



Technical Report

# Integrating Lotus Domino 8.5 for Linux with a NetApp Storage System

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## EXECUTIVE SUMMARY

With the push for cost savings and the use of the latest innovations, such as virtualization and cloud computing, network-attached storage usage has increase exponentially. The old approach of storing the Domino environment on local disks or direct-attached storage is becoming history, and customers rely on shared infrastructure more than ever. Network-attached storage not only offers cost savings, but also allows customers to take advantage of storage technology for backup/restore, clone copies, replication, and data compression. This document describes the steps necessary to integrate a NetApp® storage system with an IBM Lotus Domino server for Linux®.

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## 1 PURPOSE AND SCOPE

The data center environment is increasing based on a shared infrastructure. A shared infrastructure not only saves money but also helps to maximize compute and human resources. A shared infrastructure is the fundamental requirement for the latest technological advancements such as virtualization and cloud computing. NetApp is a pioneer in the field of shared infrastructure technologies and offers unified network-attached storage systems and software products that are perfectly suited for shared infrastructures. This document describes the steps necessary to integrate a NetApp storage system with an IBM Lotus Domino 8.5.x for a Linux server. The main topics covered are:

- Preparing the NetApp storage system for Lotus Domino
- Configuring the Linux server and installing the Lotus Domino software
- Migrating the Lotus Domino server from local disks (or other storage) to logical unit numbers (LUNs) on a NetApp storage system

## 2 ASSUMPTIONS

The reader should have knowledge of the following products and technologies for this report to be useful:

- Linux
- Lotus Domino 8.5.x
- The NetApp storage system, Data ONTAP<sup>®</sup>, and System Manager

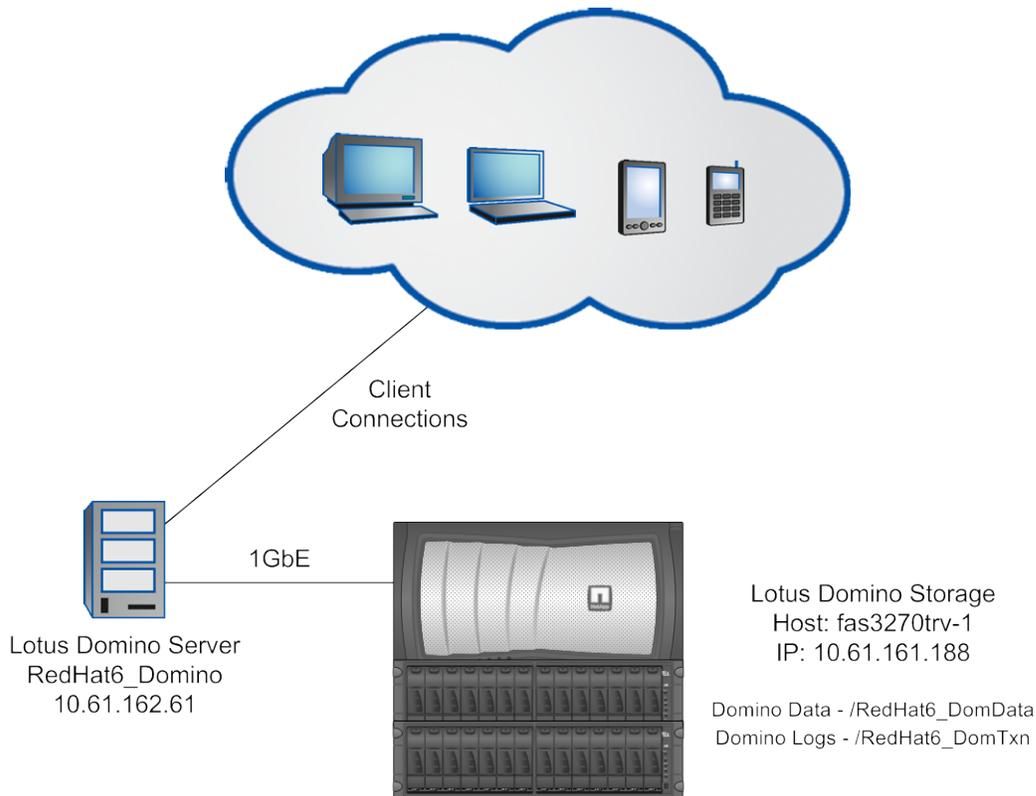
## 3 INFRASTRUCTURE OVERVIEW

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

- Red Hat Linux 6.0 server: X86 virtual server with on-board Gigabit Ethernet (GbE) connection
- NetApp FAS3200 storage system running Data ONTAP 8.0 with:
  - On-board 10/100/1000 Ethernet connection
  - GbE adapter

Figure 1 shows these infrastructure components.

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



### 3.1 LINUX

For this technical report we used a Lotus Domino 8.5.2 enterprise server for Linux. NetApp supports Lotus Domino 8.0 running on Microsoft® Windows®, UNIX®, Linux, and AIX. NetApp also supports Domino partitioning and Domino clustering for high availability and disaster recovery.

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 should be implemented for failover. In cluster implementations, separate volumes are required for each Domino data directory<sup>1</sup>.

### 3.2 NETAPP STORAGE SYSTEM

Any currently supported NetApp storage system that can run Data ONTAP 7.2 or later supports Lotus Domino data and transaction logs. IBM, as well as NetApp, supports NFS, CIFS, FCP, and iSCSI; therefore, we are not restricted by protocols.

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

<sup>1</sup> For a list of supported configurations, see the IBM document [Using Lotus Domino with NetApp Storage Products](#).

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 on the NetApp Support site (formerly [NOW™](#)—NetApp on the Web).

The entire Domino environment can be stored on one or more flexible volumes. This is key to ease of use and manageability of a Domino server housed on a NetApp storage system. 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 points to consider 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. NetApp recommends having a mirrored root volume.
- NetApp strongly recommends that the root volume on the Domino storage system not be used to store the Domino files. Rather, use another volume on the NetApp storage system.
- NetApp strongly recommends that, for performance reasons, a large aggregate be used whenever possible. Multiple FlexVol volumes required for a Domino environment can be created within a single large aggregate.
- Domino data directories and Domino log directories should be kept on separate volumes for both recovery and performance reasons. If database and transaction log volumes are housed on the same volume, then Snapshot<sup>®</sup> recovery returns the logs to the same state they were in at the time the Snapshot copy was taken. This makes any type of roll-forward recovery impossible because the needed log files are no longer available.
- If Network Data Management Protocol (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, define your LUNs in the root of the volume, and let the storage system manage the storage.

