redirected to the new location of their mailboxes and their Outlook profiles will be automatically updated. If any users do not connect before the server is removed, IT services will need to manually update the user's Outlook profile at the client desktop.
7. If the old server was also a domain controller, use dcpromo to demote the old server to a member server before removing it.
8. Uninstall Microsoft Exchange 2000 Server from the original servers.

Impact of migration and consolidation on Exchange users

Testing was done using the LoadSim 2000 default MMB2 profile. The MMB2 benchmark was developed for Exchange 2000 server performance measurement using the Microsoft LoadSim Messaging Application Programming Interface (MAPI) tool. HP, in collaboration with Microsoft, developed MMB2; the workload is characteristic of a heavy corporate MAPI mail environment. Results should be interpreted as a benchmark for comparing messaging throughput of various servers and configurations and should not be confused with deployment recommendations.

Mailbox move durations

Mailbox migrations were conducted in groups containing one-third of the total number of users to be migrated. Because the total number of users was evenly dispersed among the three servers that were to be decommissioned, all the users' mailboxes were moved from a server to be decommissioned as one group, one server at a time. (This is not a requirement. This data is intended to help assist in judging the amount of time the Move Mailbox utility would take to move a given number of mailboxes.)

Because the migration is done at the mailbox level and not at the database level, there is no limit to how small the number of users to migrate could be. Clearly, mailbox restores would take less time if you decide to migrate in small batches. Therefore, it might be a good idea to migrate a small test group at first. Deciding how many mailboxes depends on the implementation. You must keep a balance between using the ability to schedule a single batch and the "smaller is better" philosophy, which provides quicker restore of mailboxes if data loss occurs.

Tables 3 and 4 show the total time it took to migrate mailboxes during testing. Note the size of data being moved is approximately 20 MB per user mailbox, as is initialized by LoadSim when using the MMB2 profile. A simulated user load of two-thirds of the total number of users in the Exchange organization was applied during the mailbox migration.

Table 3. Total mailbox move time—Test 1 (MSA1000)

	Number of active users simulated during move	Number of mailboxes being migrated	Size of data being moved	Duration of mailbox migration (hours: minutes)
Migration 1	0	400	8.19 GB	2:08
Migration 2	400	400	8.19 GB	2:30
Migration 3	800	400	8.19 GB	2:43
Total		1,200	24.57 GB	7:21

Table 4. Total mailbox move time—Test 2 (EVA3000)

	Number of active users simulated during move	Number of mailboxes being migrated	Size of data being moved	Duration of mailbox migration (hours: minutes)
Migration 1	0	1,000	20.48 GB	7:05
Migration 2	1,000	1,000	20.48 GB	4:25
Migration 3	2,000	1,000	20.48 GB	8:42
Totals		3,000	61.44 GB	20:12

Note the differences between the mailbox move durations during the second test. The causes of these differences were identified using Windows Event Viewer.

- During migration 1 in the second test, antivirus software scans occurred. While the total mailbox move took longer, it was interesting to note that the average user downtime, the average time to move an individual mailbox, was not affected.
- During migration 2 in the second test, antivirus activity and Exchange system maintenance did not occur during the move.
- During migration 3 in the second test, Exchange database online maintenance occurred, which affected both the total period of mailbox move time and the individual mailbox move time. However, there were no significant changes in LoadSim scores for this test.

Table 5 shows the average time encountered to move one mailbox. Again, a simulated user load of two-thirds of the total users was applied during the mailbox migration.

Because the Exchange Mailbox Move utility automatically disconnects the user when starting a mailbox move, the average mailbox move time equates to the average time the users are unable to access their mailboxes.

Table 5. Average time to move one mailbox

	MSA1000 duration of mailbox migration (minutes)	EVA3000 duration of mailbox migration (minutes)
Migration 1	1.28	1.17
Migration 2	1.50	1.06
Migration 3	1.65	2.09

LoadSim scores

LoadSim scores primarily represent a measure of user response time. These scores are derived using server performance averages recorded during a four-hour steady state period of each test. A LoadSim 95th percentile score of less than 1,000 is generally considered a passing score. In the testing example, a LoadSim score of 32 implies that 95% of users would complete an exchange request in less than 32 milliseconds. All scores taken during the test were well below the unacceptable user response time limit. The response time experienced by HP simulated end users showed that they were not negatively affected by the migration.

