



NETAPP TECHNICAL REPORT

Deploying Lotus Domino 8.0.2 Server in an AIX and NetApp Storage System Environment Using NFS

John B. Spinks, NetApp
January 2009 | TR-3723-0109

EXECUTIVE SUMMARY

IBM Lotus Domino software provides world-class collaboration capabilities that can be deployed as a core e-mail and enterprise scheduling infrastructure, as a business application platform, or both. This technical paper describes the steps necessary to deploy and configure an IBM Lotus Domino server in an AIX® and NetApp® storage system environment using the NFS protocol.

TABLE OF CONTENTS

| | | |
|----------|---|-----------|
| 1 | PURPOSE AND SCOPE | 3 |
| 2 | ASSUMPTIONS | 3 |
| 3 | INFRASTRUCTURE OVERVIEW | 3 |
| 3.1 | AIX | 4 |
| 3.2 | USER ACCOUNTS | 4 |
| 3.3 | NETAPP STORAGE SYSTEM | 4 |
| 3.4 | NETWORK | 5 |
| 4 | USING LOTUS DOMINO WITH A NETAPP STORAGE SYSTEM | 5 |
| 4.1 | ADVANTAGES OF NETAPP STORAGE SYSTEMS | 5 |
| 4.2 | LOTUS DOMINO TRANSACTION LOGGING | 6 |
| 5 | CONFIGURATION OVERVIEW | 7 |
| 5.1 | CONFIGURING THE STORAGE SYSTEM | 7 |
| 5.2 | CONFIGURING THE AIX SERVER | 10 |
| 5.3 | INSTALLING THE LOTUS DOMINO SERVER | 12 |
| | SETTING UP THE LOTUS DOMINO SERVER | 13 |
| 6 | STARTING THE DOMINO SERVER | 14 |
| 6.1 | STARTING THE DOMINO SERVER IN THE FOREGROUND | 14 |
| 6.2 | STARTING THE DOMINO SERVER IN THE BACKGROUND | 15 |
| 6.3 | STARTING THE DOMINO SERVER BY USING THE JAVA DOMINO CONSOLE | 15 |
| 6.4 | STARTING THE DOMINO SERVER FROM A SCRIPT | 16 |
| 7 | TRANSACTIONAL LOG CONFIGURATION | 16 |
| 8 | CONCLUSION | 16 |
| | APPENDIX A: PREINSTALLATION CHECKLIST | 17 |
| A.1 | STORAGE SYSTEM | 17 |
| A.2 | HOST SERVER | 17 |
| A.3 | DOMINO SERVER | 17 |
| | APPENDIX B: DOMINO SCRIPTS | 18 |
| B.1 | DOMINO | 18 |
| B.2 | STARTSERVER | 19 |

1 PURPOSE AND SCOPE

This document describes the steps necessary to deploy and configure IBM Lotus Domino 8.0.x in a NetApp storage system and AIX environment. The main topics covered are:

- Advantages of using a NetApp storage system with Lotus Domino
- Configuring the AIX server for use with NetApp storage
- Installing the Lotus Domino software
- Starting the Domino server in the foreground, background, or Java™-based Domino console
- Scripts for automating the startup of Domino

2 ASSUMPTIONS

This document describes the deployment of Lotus Domino 8.0.x into an already functioning AIX 5.3 server and NetApp storage system environment. We therefore assume that you are familiar with Domino installation and administration and the basic operation of a NetApp storage system and network protocols such as NFS, iSCSI, and FCP. We also assume that you have basic AIX administration skills.

NetApp recommends that you read the Domino installation documentation for your particular operating system and follow its steps to install and configure your Domino server. If the Domino documentation and this technical report contradict each other, assume that the Domino documentation is correct. Please inform this report's author if you discover any such contradictions.

3 INFRASTRUCTURE OVERVIEW

To produce this report we used the following infrastructure components to set up Lotus Domino with a storage system:

- AIX server: IBM P520
- NetApp FAS3070 storage system running Data ONTAP® 7.2 with:
 - Onboard 10/100/1000 Ethernet connection
 - Gigabit Ethernet adapter

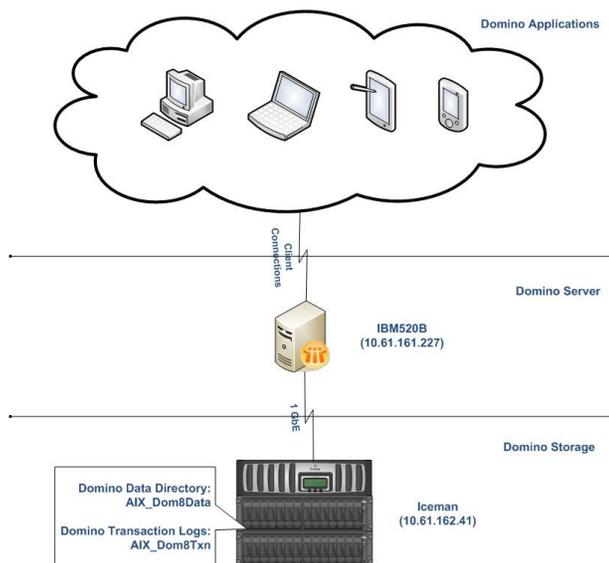


Figure 1) The main infrastructure components of a Lotus Domino on NetApp storage system environment.