In addition to running the appropriate Data ONTAP version, you must activate the appropriate protocol (FCP, iSCSI, or NFS) license on the storage system.

### 3.3 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 use.

See Table 1 for the names, addresses, and locations used throughout this report.

Table 1) Names, addresses, locations.

Names, Addresses, and Locations	Name, Address, and Location Used in This Report
Name of the NetApp storage system	fas3270trv-1
IP address of the NetApp storage system	10.61.161.188
Connection protocol	NFS
Name of the server hosting the Lotus Domino server	redhat6_domino
IP address of the host server	10.61.162.61
Target volume on the storage system for Domino data	RedHat6_DomData
Target volume on the storage system for Domino logs	RedHat6_DomTxn

Names, Addresses, and Locations	Name, Address, and Location Used in This Report
Location where the virtual disk for Domino data is mounted	/mnt/domdata
Location where the virtual disk for Domino transaction logs is mounted	/mnt/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 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. 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<sup>®</sup> command, an entire Domino environment can be restored in a matter of seconds. No data copying is involved, saving time because the file system is restored to the original state it occupied at the time the Snapshot copy was created. Data ONTAP 7G supports 255 Snapshot copies per flexible 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 can create Domino server backup in a matter of seconds without bringing the server down and can be used as a complementary technology for higher system uptime.
- **High reliability.** The double-parity RAID-DP<sup>®</sup> 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. For more details about RAID-DP, read TR-3298, [RAID-DP: NetApp Implementation of Double-Parity RAID for Data Protection](#).
- **No affect 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 copies doesn't involve actual data movement (data I/O), so the backup process has virtually no performance affect 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 creation. 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<sup>®</sup> manages the space on the storage system volume. Section 8, “Domino Compact Best Practices for NetApp Environment,” covers NetApp best practices with Domino compaction.

## 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 two 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.

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 nonvolatile RAM (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 2.

Table 2) Domino transactional logging types.

Type	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 with the new transaction when the defined size is reached. 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	Linear logging is similar to circular logging, but it 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, NetApp SnapManager <sup>®</sup> for Domino, or your own custom scripts. Archive logging enables rollback, media recovery, and point-in-time recovery.

NetApp recommends that you store data and transaction logs on separate volumes.

## 5 CONFIGURATION OVERVIEW

This technical report specifically addresses a configuration in a Network File System (NFS) environment. For fabric-attached storage (FAS) or iSCSI environments, see the [IBM System Storage N Series Fibre Channel and iSCSI 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 setup instructions see the [Software Setup Guide](#) on NOW.

2. Activate the appropriate license keys.

NetApp storage is a unified storage system, which means that all supported file access protocols (FCP, iSCSI, NFS, and Common Internet File System protocol [CIFS]) are supported on the same box. These protocols are licensed services. You must 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.

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

```
license add 123XYZABCD
```

**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.

3. Install NetApp System Manager.

NetApp System Manager can be downloaded from the NetApp Support site ([NOW](#)). A valid username and password are required. System Manager can be found under Downloads → Software. Locate System Manager. Select Windows from the drop-down box, then click Go. Click View & Download next to the latest version, read the information about the product, and click Continue near the bottom of the page. After accepting the license agreement you are able to download the System Manager Installation File.

Run the installation file and follow the on-screen instructions to complete the installation.

After installation is complete, open NetApp System Manager using the desktop shortcut. Select Add to add a storage system. This prompts you for the Host Name or IP Address of the storage system. Click Add System when you are done.

4. Update the `/etc/hosts` file on the storage system.

To make sure that names are resolved properly, update the `/etc/hosts` file on the storage system to include the IP Address of the Domino server. The easiest way to update this file is by using NetApp System Manager.

To update the `hosts` file using System Manager, follow these steps:

- a. Open NetApp System Manager.
- b. Click the arrow to the left of the storage system's name to expand the options for your NetApp storage system. If it is part of a high availability (HA) pair, you might need to expand the pair and then expand the storage system.

- c. Expand configuration, then network, and then select Network Files. The current tab should read Etc Hosts at the top; otherwise, click the Etc Hosts tab.
- d. Click Add.
- e. Fill in the requested information:
  - IP Address [10.61.162.61]
  - Host Name [RedHat6\_Domino]
  - Aliases
- f. Click OK to save the changes to the `hosts` file.

This completes updating the `hosts` file.

5. (Optional) Enable `rsh` (remote shell) access for the database server.

To use `rsh` commands from the Domino server, you must perform two steps.

First, enable the `rsh` option on the storage system by executing the following command:

```
options rsh.enable on
```

**Note:** This should be entered using a console command. Connect to your storage system using a telnet/ssh client such as [PuTTY](#).

Second, add the Domino host and user name to the `/etc/hosts.equiv` file.

Add the Domino 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 NetApp System Manager.

To update the `hosts.equiv` file using System Manager, follow these steps:

- a. Open NetApp System Manager.
- b. Expand your NetApp storage system. If it is part of an HA pair, you might need to expand the pair and then expand the storage system.
- c. Expand Configuration, Security, and then select Password/RSH/Trusted hosts.
- d. At the top of the screen click Edit.
- e. In the Edit Security Settings box, click the RSH settings tab.
- f. Fill in the requested information:
  - Host name/IP address
  - User ID (on remote host)
- g. Click Add to save the changes to the `hosts.equiv` file.

This completes updating the `hosts.equiv` file.

6. Create space on the NetApp storage system. To create space on the NetApp storage system, you may need to create aggregates, flexible volumes, and LUNs.

**Note:** No LUNs are needed for NFS in this example.

An aggregate is a physical pool of storage at the RAID level; it can be created by using NetApp System Manager. If you already have created an aggregate that you want to use, continue by creating a FlexVol volume (step 8).

7. Create an aggregate.

To create an aggregate, follow these steps:

- a. Open NetApp System Manager.
- b. Expand your NetApp storage system. If it is part of an HA pair, you might need to expand the pair and then expand the storage system.
- c. Expand Storage and then select Aggregates.

- d. Under Aggregates, click Create.
  - e. Follow the steps in the wizard to create the new aggregate.
8. Create a FlexVol volume.

A Flexible volume, or 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 can be created by using NetApp System Manager.