In Table 6, the “Number of users running Load/LoadSim clients” column indicates the total number of users being simulated and the number of servers being used to generate load. For example, during migration, the number of users simulated was 800 and two servers were used to simulate the users (400 each). Two LoadSim scores were recorded in the “MSA1000 during move” column because each of the two clients will report a score.

Table 6. LoadSim scores test 1

	Number of users running Load/LoadSim clients	MSA1000 during move	Number of users/LoadSim clients	MSA1000 after migration
Migration 1	800/2	45 43	400/1	32
Migration 2	800/2	94 43	800/2	25 29
Migration 3	800/2	32 48	1,200/3	57 61 69

Table 7. LoadSim scores test 2

	Number of users/ LoadSim clients	EVA3000 during move	Number of users/ LoadSim clients	EVA3000 after migration
Migration 1	2,000/4	40	1,000/2	67
		54		60
		40		
		51		
Migration 2	2,000/4	88	2,000/4	32
		34		30
		79		34
		45		28
Migration 3	2,000/4	59	3,000/6	39
		74		34
		64		44
		81		40
				33
	43			

Appendix A—Performance data

The following table summarizes the test results for the final configurations.

Table 8.

Summary	MSA1000 test	EVA3000 test
Client load	1,200 users	3,000 users
Benchmark profile	MAPI Messaging Benchmark (MMB2)	MAPI Messaging Benchmark (MMB2)
Protocol	Exchange MAPI	Exchange MAPI
Length of steady state	4 hours	4 hours
Length of test	8 hours	8 hours
Transactions in total		
Total messages submitted (four-hour steady state)	13,186	80,213
Total messages recipients delivered (four-hour steady state)	29,214	326,371
Total messages sent (four-hour steady state)	13,186	80,213
Transaction load (average per minute)		
Messages submitted/min	54.9	330.5
Messages delivered/min	121.7	1358.8
Messages sent/min	54.9	330.5
Processor utilization		
Average processor utilization (four-hour steady state)	2.8%	10.7%
Disk array performance		
Avg. database disk transfers/s (four-hour steady state)	573	633
Avg. log disk transfers/s (four-hour steady state)	33	257
Avg. database disk bytes/s (four-hour steady state)	2,561,742	3,119,950
Avg. log disk bytes/s (four-hour steady state)	129,620	611,934

Appendix B—Reference configuration

The reference configuration is appropriate for the test scenarios, which did not exceed 3,000 users. Hardware purchases should be made with the assistance of an HP sales professional, who can appropriately size the configuration to fit specific organizational needs.

Table 9. HP ProLiant DL580 G2

Quantity	Part number	Description	Comments/notes
1	325132-001	HP ProLiant DL580 G2 X2.0GHz U.S. server with an Intel Xeon MP 2.0-GHz, 400-MHz processor, 1-MB L3 cache, and a standard 1024 MB memory. Rack server.	
2	321835-B21	2-GB Dual Channel PCIx FC HBA	
4	286713-B22	HP 36-GB, 10,000-rpm U320 Pluggable Hard Drive	For operating system and application only.
1	273915-B21	HP Smart Array 6402/128MB Controller	
1	202170-B21	HP 1024 MB PC1600 Reg SDRAM memory	
1	202171-B21	HP 2048 MB PC1600 Reg SDRAM memory	
1	203320-B21	HP Hot Plug Expansion Board Memory	
3	325252-B21	Intel Xeon 2.0-GHz, 1-MB 570G2/580G2 Processor	
1	339778-B21	HP RAID 1 Drive 1 Setting	
1	376911-001	HP CPe 3Y 4H 24x7 HW 500 Srs 4-Hour 24 Hour x 7 Day Coverage 3 Years	

Table 10. EVA3000 #1 components

Quantity	Part number	Description
1	338042-B21	42U EVA cab 60Hz ALL
1	344822-B21	EVA3000 2C2D-C CTO 8x72 GB/15k ALL
1	325584-888	EVA3000 CTO Flag Storage
20	293568-B23	FC HDD INT CTO 72 GB 15K Fact
1	T3589A	VCS HSV100 Media Kit 3.0a