3.1 AIX

NetApp supports Lotus Domino 6.5 and later on Microsoft® Windows®, UNIX®, Linux, and AIX. NetApp also supports Domino partitioning and Domino clustering for high availability and disaster recovery.

For this technical document we used Lotus Domino 8.0.2 enterprise server for AIX. You should make sure that the server meets the minimum requirements for running Lotus Domino. For customers who plan to install Lotus Domino on a NetApp storage system cluster, Lotus Domino clustering must be implemented for failover. In cluster implementations, separate volumes are required for each Domino data directory¹.

3.2 USER ACCOUNTS

For this technical report, a user must be created on both the AIX server and the NetApp storage system. This user must be set up identically on both systems and have administrator-level privileges. For more information see section 5, "Configuration Overview."

3.3 NETAPP STORAGE SYSTEM

Any currently supported NetApp storage system that can run Data ONTAP 7.0 or later will support Lotus Domino version 6.5 or later.

A NetApp storage system running Data ONTAP 7G supports a virtual storage layer called flexible volumes, also known as FlexVol® volumes. A FlexVol volume is created within an aggregate and is loosely coupled with its containing aggregate. Flexible volumes provide greater performance than traditional volumes and can grow and shrink as needed. Data ONTAP makes it easy to control the placement of related Domino file systems on FlexVol volumes. For more information about creating and managing FlexVol volumes, refer to the `vol` command in the NetApp documentation available online at [NOW™ \(NetApp on the Web\)](#).

A key to ease of use and manageability of a Domino server housed on a NetApp storage system is that the entire Domino environment can be stored on one or more flexible volumes. This configuration requires minimal attention by Domino administrators and system administrators; allowing the storage system to manage the physical data storage provides high performance and availability. However, there are a few storage system physical design considerations to address so that these benefits are not compromised:

- Lotus Domino best practices for local drives should be applied to LUNs as well.
- The root volume should be its own volume. The root volume can be a traditional volume or a FlexVol volume. For extra reliability and flexibility, NetApp recommends having a mirrored root volume.
- NetApp strongly recommends that all of the Domino files be stored on a volume on the NetApp storage system that is not the root volume.
- NetApp strongly recommends that a large aggregate be used whenever possible for performance reasons. Multiple FlexVol volumes required for a Domino environment can be created within a single large aggregate.
- Domino transaction log files should be kept on a different volume from the volumes housing the Domino data directory. Also, Domino data and transaction logs should reside on separate flexible volumes.

Note: If database and transaction logs are housed in different directories on the same flexible volume, roll-forward recovery for Domino becomes impossible. Using SnapRestore® to restore the volume will return the logs to the same state they were in at the time the Snapshot™ copy was created. As a result, log data generated after creation of the Snapshot copy will be lost.

¹ For a list of supported configurations, see the following IBM Web site: <http://www-1.ibm.com/support/docview.wss?rs=0&uid=swg27005236>.

- If NDMP is used to back up Domino data residing on the NetApp storage system, multiple backup tasks can be spawned. It is simpler and more efficient to create a volume, and let the storage system manage the storage.

3.4 NETWORK

To use the NetApp storage system, a network connection must first be established between the Domino server and the NetApp storage system. The type of connection you establish depends on the type of environment that you are using.

NetApp strongly recommends using Gigabit Ethernet to support your Lotus Domino database environment on the NetApp storage system.

The following naming conventions are used throughout this paper:

- The name of the NetApp storage system is: iceman.
- The IP address of the NetApp storage system is: 10.61.162.41.
- The server provides access to the storage using the NFS protocol. The name of the server hosting Lotus Domino server is: ibm520b.
- The IP address of the host server is: 10.61.161.227.
- The target volume on the storage system for Domino data is: AIX_Dom8Data.
- The target volume on the storage system for Domino logs is: AIX_Dom8Txn.
- The virtual disk for Domino data is mounted at: /Domino.
- The virtual disk for Domino transaction logs is mounted at: /DomTxn.

In production environments, NetApp recommends multiple switches and virtual interfaces (VIFs) for scalability and network redundancy.

4 USING LOTUS DOMINO WITH A NETAPP STORAGE SYSTEM

There are several advantages to storing Lotus Domino data and transaction logs on a NetApp storage system. This section examines some of those advantages and explores the steps that must be taken to enhance the overall Domino performance.

4.1 ADVANTAGES OF NETAPP STORAGE SYSTEMS

Running Domino with databases and transaction log files stored on a NetApp storage system has several advantages:

- **Extremely fast backup:** Snapshot copies can be created in a matter of seconds, regardless of the size of the Domino database or the level of activity on the NetApp storage system used. This reduces the Domino backup window from hours to seconds and allows Domino administrators to take frequent full backups without having to take the Domino server offline.
- **Quick recovery:** Using the Data ONTAP SnapRestore command, an entire Domino environment can be restored in a matter of seconds. No data copying is involved, so an incredible amount of time is saved because the file system is put back to the original state it was in at the time the Snapshot copy was created. Data ONTAP 7G supports 255 Snapshot copies per WAFL® volume. The ability to store a large number of low-impact, frequently created Snapshot copies brings the time needed to perform a roll-forward recovery operation down to minutes or seconds. In many circumstances it allows the Domino administrator to restore the Domino server immediately without the need to restore from tape.
- **High availability:** The need for 24x7 availability is fast becoming a reality for organizations of all sizes. Organizations cannot tolerate scheduled downtime, nor can they afford extended periods of slow system response caused by traditional Domino server backup methods. NetApp Snapshot technology that can create Domino server backup in a matter of seconds without bringing the server down can be used as complementary technology for higher system uptime.