To create a FlexVol volume, follow these steps:

- a. Open NetApp System Manager.
- b. Expand your NetApp storage system. If it is part of an HA pair, you might need to expand the pair and then expand the storage system.
- c. Expand Storage and then select Volumes.
- d. Under Volumes, click Create.
- e. This opens the Create Volume window. To create your volume you must:
  - Enter a name for your volume.
  - Select a storage type of network-attached storage (NAS) (NFS or CIFS) or storage area network (SAN) (FCP or iSCSI).
  - Select the aggregate in which you want this volume to reside.
  - Enter a size for the volume.
  - Select your Snapshot reserve. This defaults to 20%.

**Note:** Additional options are available on the Space settings and Quotas tabs.

- f. Click Create when finished to create your volume.
9. Disable the automatic Snapshot feature.

Normally, a database backup is 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 NetApp System Manager.

To disable the automatic Snapshot feature, follow these steps:

- a. Open NetApp System Manager.
- b. Expand your NetApp storage system. If it is part of an HA pair, you might need to expand the pair and then expand the storage system.
- c. In the left pane, expand Storage. Then select Volumes.
- d. In the right pane, select the volume you want to change. Click Snapshot and then click Configure at the top of the window.
- e. In the Configure Volume Snapshots window, uncheck the Enable scheduled snapshots option and then click OK to save your settings.

Repeat step 9 and turn auto Snapshot off for all volumes that are to be used for the database.

If the volumes are on the same storage system, you need only repeat steps 9c through e.

## 5.2 CONFIGURING THE LINUX SERVER

### LINUX ENVIRONMENT

This section addresses the configuration of the Linux 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 Linux server. To do this, you must use a text editor on the Linux server. For this report we used the vi text editor, which is included in most Linux distributions. 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 fas3270trv-1 storage system, which has the IP address 10.61.162.188, to the `/etc/hosts` file, enter:

```
10.61.161.188 fas3270trv-1
```

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

```
mkdir -p [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`, execute the following command on the Domino server:

```
mkdir -p /mnt/domdata
```

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

5. You should also create a group and a user account to manage your Domino server.

Create the group named `notes` and the user named `domadmin`.

In this example, the default group and user names are used.

- a. To add a group, execute the following command on the Linux server:

```
groupadd [groupname]
```

For example, enter `groupadd notes`.

- b. To add a name, execute the following command on the Linux server:

```
Useradd -c <comments> -g [groupname] -d {userdirectory} [username] -p [password]
```

Where:

- *comments* is a description of the user.
- *groupname* is the name of the group where the user is a member.
- *userdirectory* is the user's home directory. This should be the same as the notes data directory.
- *username* is the name of the user who is a member of *groupname*.
- *password* is the user's password.

For example, to add a user named `domadmin` who belongs to group `notes` and has a default directory of `/mnt/domdata`, execute the following command:

```
useradd -c "Domino Admin Account" -g notes -d /mnt/domdata domadmin -p domadmin
```

6. If you are running your Linux environment on an x86 server, you should review [Domino for Linux on x86 Configuration](#) (IBM technote #1377724). By default, Linux limits the number of file descriptors that any one process can open to 1,024. This technote discusses how to increase the default setting for Domino. In order to overwrite the default values, you need to modify the `/etc/security/limits.conf` file, adding or modifying the following lines:

```
[username] soft nofile 20000
[username] hard nofile 49152
```

Where:

`username` is the name of the user who will run the Domino server. For the purposes of this paper we use `domadmin` as the user.

It is also important to verify that the following line is present in the appropriate `pam.d` login file:

```
session required pam_limits.so
```

If `ssh` is used, this line must appear in `/etc/pam.d/ssh`.

If `telnet` is used, this line must appear in `/etc/pam.d/login`.

If `rlogin` is used, this line must appear in `/etc/pam.d/rlogin`.

When using a script to start the Domino server, the start section of the script must also have the line:  
`ulimit -n 20000`.

7. In addition to changes described in the previous step, you must make several Linux kernel value changes for large-scale Domino environments. Generally, these values are modified by Domino using the `tunekrnl` program; however, it is a good idea to validate that the proper changes have been made. See Table 3 for the changed values.

Table 3) Kernel values modified by Domino.

Kernel Parameter	Default Value	Tunrknl Value	Description
<code>/proc/sys/fs/file-max</code>	(as low as 8192)	131072	Maximum number of system-wide file descriptors
<code>/proc/sys/kernel/sem</code>	250 32000 32 128	250 256000 32 1024	Shared semaphore allocation sizes and limits
<code>/proc/sys/kernel/shmmax</code>	32 M	256 M	Maximum shared-memory segment size
<code>/proc/sys/net/ipv4/tcp_fin_timeout</code>	60	15	Retransmission timer for a FIN (socket close) in seconds
<code>/proc/sys/net/ipv4/tcp_max_syn_backlog</code>	1024	16384	Maximum value of the <code>listen()</code> connection backlog

Kernel Parameter	Default Value	Tunrkrnl Value	Description
/proc/sys/net/ipv4/tcp_tw_reuse	0	1	1 enables time-wait assassination, allowing rapid reuse of sockets
/proc/sys/net/ipv4/ip_local_port_range	32768 61000	1024 65535	Increase the range of port values available for connect()
/proc/<pid>/mapped_base	1 gigabyte	16 megabytes	The floor address value above which memory allocations may occur on SLES

## NFS ENVIRONMENT

This section addresses the configuration of the NFS environment.

1. Append an entry for each FlexVol volume to the `/etc/fstab` file found on the database server. The entry should look similar to the following:

```
[StorageSystemName]:[VolName] [MountPoint] nfs hard,
rw,nointr,rsize=32768,wsiz=32768,bg,vers=3,tcp 0 0
```

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 `RedHat6_DomData` on a mount point named `/mnt/domdata`, add the following line to the `/etc/fstab` file found on the database server:

```
fas3270trv-1:/vol/RedHat6_DomData /mnt/domdata nfs
hard,rw,nointr,rsize=32768,wsiz=32768,bg,vers=3,tcp 0 0
```

2. After adding the entries to the `/etc/fstab` file, 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, execute the following command on the database server:

```
mount /mnt/domdata
```

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

3. To create a database on the storage system volumes, the database instance owner must have ownership of the mounted file systems. Change ownership for each mounted FlexVol volume that is used for the database by executing the following command on the database server:

```
chown -R [username]:[groupname] [MountPoint]
```

Where:

- *username* identifies the user who owns the file or directory.
- *groupname* identifies the group where the user is a member.
- *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 `/mnt/domdata` to the user named `domadmin` with the group `notes`, execute the following command on the database server:

```
chown -R domadmin:notes /mnt/domdata
```

It is likely that the `chown` command results in a couple of on-screen messages. This is typically because the `.snapshot` directory is read-only and the ownership cannot be changed.

### 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 8.5.2 of the Domino server was downloaded by the root user into a folder called *software*. The downloaded file is named `lotus_domino852_xlinux_en.tar`. To extract this file, execute the following command:

```
tar -xvf lotus_domino852_xlinux_en.tar
```

#### DOMINO INSTALLATION

Throughout the installation, you make selections using the number keys on your keyboard.

1. Change the directory to the extracted directory (`/software/linux/domino`) where the installation file was placed.
2. Execute the `install` command to begin the installation:

```
./install
```

Continue the installation in console mode.