Table 11. SAN fabric components—Use when EVA3000 is selected

Quantity	Part number	Description
2	AA980A	HP StorageWorks SAN Switch 2/8V power pack
16	300834-B21	500-m Optical Tran ALL
1	189715-003	HP OpenView Storage Management Appliance software
16	221692-B22	5-m SW LC/LC FC Cable ALL

Table 12. Software kits and licenses

Quantity	Part number	Description
1	165989-B25	SP WIN 1 LTU/CD 4.0C all
1	T2538BA	HP OpenView SOM 1.1 with I&S Svcs, doc, and media
3	T2539AA	HP OpenView SOM 1TB LTU

Table 13. MSA1000 #1 components

Quantity	Part number	Description
1	201723-B22	MSA1000
1	218231-B22	MSA1000 Controller
2	254786-B21	HP 256-MB Battery-Backed Cache Module
14	286778-B22	HP 72-GB, 15,000-rpm U320 Pluggable Hard Drive
2	286763-B21	MSA Hub 2/3

Table 14. Rack parts—Use when MSA1000 is selected

Quantity	Part number	Description
1	245161-B21	HP 10642 42U Standard Rack Pallet
1	221546-001	HP TFT5600RKM Integ 1U US Keyboard and Monitor
1	400336-001	HP 1x4 Port KVM US Switch Box
1	110936-B21	HP CPU - KVM Switch Box 12-ft/3.7-m Cable
4	253214-B21	HP 10K Qty-10 1U Graphite Blanking Panel
1	246099-B21	HP 10K Graphite Metallic 42U Side Panel
1	246107-B21	HP 10K Graphite 600mm Stabilizer Option Kit
1	252663-B21	HP 40-A High Voltage Modular PDU

Table 15. HP Services

Quantity	Part number	Description
1	HA109A3	HP CP 3Y Support Plus
14	HA109A3 699	For HP Internal Entitlement Purposes
1	HA109A3 8D4	Support—FC Host Bus Adapter
2	HA109A3 8NL	Support—SAN Switch 2/8V PP
1	HA113A1	HP CP Installation
1	HA113A1 527	Installation—Host Adapter Card/Router
2	HA113A1 564	Installation—Disk Systems/MSA/EMA
1	HA113A1 5DG	Installation—Secure Path 1 Host LTU
2	HA113A1 5GA	Installation—Low-end SAN/Edge Switch/HAFM

For more information

The following documents and locations provide information regarding successful deployment of Microsoft Exchange Server on HP products.

- HP Storage Solutions for Microsoft Exchange Server 2003
<http://www.hp.com/solutions/Microsoft/exchange/storage>
- MSA1000 Installation Guide
http://h20000.www2.hp.com/bizsupport/TechSupport/Resource.jsp?locale=en_US&taskId=115&prodSeriesId=377751&prodTypeId=12169
- EVA3000 Installation Guide
http://h20000.www2.hp.com/bizsupport/TechSupport/Resource.jsp?locale=en_US&taskId=115&prodSeriesId=315127&prodTypeId=12169
- “Windows applications may experience performance issues with EVA Virtual Disks during a heavy write load”
http://h20000.www2.hp.com/bizsupport/TechSupport/Document.jsp?objectID=PSD_OI040301_CW02&prodTypeId=12169&prodSeriesId=377751&locale=en_US

Microsoft

- Microsoft Exchange Server 2003 Deployment Guide
<http://www.microsoft.com/exchange>
- Microsoft Knowledge Base Article 822895—Overview of the Public Folder Migration tool
- Microsoft Knowledge Base Article 271547—Move Mailbox utility does not work when antivirus API is in use
- Microsoft Knowledge Base Article 315407—For information on the HeapDecommitFreeBlockThreshold Registry Key setting
- Microsoft Knowledge Base Article 328882—Exchange Memory Use and the /3GB Switch (For information on the /USERVA=3030 switch, refer to “Allocating Memory by Using Boot.ini Switches” at <http://www.microsoft.com/exchange/techinfo/tips/memorytip01.asp>.)
- Microsoft MMB2
<http://www.microsoft.com/exchange/techinfo/planning/2000/mmb2desc.asp>

Active Answers

- <http://www.hp.com/solutions/activeanswers>

© 2004 Hewlett-Packard Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Microsoft and Windows are U.S. registered trademarks of Microsoft Corporation. Intel, Pentium, and Xeon are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

5982-8353EN, Rev. 1 10/2004