- **High reliability:** The RAID architecture used for NetApp storage systems is unique and provides greater reliability than many traditional RAID implementations. If a disk in a NetApp RAID group fails, it is reconstructed automatically without any user intervention. Additionally, NetApp supports RAID-DP® architecture. For more details about RAID-DP, read *NetApp Data Protection: Double Parity RAID for Enhanced Data Protection with RAID-DP*.
- **No impact on system response time during backup:** A Snapshot copy is simply a picture of the file system at a specific point in time. Therefore, creating a Domino server backup by using Snapshot doesn't involve actual data movement (data I/O), so the backup process has virtually no performance impact on system response time.
- **Minimum storage requirement:** Two Snapshot copies created in sequence differ from each other by the blocks added or changed in the time interval between their creations. This block-incremental behavior limits associated storage capacity consumption.
- **Load balance:** Data load balancing is performed by storage; therefore, many of the tasks associated with load balancing between multiple Domino directories can be eliminated. Because of the high performance of the NetApp storage system, only one volume needs to be defined for each directory used.
- **Compaction of Domino databases:** Compaction does not need to be performed as often, because of the way that WAFL manages the space on the storage system volume.

4.2 LOTUS DOMINO TRANSACTION LOGGING

Lotus Domino supports transaction logging. With this feature enabled, the system captures database changes and writes them to the transaction log. Then if a system or media failure occurs, you can use the transaction log and a previously created backup to recover your Domino databases.

Transaction logging provides three main benefits:

- **No fix-up required:** In most cases, you no longer need to run the fix-up task to recover databases after a system failure, which results in faster server restarts. Fix-up must check every document in each database, while transaction log recovery applies or undoes only those transactions not written to disk at the time of the system failure.
- **Superior performance:** Transaction logging saves processing time because it allows Domino to defer database updates to disk during periods of high server activity. Transactions are recorded sequentially in the log files, which is much quicker than database updates to random, nonsequential parts of a disk. Because the transactions are already recorded, Domino can safely defer database updates until a period of low server activity.
- **Simplified backup process:** Using transaction logging simplifies your daily backup procedure. You can use Snapshot to perform daily incremental backups of the transaction logs, rather than perform full database backups.

Lotus Domino's serialized log writes play to one of the strengths of the NetApp storage system. WAFL is very efficient at writing data to a storage system volume. The storage system's NVRAM cache effectively groups incoming data and writes it out to disk in an efficient manner.

Lotus Domino supports three types of transaction logging, as described in Table 1.

Table 1) Domino transaction logging types.

| Style | Description |
|----------|---|
| Circular | Circular logging is the default transaction logging type. It uses one transaction log file of a predefined size (192MB to 4GB). The transaction log size is defined in the server document. The circular logging overwrites the old data when the defined size is reached with the new transaction. Domino writes the old transaction log data to the disk before it is overwritten. This method helps in server crash recovery but limits the Domino administrator's ability to perform roll-forward recovery because the old logs are overwritten. Circular logging does not support incremental backups. |

| | |
|----------|---|
| Linear | Similar to circular logging but allows a log space larger than 4GB. |
| Archival | This method of transaction logging doesn't overwrite the transaction log file. After a file has reached its defined size, Domino creates a new transaction log file. After all the data is committed to the database, the old transaction log file becomes available for archiving. For archiving the transaction log file, you can use a third-party tool such as Tivoli or your custom scripts. Archive logging enables rollback, media recovery, and point-in-time recovery. |

NetApp requires data and transaction logs to be stored on separate volumes.

5 CONFIGURATION OVERVIEW

This technical report specifically addresses a configuration on an NFS environment. For FAS or iSCSI environment configurations, please refer to the appropriate sections of NetApp TR-3272, [DB2 Enterprise Server Edition V8 for UNIX: Integrating with a NetApp Storage System](#). Also see the [IBM System Storage N series Fibre Channel and iSCSI Configuration Guide](#).

5.1 CONFIGURING THE STORAGE SYSTEM

1. Set up and install Data ONTAP.

Install Data ONTAP on your NetApp storage system if it is not already installed. For Data ONTAP installation and set up instructions, see the *Software Setup Guide* on NOW.

2. Activate the appropriate license keys.

On the NetApp storage system, file access protocols FCP, iSCSI, NFS, and CIFS are licensed services. You need to enable the appropriate service by activating license keys for the protocol you intend to use. The license keys can be activated by executing the following command from the NetApp storage system:

```
License add [LicenseCode]
```

Where

- *LicenseCode* identifies the product license key you obtained from NetApp.

Note: Parameters shown in angle brackets (< >) are optional. Parameters or options shown in square brackets ([]) are required. Options shown in curly brackets ({ }) are mutually exclusive and one value must be selected. A comma followed by ellipses (...) indicates that the preceding parameter can be repeated multiple times.