```
Lotus Domino for Unix Install Program
-----
You have to set environment variable DISPLAY to run in graphic mode
Answer Yes to continue in console mode
Answer No to exit application.
Do you want to continue installation in console mode?[Yes]
```

3. Press the `<Enter>` key to accept the default selection of `[Yes]` and then press `1` for Next.

```
Welcome to the InstallShield Wizard for Lotus Domino
The InstallShield Wizard will install Lotus Domino on your computer.
To continue, choose Next.
Lotus Domino
IBM
http://www.lotus.com
Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]
```

4. Read through the system response before accepting the Lotus Domino Software Agreement.

```
Press Enter to continue viewing the license agreement, or, Enter "1" to
accept the agreement, "2" to decline it or "99" to go back to the previous
screen, "3" Print.
```

5. Press `1` to accept the agreement and then press `1` to move to the next window.

The next step allows you to install additional Domino data directories for use with Domino partitions. This is useful if you already have an installed Domino server and simply want to add another partition.

```
[ ] 1 - Install Data Directories Only for Partitioned Domino Server
To select an item enter its number, or 0 when you are finished: [0]
```

6. Determine whether or not you want to use Domino partitions, make your choice, and then press 1 for Next.

For this report we did not use Domino partitions; therefore, we accepted the default selection of 0.

You are prompted for your Lotus Domino installation location. This is the location of Domino's binary files and by default is the installation location `/opt/ibm/lotus`.

```
Lotus Domino Install Location
Please specify a directory or press Enter to accept the default directory.
Program Files Directory Name [/opt/ibm/lotus]
```

7. Press <Enter> to select the default location or type the location where you want the program installed. For this report we accepted the default selection.

```
Server with more than one partition
Answer Yes to install partitioned server
Answer No to install non-partitioned server
Partitioned Server: [No]
```

8. Determine whether or not to install multiple Domino partitions, make your choice, and then press 1 for Next.

For this report we selected the default option of [No].

```
Lotus Domino Install Location
Please specify a directory or press Enter to accept the default directory.
Data Files Directory Name [/local/notesdata]
```

9. Type your Lotus Domino installation location or accept the default location of `/local/notesdata`. This is your Domino Data directory. Press <Enter> and then press 1 for Next.

For this report we installed on `/mnt/domdata`.

10. Identify your Domino user name and group name. The default is the user named `domadmin` and the group named `notes`. We used the defaults. Type your user or accept the default entry and press <Enter>. Type your group or accept the default entry and press <Enter>. Then press 1 for Next.

```
Select Server Setup
```

After the installation completes, for new installation server setup will be launched and for upgrade the server will be restarted automatically.

The default value is "Manual Server Setup" which does not launch server setup or restart the server after installation.

Select "Local Server Setup" to launch server setup after a new server installation or to restart the server after a server upgrade.

Select "Remote Server Setup" to launch server setup in listen mode for new server installations. You will then be able to connect to the server with the Remote Server Setup tool.

```
[ ] 1 - Local
[ ] 2 - Remote
[X] 3 - Manual
```

To select an item enter its number, or 0 when you are finished: [0]

11. Select your server setup type and then press <Enter>. After making your selection, press 1 for Next.  
For this report, we used the default of Manual.

You are asked to select your installation type. The on-screen dialog describes the available options.

Choose the setup type that best suits your needs.

[ ] 1 - Domino Utility Server

Installs a Domino server that provides application services only.

Note that it does not include support for messaging services. See full licensing text for details.

[ ] 2 - Domino Messaging Server

Installs a Domino server that provides messaging services. Note that it does not include support for application services or Domino clusters.

[X] 3 - Domino Enterprise Server

Installs a Domino server that provides both messaging and application services.

[ ] 4 - Customize Domino Server

Allows you to select the features you want to install.

To select an item enter its number, or 0 when you are finished: [0]

12. Select your installation type. Press <Enter> after making your selection and then press 1 for Next.  
For this report we selected the default option of Domino Enterprise Server.

You are presented with a summary of your selections. You most likely need to press <Enter> to complete reading through the summary.

13. After reading the summary of your selections, press 1 for Next.

When installation is complete, you see the following system response.

Installing Lotus Domino. Please wait...

```
|-----|-----|-----|-----|
0%          25%          50%          75%          100%
||||||||||||||||||||||||||||||||||||||||||||||||||||
```

Please, manually configure the Domino Server as follows:

- 1) Login as the appropriate Unix user: 'domadmin';
- 2) Change to the data directory using the command: 'cd /mnt/domdata';
- 3) Configure the server using the command: '/opt/ibm/lotus/bin/server'

To configure server remotely, the remote server setup tool is required and you can use the command:

```
'/opt/ibm/lotus/bin/server -listen'
```

After issuing this command, additional instructions will appear for remote server setup. For additional details see the section 'Using the Domino Server Setup remotely' in the Lotus Domino Administrator Help Documentation.

--

The InstallShield Wizard has successfully installed Lotus Domino. Choose Finish to exit the wizard.

Press 3 to Finish or 4 to Redisplay [3]

14. Press 3 to finish and exit the 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`.

To start the CheckOS tool, execute the following command:

```
./checkos
```

Following is an example of the command being run:

```
[root@redhat6-domino bin]# ./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.
    OS: Linux 2.6.32-71.el6.i686
    MACHINE: i686
The OS appears to have the correct patches .
```

If any patches need to be installed, they are listed under: The following OS patches are required.

## 5.4 SETTING UP THE LOTUS DOMINO SERVER

1. Log in as the Domino user.

Before running setup, log out of your server and log back in as the Domino user. For this report, we used the user domadmin.

Set the PATH environment variable.

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 to the PATH.

Enter the following at the command line:

```
export PATH=$PATH:/opt/ibm/lotus/bin
```

**Note:** Linux is case-sensitive and PATH must be uppercase.

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

- 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 different, but, once the setup process begins, everything else is the same regardless of the method used. The following two sections discuss how to start each of the two methods.

### LOCAL SETUP

To start the local server setup, you must 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:

```
/opt/ibm/lotus/bin/server
```

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

## REMOTE SETUP

For this report, use 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 and 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:

```
/opt/ibm/lotus/bin/server -listen
```

Information similar to the following appears:

```
Remote server setup enabled on port 8585.  
The Domino setup server is now in listening mode.  
A remote client can now connect to this server and configure Domino.  
To connect to this server, launch the Remote Domino Setup program from a  
command-prompt as follows:
```

```
From a Domino administrator client: serversetup -remote
```

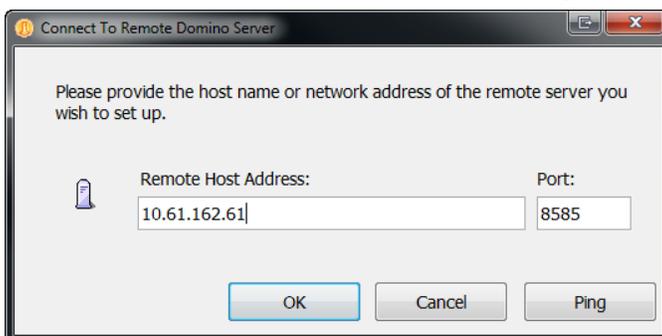
```
From a Domino server: server -remote
```

```
To end this server, launch the Remote Domino Setup program from a command-  
prompt as follows:
```