For example, to activate the license code 123XYZABCD obtained from NetApp for NFS, you would execute the following command on the storage system:

```
license add 123XYZABCD
```

3. Update the `/etc/host` file on the storage system.

To make sure that names are resolved properly, update the `/etc/host` file to include the IP address of the Domino server. The easiest way to update this file is by using FilerView®.

To use FilerView to update the `host` file, follow these steps:

- (1). Open an Internet browser—we recommend Internet Explorer.
- (2). Enter the IP address of your NetApp storage system, followed by `/na_admin`.

For our storage system, iceman, the IP address is 10.61.162.41:

```
http://10.61.162.41/na_admin/
```

- (3). When the page loads, click the FilerView icon.



FilerView® helps you configure and monitor your filer.

- (4). When prompted, log in to your NetApp storage system using the appropriate credentials.
- (5). In the left pane, click Network to expand the options.
- (6). Under Network, click Manage Hosts File.
- (7). In the right pane, click in the text box and then click Insert.
- (8). Fill in the requested information:
 - IP Number [10.61.161.227]
 - Official Host Name [ibm520b]
 - Aliases
 - Comment
- (9). Click OK to save the changes to the `host` file.

This completes updating the `host` file.

4. (Optional) Enable `rsh` access for the database server.

To use the `rsh` (remote shell) command from the Domino server, you need to perform two steps. First, enable the `rsh` option on the storage system by executing the following command:

```
options rsh.enable on
```

Note: You can execute commands through FilerView by expanding the Filer section and then clicking Use Command Line.

Add the database host and user name to the `/etc/hosts.equiv` file found on the storage system. Again, the easiest way to add this information to the `hosts.equiv` file is to use FilerView.

To use FilerView to update the `hosts.equiv` file, follow these steps:

- a. Follow steps 3a–3d.
- b. In the left pane, click Security to expand the options.
- c. Under Security, click Manage Rsh Access.
- d. In the right pane, click in the text box and then click Insert.
- e. Fill in the requested information:
 - Host name or IP
 - User (on remote host)
 - Comment
- f. Click OK to save the changes to the `hosts.equiv` file.

This completes updating the `hosts.equiv` file.

5. Create space on the NetApp storage system. To create space on the NetApp storage system, you need to create aggregates and flexible volumes. An aggregate is a physical pool of storage at RAID level; it can be created by using FilerView. There are two ways you can create an aggregate: one using command line and the second using FilerView.

- (1). In order to create an aggregate using command line, you need to execute the following command on the NetApp storage system:

```
aggr create [AggrName] -f -t {raid4 | raid_dp} -r [RaidSize]
[nDisk]@[DiskSize] | -d <disk1, disk2,..,diskn>
```

Where

- `AggrName` identifies the name assigned to the aggregate.

- `RaidSize` identifies the size of the raid group that will be created by the command implicitly.
- `nDisk` identifies the number of disks that are going to be used for the aggregate.
- `DiskSize` identifies the size of the disks that are being used for the aggregate.

For example, to create an aggregate named `aggr1` that has eight 144-Gig disks in it and that uses RAID-DP, you would execute the following command on the storage system:

```
aggr create aggr1 -r 8 8@144g -t raid_dp
```

(2). To create an aggregate using FilerView, follow these steps:

- Follow steps 3a–3d.
- In the left pane, click **Aggregates** to expand the options.
- Under **Aggregates**, click **Add**.
- Follow the steps in the wizard to create the new aggregate.

A FlexVol volume is a logical storage container inside an aggregate. It can be as small as a few megabytes and as large as the aggregate itself. A FlexVol volume also can be created by using FilerView or command line.

(1). From command line, a FlexVol volume can be created using the following command:

```
vol create [VolName] [AggrName] [VolSize]
```

Where

- `VolName` identifies the name assigned to the FlexVol volume that is being created.
- `AggrName` identifies the name assigned to the aggregate.
- `VolSize` identifies the size of the volume in terms of MB, GB, TB, etc.

For example, to create a flexible volume named `AIX_Dom8Data` that is 100GB in size and that resides in the aggregate named `aggr1`, you would execute the following command on the storage system:

```
vol create AIX_Dom8Data aggr1 100GB
```

(2). To create a FlexVol volume using FilerView, you need to follow these steps:

- Follow steps 3a–3d.
- In the left pane, click **Volumes** to expand the options.
- Under **Volumes**, click **Add**.
- Follow the steps in the wizard to create the new FlexVol volume.

6. Disable the automatic Snapshot feature.

Normally, a database is backed up based on a user-defined schedule. Therefore NetApp recommends that you turn off the automatic Snapshot feature for any volume to be used for the database and its transaction log files. The automatic Snapshot feature can be turned off by using FilerView.

To disable the automatic Snapshot feature, follow these steps:

- Follow steps 3a–3d.
- In the left pane, click **Volumes** to expand the options.
- Under **Volumes**, click **Snapshots** to expand the options.
- Under **Snapshots**, click **Configure**.

- e. In the right pane, from the drop-down list beside Volume, select the volume to configure.
The settings automatically refresh to reflect the settings of the selected volumes.
- f. In the right pane, locate Scheduled Snapshots and clear the checkbox next to Scheduled to disable the scheduled Snapshot copy.
- g. Click Apply at the bottom of the right pane to save your settings.
Repeat this step and turn Auto Snapshot off for all volumes that are to be used for the database.

7. If NFS is used, export the volumes.

To access the volumes on a storage system using the NFS protocol, you must export them. A volume can be exported by adding an entry to the `/etc/exports` file found on the storage system and giving the database server appropriate access to it. You can use FilerView for this purpose.

To export the volumes for NFS, follow these steps:

- a. Follow steps 3a–3d.
- b. In the left pane, click NFS to expand the options.
- c. Under NFS, click Add Export.
- d. Follow the steps in the wizard to export the volume.
- e. Repeat this step and create an export entry for all volumes to be used for the database.

5.2 CONFIGURING THE AIX SERVER

This section addresses the configuration of the AIX server.

1. Log in to the server as a standard user.
2. SU to root.
3. Add the IP address and name of the NetApp storage system to the `/etc/hosts` file on the AIX server. To do this, you must use a text editor on the AIX server. For this report we used the vi text editor. You also need to use the vi text editor to append entries to several other example files in this report.

To use the vi text editor, enter the following command:

```
vi /etc/hosts
```

The entries in the `/etc/hosts` file should look similar to the following:

```
[StorageSystemIP] [StorageSystemName]
```

Where:

- *StorageSystemIP* identifies the network IP address assigned to the storage system.
- *StorageSystemName* identifies the name assigned to the storage system.

For example, to add the iceman storage system, which has the IP address 10.61.162.41, to the `/etc/hosts` file, you would enter:

```
10.61.162.41 iceman
```

4. You should also create a group and a user account to manage your Domino server. In AIX, user accounts and groups are created using the AIX System Management Interface Tool (SMIT) or command line.

For the purposes of this paper we will use the command line. If you wish to use SMIT, type SMIT at the command line and follow the prompts.

Create a group named “notes” and a user named “notes.”

- a. Create a group named “notes”:

```
mkgroup notes
```

- b. Create a user named "notes" that is a member of the notes group and has a home directory of /Domino:

```
mkuser -a group=notes home=/Domino notes
```

- c. Set the password of your new user "notes":

```
passwd notes
```

5. Create mount points to mount storage system volumes. To create mount points, execute the following command on the Domino server:

```
mkdir [MountPoint]
```

Where

- *MountPoint* identifies a directory path on the Domino server that is used for mounting a FlexVol volume.

For example, to create a mount point named /mnt/domdata, you would execute the following command on the Domino server:

```
mkdir /mnt/domdata
```

Repeat this step and create a mount point for each FlexVol volume to be used for the Domino server.

6. Make volume mounts permanent.

You can mount volumes simply by issuing mount commands but these mount entries are not persistent and after reboot the volumes will not be available. In order to make mount points persistent, you need to add the mount entries to the /etc/filesystems file with the appropriate option.

- a) Append an entry for each FlexVol volume to the /etc/filesystems file found on the database server. The entry should look similar to the following:

```
/MountPoint
Dev          ="/vol/[VolName]"
Vfs          =nfs
Nodename     =[StorageSystemName]
Mount        =false
Options      =<rw,bg,hard,nointr,proto=tcp,vers=3,rsize=32768,wsiz=32768,time0=600>
Account      =false
```

Where

- *StorageSystemName* identifies the name assigned to the storage system.
- *VolName* identifies the name assigned to a FlexVol volume on the storage system.
- *MountPoint* identifies a directory path on the database server that is used to mount a FlexVol volume.

For example, to mount a FlexVol volume named *AIX_Dom8Data* on a mount point named /Domino, you would add the following line to the /etc/filesystems file found on the database server:

```
/Domino:
dev          = "/vol/AIX_Dom8Data"
vfs          = nfs
nodename     = 10.61.162.41
mount        = false
options      = rw,bg,hard,nointr,proto=tcp,vers=3,rsize=32768,wsiz=32768,timeo=600
account      = false
```

- b) After adding the entries to the `/etc/filesystems` file, you need to mount and make the storage system volumes available by executing the following command on the database server:

```
mount [MountPoint]
```

Where

- *MountPoint* identifies a directory path on the database server that is used to mount a FlexVol volume.

For example, to mount a NetApp storage volume named `domdata` on a mount point named `/mnt/domdata` and make it available, you would execute the following command on the database server:

```
mount /Domino
```

Repeat this step for each FlexVol volume to be used for the Domino database.

- c) In order to create Domino databases on the storage system volumes, the Domino user should have ownership of the mounted file systems. You need to change ownership for each mounted FlexVol volume that is used for the database by executing the following command on the server:

```
chown -R user:group [MountPoint]
```

Where

- *MountPoint* identifies a directory path that is used to mount the FlexVol volume on the database server.