```
From a Domino administrator client: serversetup -q
```

```
From a Domino server: server -q
```

2. The rest of the steps in this section require that you have the Lotus Admin client installed with the Remote Server Setup option. If you do not have this installed on your local workstation, run the installer and select the Remote Server Setup option before continuing.
3. On your local Windows workstation, start the Remote Server Setup. In Windows XP/Vista®/7 you can start this by selecting Start → All Programs → Lotus Applications → Remote Server Setup.
4. In the Connect To Remote Domino Server dialog box, enter the IP address of your Domino server.

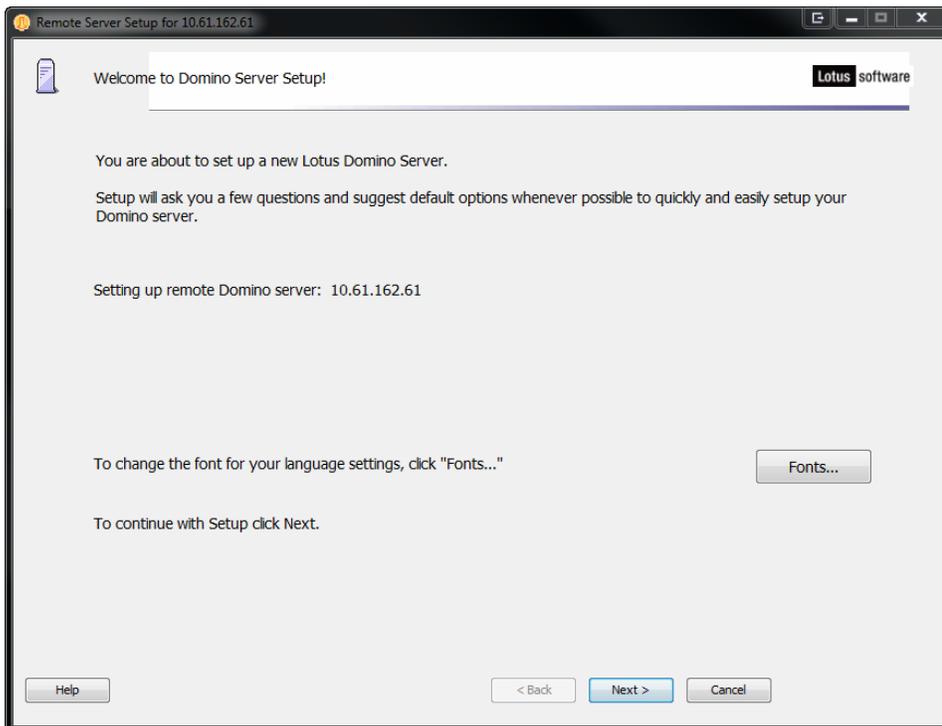


5. Click the Ping button to make sure that you are properly communicating with the Domino server. You should see a response similar to the following:



If you get a “Network Communication error occurred” message you may need to check firewalls on both the Linux server and your local workstation. To turn off your Linux firewall temporarily, enter the command `service iptables stop`.

6. Click OK to close the Server Setup window and then click OK to begin the Remote Server Setup process.



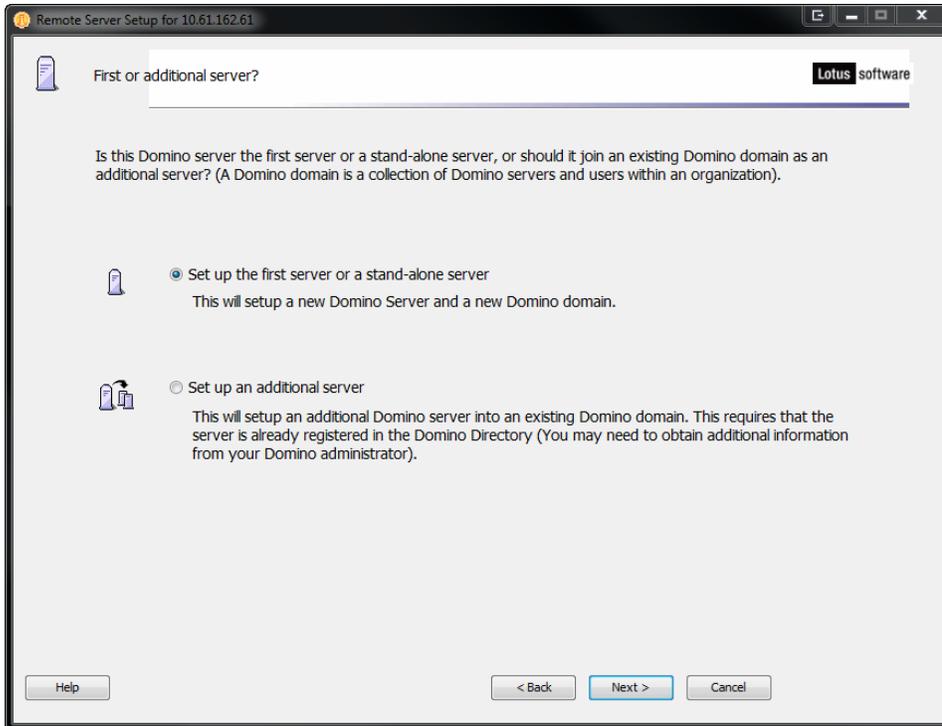
Continue with the Domino server setup in the following section, “Welcome to Domino Server Setup.”

## WELCOME TO DOMINO SERVER SETUP

**Note:** For this setup we used Remote Server Setup, as reflected in the title bars of many of the following screenshots. Other than that, all options and settings are exactly the same as local server setup, unless otherwise noted.

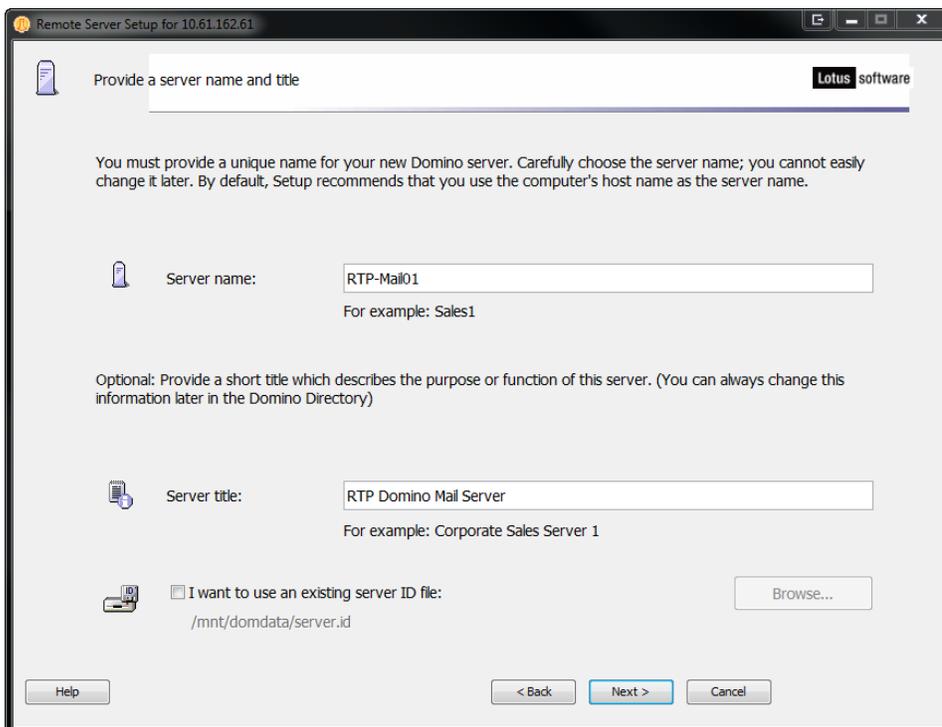
1. Select first server or additional server.

First you must select whether you are setting up the first server in your Domino environment or an additional server. For this report, we chose the first server.



2. Provide a server name and title.

We named our Domino server RTP-Mail01 and gave it the descriptive title RTP Domino Mail Server.

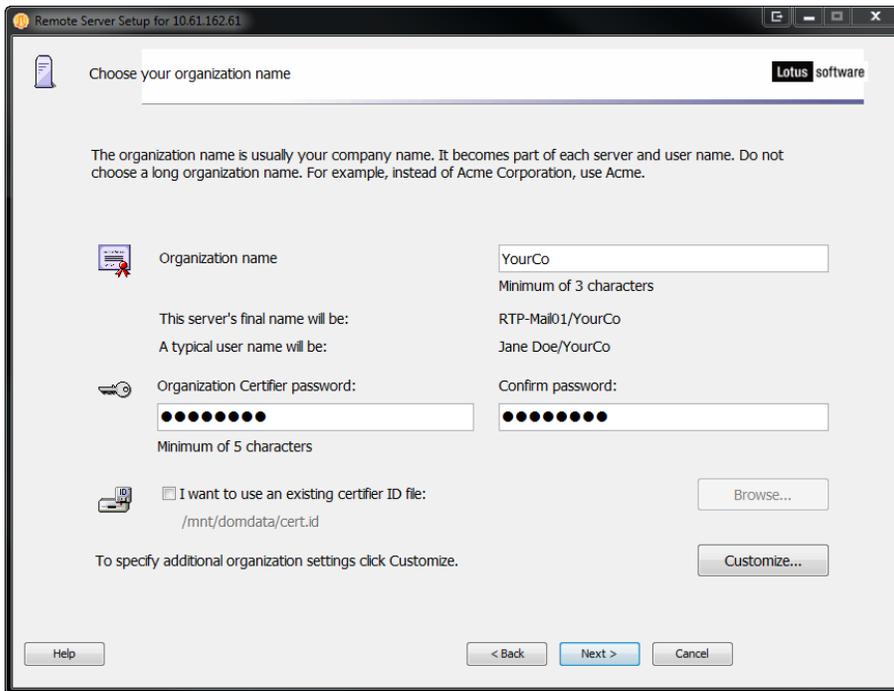


3. Choose your organization name.

Enter an organization name and set an Organization Certifier password. This password should be a secure password, much more complex than the one used as an example.

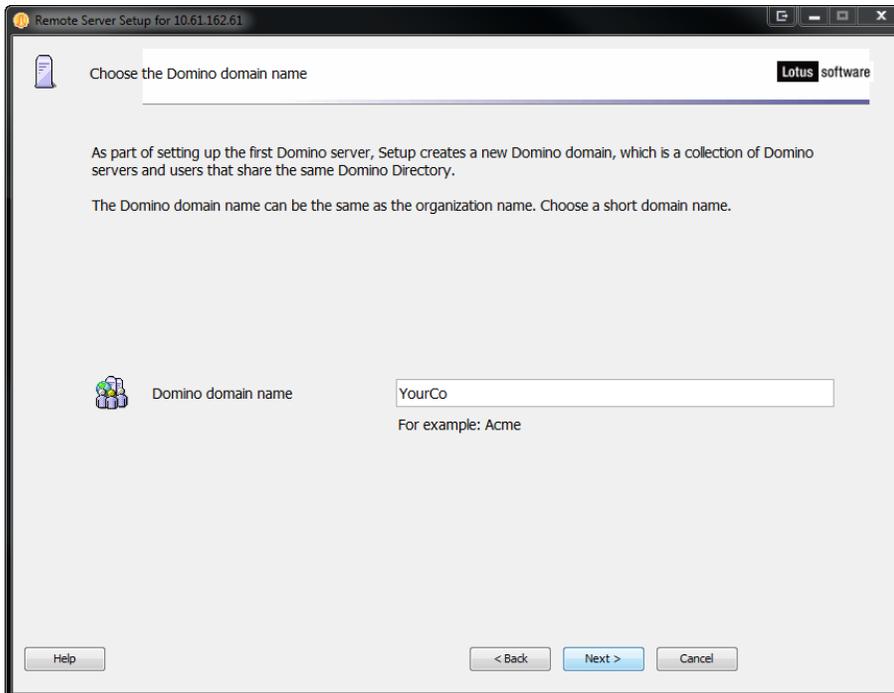
We entered the fictional organization name YourCo.

We set the Organization Certifier password as T3s+C3rt.



4. Enter the Domino domain name.

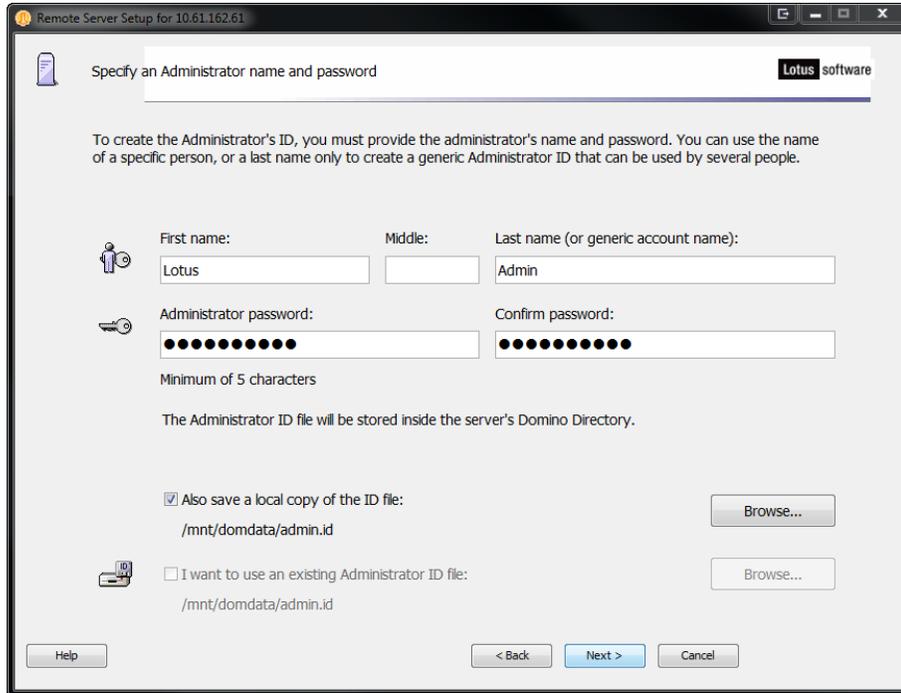
Enter your Domino domain name. This can be the same as your organization name; in this example we use YourCo.