For example, to grant ownership of a file system mounted on the mount point named `/Domino` to the user named `notes`, you would execute the following command on the database server:

```
chown -R notes:notes /Domino
```

5.3 INSTALLING THE LOTUS DOMINO SERVER

At this step we assume that you have acquired the appropriate software either on CD-ROM or as an extractable `tar` file. For this report, version 7.0.3 of the Domino server was downloaded by the root user into a folder called `software`. The downloaded file is named `Domino_8.0.2_64bit_AIX_C1K3BEN.tar`. To extract this file, execute the following command:

```
tar -xvf Domino8.0.2_64bit_AIX_C1K3BEN.tar
```

Domino Installation

Change the directory to the extracted directory (`/aix64/Domino`) where the install file was placed.

To begin the installation, execute the following command on the Domino server:

```
./install
```

Follow the installation wizard steps and complete the Domino Installation.

The CheckOS Tool

The CheckOS Tool is a script installed during the Domino installation process. This tool is used to verify that the operating system has all of the patches needed to run your version of Domino.

To use the CheckOS tool, you must be logged in to the server as the root user and you must be in your Lotus binary directory. The default directory is `/opt/ibm/lotus/bin`. If you are following along in this paper, the CheckOS tool will be installed in `/Domino/lotus/bin`.

To start the CheckOS tool, execute the following command:

```
./checkos
```

Here is an example of the command being run:

```
# ./checkos
```

For the latest patch DB please go to <http://www.lotus.com/ldd/checkos>.

This will check the Operating System level and tell you what is missing. Note, no patch list if all patches are present.

With AIX we check for APARS and patches separately, you could be missing one and not the other.

You are missing the following AIX APARS: if no list appears you have all APARS:

```
OS: AIX 5.3.0.0
```

```
MACHINE: Power
```

```
NOTES: Release 7.0
```

```
PATCH DB: June 1, 2005
```

The OS appears to have the correct patches.

```
#
```

SETTING UP THE LOTUS DOMINO SERVER

1. Log in as the Domino user.

The first thing that you need to do before running setup is to log out of your server and log back in as the Domino user. For this report, we used the user notes.

Set the PATH environment variable.

You need to adjust the shell environment for the Domino user. The PATH environment variable identifies directories in which binaries are located, making it easier to run these binaries.

Next you add the Domino binary directory [/Domino/lotus/bin] to the PATH.

Please note that the default directory is: /opt/ibm/lotus/bin.

Enter the following at the command line:

```
export PATH=$PATH:/Domino/lotus/bin
```

Note: AIX is case sensitive, and PATH must be uppercase.

You can verify that this command was executed correctly in two ways:

Enter **echo \$PATH** at the command prompt to display the contents of the PATH environment variable on the screen.

Enter **which server** and make sure that the Domino path that you exported is displayed.

2. Set up the Domino server.

You have two options for setting up your Domino server—local and remote. Starting the setup for each is a little different, but once the setup process begins everything else is the same regardless of the method used. The following paragraphs discuss how to start each of the two methods.

Local Setup

All you need to do to start the local server setup is to be logged on as the Domino user on the local server. Make sure that you are in the Domino data directory (the same directory as the `notes.ini` file). To start the Domino server setup, execute the following command:

```
/Domino/lotus/bin/server
```

Continue with the Domino server setup in “Welcome to Domino Server Setup,” later in this section.

Remote Setup

For this report, we used remote setup. The biggest advantage of the remote server setup option is that it runs on your local workstation and allows you to download the server, administrator, and certifier ID files directly to your workstation.

To use the remote setup option, you must install Lotus Administrator with the remote server setup option on your workstation. To check whether this is already installed on your Windows workstation, select Start → All Programs → Lotus Applications and see if the Remote Server Setup option is available. If you have already installed Lotus Administrator but need to install the Remote Server Setup option, simply launch the `setup.exe` file from where you previously installed Lotus Administrator, then select the Remote Server Setup option to be installed.

1. To use the remote setup option, you must start the Domino server with the listen option:

```
/Domino/lotus/bin/server -listen
```

2. On your local Windows workstation, start the Remote Server Setup. In Windows XP you can start this by selecting Start → All Programs → Lotus Applications → Remote Server Setup.
3. In the Connect To Remote Domino Server dialog box, enter the IP address of your Domino server.
4. Click the Ping button to make sure that you are properly communicating with the Domino server.
5. Click OK to close the Server Setup window, then click OK to begin the Remote Server Setup process.
6. Continue with the Domino server setup in “Welcome to Domino Server Setup,” next.

Welcome to Domino Server Setup

1. Complete the Welcome to Domino Server Setup Wizard.
2. This concludes the setup of your Lotus Domino server.

6 STARTING THE DOMINO SERVER

This section discusses starting the Domino server, both manually and from a script.

There are several different ways that you can start the Domino server:

- Starting in the foreground
- Starting in the background
- Starting with the Java console
- Starting with a script

NetApp recommends starting Domino with a script, but it is important to understand all of these options.

6.1 STARTING THE DOMINO SERVER IN THE FOREGROUND

The traditional way to start Domino is from a terminal window or shell. If you have been following along step by step with this report, then your environmental variables should already be set and the only thing that you need to do is enter the command to start the server:

```
Server
```

If this command fails, first review section 5.4 on setting the PATH environment variable, or supply the full path so that AIX can locate the executable.

Executing the `server` command starts the server in the foreground so that you can monitor the activities of the Domino server. However, as with any AIX program running in the foreground, you need to leave the shell window open for the program to continue running.

6.2 STARTING THE DOMINO SERVER IN THE BACKGROUND

You probably won't want to leave a shell window open at all times in order to keep your Domino server running, so a better solution may be to start your Domino server in the background. This requires one simple change to the command:

```
server &
```

This command is roughly equivalent to running as a service in the Windows server environment.

6.3 STARTING THE DOMINO SERVER BY USING THE JAVA DOMINO CONSOLE

The Java Domino console is a relatively new feature (introduced in Domino 6) that allows the administrator to send commands to a server or multiple servers. No Notes ID is required, only a Domino Internet name and password.

To start Domino with the Java console, execute the following command:

```
server -jc &
```

This command starts the Domino server, with the Java console option, in the background.

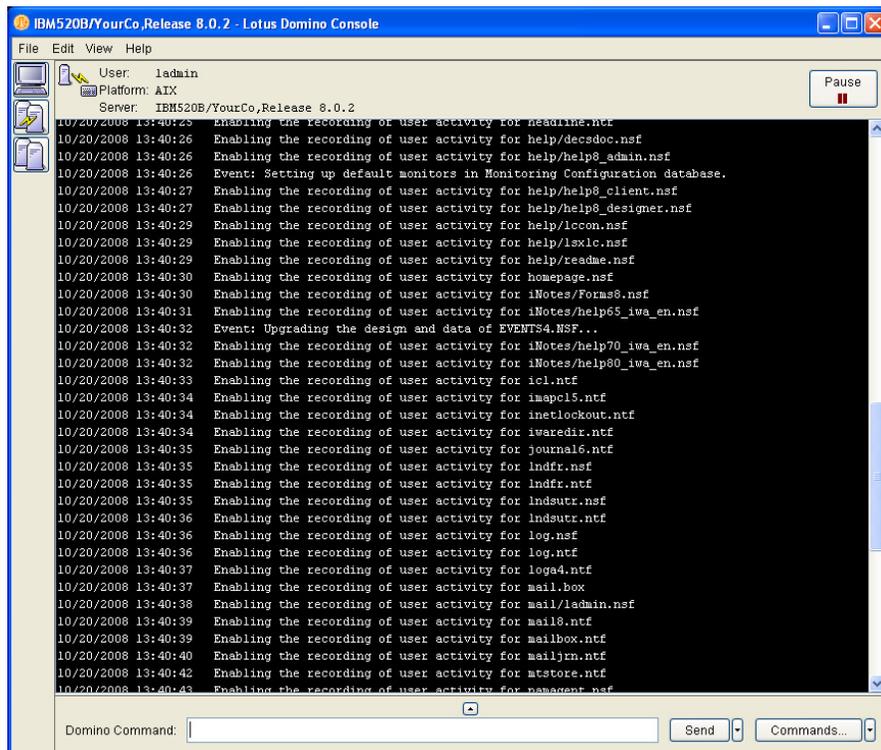
This command launches three components: the Domino server, the Domino controller, and the Domino console. The Domino controller runs on the server and listens for connection requests from the console. All data between the Java console and the Java controller is encrypted using SSL.

The Java console can be started or stopped at any time without affecting the operational status of the Domino server.

To disconnect from the server, simply select File → Disconnect Controller or File → Exit to exit the Domino console. Note that if you issue the `exit` command at the Domino command prompt, the Domino server quits and ceases operation.

To restart the Java console at any time, execute the following command:

```
Jconsole
```



When you use the `jconsole` command you are prompted for your credentials, because you are not launching the Java console at the same time as the Domino server. You can also use the Java console to connect to other Domino servers in your environment.

6.4 STARTING THE DOMINO SERVER FROM A SCRIPT

NetApp recommends that you start Domino from a script, so that the Domino server is always started when the AIX server is rebooted.

NetApp also recommends that you have your AIX administrator implement a script to start the Domino server automatically at startup. Sample scripts are provided in the IBM Redbook “Lotus Domino 6 for Linux” on the IBM Web site and in this report’s Appendix B, “Domino Scripts.”

7 TRANSACTIONAL LOG CONFIGURATION

Now that your Domino server is up and running, you should configure the transactional logging and set the directory to the `/DomTxn` directory that was configured as part of this paper.

The best way to configure the transactional logs is to refer to the appropriate section in Domino Help. In Domino 8 Help the section on Transactional Logging can be found under Monitoring → Managing Servers → Transactional logging.

8 CONCLUSION

This concludes the configuration of your AIX, Domino, and NetApp storage systems. Using NetApp storage systems with a Lotus Domino server can help your organization meet increasingly stringent service-level agreements while maximizing performance and minimizing storage and Domino administration requirements.

The information presented in this document has been tested by NetApp using only a limited set of hardware and software options; therefore your experience may differ from that presented here. If you have any problems with the techniques described in this technical report, please contact the author.

APPENDIX A: PREINSTALLATION CHECKLIST

A.1 STORAGE SYSTEM

| Item | Example | Your Environment |
|------------------------------------|--------------|------------------|
| Storage System Name: | lceman | |
| Storage System IP Address: | 10.61.162.41 | |
| Storage System Data ONTAP Version: | 7.2 | |
| Storage System User Account: | root | |
| Storage System User Password: | [redacted] | |
| Lotus Data Directory Volume Name: | AIX_Dom8Data | |
| Lotus Data Directory Volume Size: | 20GB | |
| Lotus Transaction Log Volume Name: | AIX_Dom8Txn | |
| Lotus Transaction Log Volume Size: | 10GB | |

| | License Type (FCP, iSCSI, etc.) | License Code |
|---------------|---------------------------------|--------------|
| License Code: | | |
| License Code: | | |
| License Code: | | |

A.2 HOST SERVER

| Item | Example | Your Environment |
|---|---------------|------------------|
| Server Name: | IBM520B | |
| Server IP Address: | 10.61.161.227 | |
| Host Server Lotus User Account: | notes | |
| Host Server Lotus User Password: | passw0rd | |
| Host Server Lotus User Group: | notes | |
| Host Server Lotus Data Directory Mount Location: | /Domino | |
| Host Server Lotus Transaction Log Mount Location: | /Domtxn | |

A.3 DOMINO SERVER

| Item | Example | Your Environment |
|---------------------------------------|-------------|------------------|
| Domino Server Name: | IBM520B | |
| Domino Server Title: | Mail Server | |
| Domino Server Organization Name: | YourCo | |
| Domino Server Certifier Password: | T3s+C3rt | |
| Domino Server Administrator Name: | Lotus Admin | |
| Domino Server Administrator Password: | L0+u5@dm1n | |

APPENDIX B: DOMINO SCRIPTS

These scripts were created as part of IBM Redbook #SG246835: "Lotus Domino 6 for Linux."

The Redbook is available here: <http://www.redbooks.ibm.com/redbooks/SG246835.html>.

These script files are available from IBM at: <ftp://www.redbooks.ibm.com/redbooks/SG246835>.

This appendix contains two sample scripts: domino and startserver.

B.1 DOMINO

This script is used to start the server. Additional information is available on page 130 of the Redbook referenced above.

```
#!/bin/sh
# A startup script for the Lotus Domino 6 server
# chkconfig: 345 95 5
# description: This script is used to start the domino \
# server as a background process.\
# Usage /etc/init.d/domino start|stop
# This script assumes that you are using the performance tweaks
# detailed in the Domino 6 for Linux redbook and that these tweaks
# are stored in a directory called lib in the Domino Data directory.
# If you are not using these tweaks, you should replace the line starting with
# su - $DOM_USER -c "LD_PRELOAD...
# with the following line
# su - $DOM_USER -c "$DOM_PROG/server -jc -c" > /dev/null 2>&1 &
# You should change the 3 following variables to reflect your environment.
# DOM_HOME is the variable that tells the script where the Domino Data resides
DOM_HOME=/local/notesdata
# DOM_USER is the Linux account used to run the Domino 6 server
DOM_USER=notes
# DOM_PROG is the location of the Domino executables
DOM_PROG=/opt/lotus/bin
start() {
    echo -n "Starting domino: "
    if [ -f $DOM_HOME/.jsc_lock ]; then
        rm $DOM_HOME/.jsc_lock
    fi
    su - $DOM_USER -c
"LD_PRELOAD=$DOM_HOME/lib/libpthread.so.0:$DOM_HOME/lib/librt.so.1;export
LD_PRELOAD;$DOM_PROG/server -jc -c" > /dev/null 2>&1 &
    return 0
}
stop() {
    echo -n "Stopping domino: "
    su - $DOM_USER -c "$DOM_PROG/server -q"
    return 0
}
case "$1" in
start)
    start
    ;;
stop)
    stop
    ;;
*)
    echo "Usage: domino {start|stop}"
    exit 1
esac
```

B.2 STARTSERVER

This script is used to start the Domino server at times other than startup.

```
#!/bin/sh
# This is a script to start Domino
# DOM_HOME is the variable that tells the script where the Domino Data
resides
DOM_HOME=/local/notesdata
# DOM_USER is the Linux account used to run the Domino 6 server
DOM_USER=notes
# DOM_PROG is the location of the Domino executables
DOM_PROG=/opt/lotus/bin

echo "Beginning startup script..."
check_controller=`netstat -an | grep " LISTEN" | grep 2050`
if [ "$check_controller" ]
then
    echo "Domino controller appears to be running - stopping..."
    echo Y | $DOM_PROG/server -jc -q;echo ''
    sleep 3
else
    check_server=`ps -A | grep replica`
    if [ "$check_server" ]
    then
        echo "Domino server appears to be running - stopping..."
        $DOM_PROG/server -q
        sleep 3
    fi
fi
echo "Starting Domino Controller and Server..."
if [ -f .jsc_lock ]; then
    rm .jsc_lock
fi
# Comment out the LD_PRELOAD lines by adding a # before the lines
# if you are not using the glibc tweaks
# Start Comments
LD_PRELOAD_SAV=$LD_PRELOAD
LD_PRELOAD=$DOM_HOME/lib/libpthread.so.0:$DOM_HOME/lib/librt.so.1:$LD_PRELOA
D
export LD_PRELOAD
# End Comments
nohup $DOM_PROG/server -jc -c > /dev/null 2>&1 &
sleep 3
# Start Comments
LD_PRELOAD=$LD_PRELOAD_SAV
export LD_PRELOAD
# End Comments
echo "Finished startup script."
```