5. Create an Administrator ID and save a copy of the ID file by specifying an administrator name and password, making sure that "Also save a local copy of the ID file" is checked and pressing Next.

We used a common default name of Lotus Admin. Because this is not a real person and should not be used often, we also set a fairly complex password:

- First Name: Lotus
- Last Name: Admin
- Password: L0+u5@dm1n



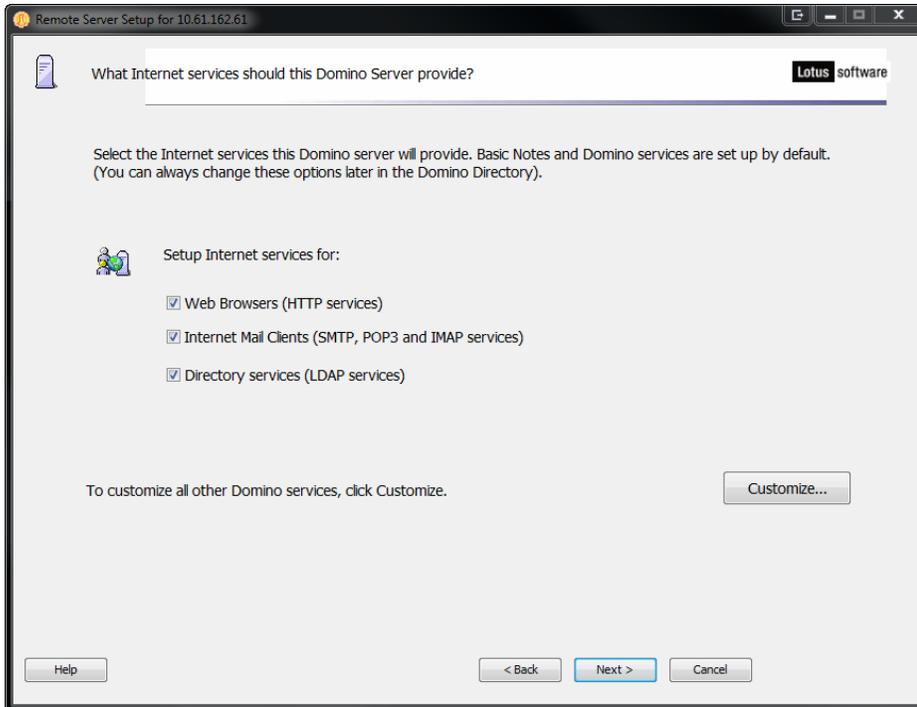
6. Select the Internet services that this Domino server provides.

Use the Customize button to select the services that you wish to install along with Lotus Domino.

- Statistics
- HTTP Server
- SMTP Server

Only those three services were selected, in addition to the defaults. Your environment probably varies from this, depending on your needs.

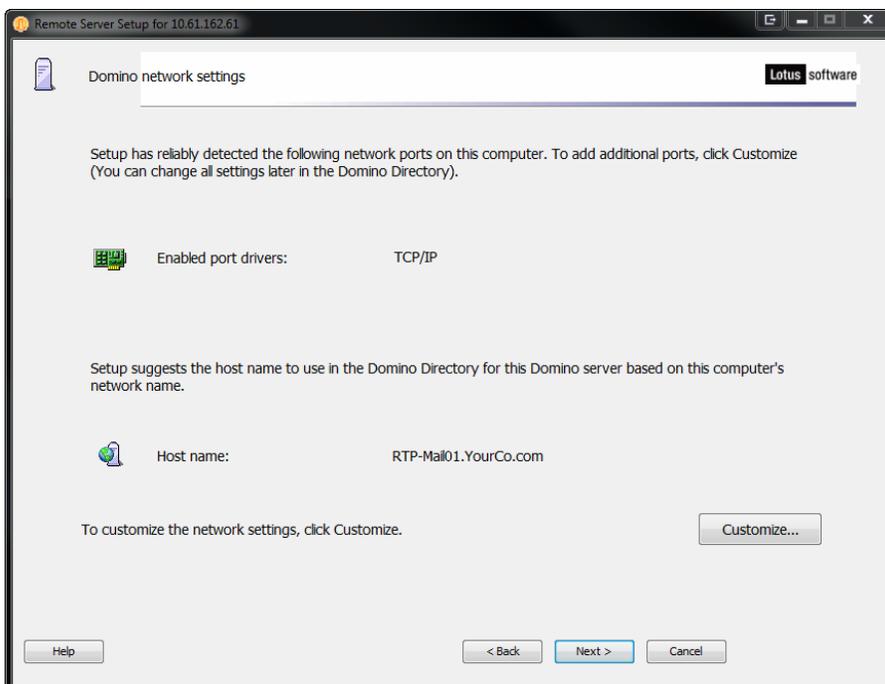
You can click Customize to further customize the services to install.



7. Define Domino network settings.

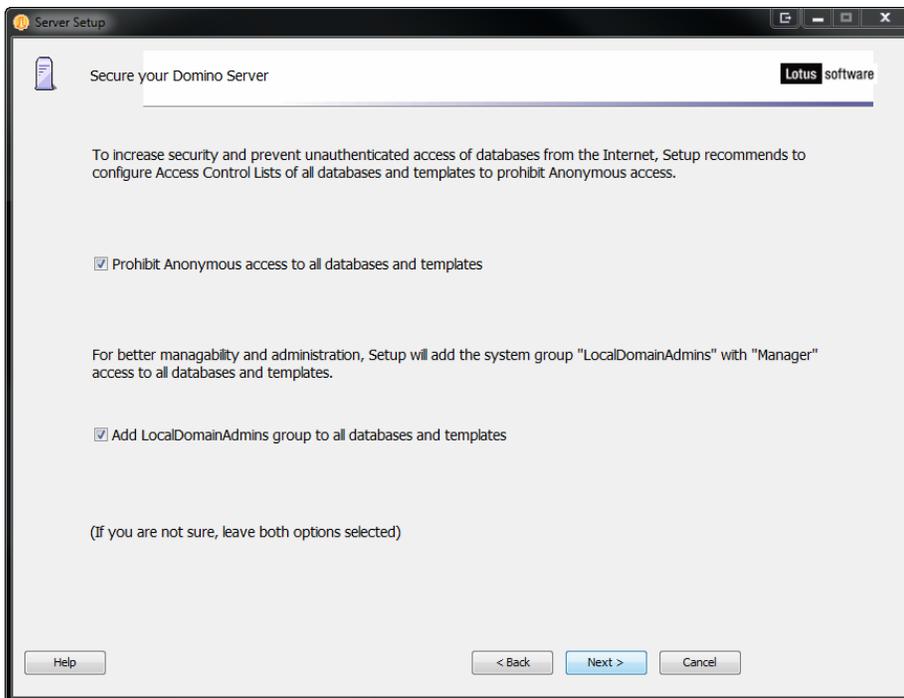
Choose which protocols to use and set your host name. You probably need to click Customize to change these settings.

We accepted the default of TCP/IP and updated Host Name to reflect RTP-Mail01.YourCo.com.



8. Secure your Domino server.

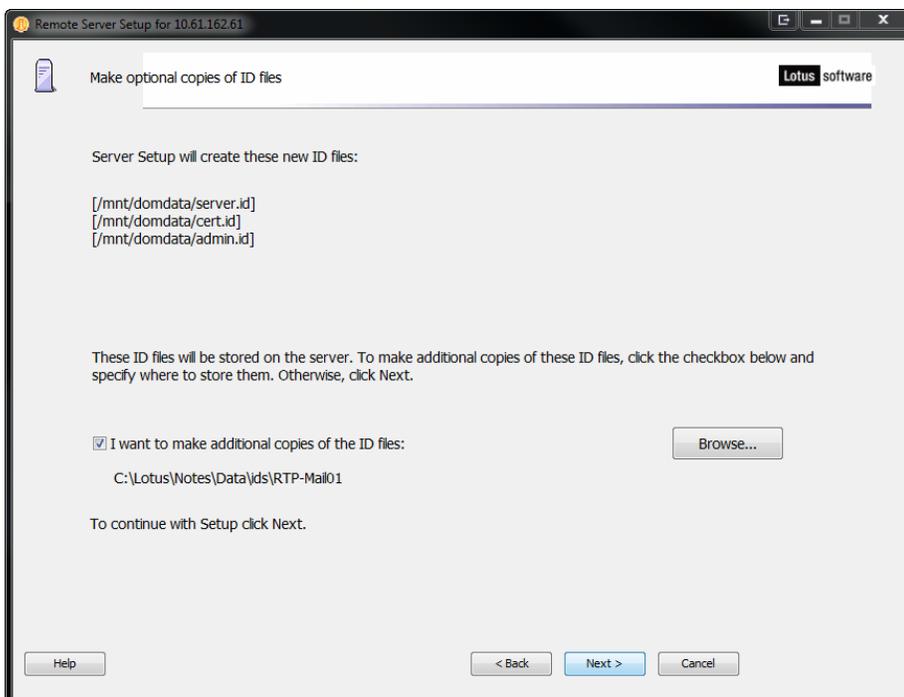
Accept the default options unless you have a reason to do otherwise.



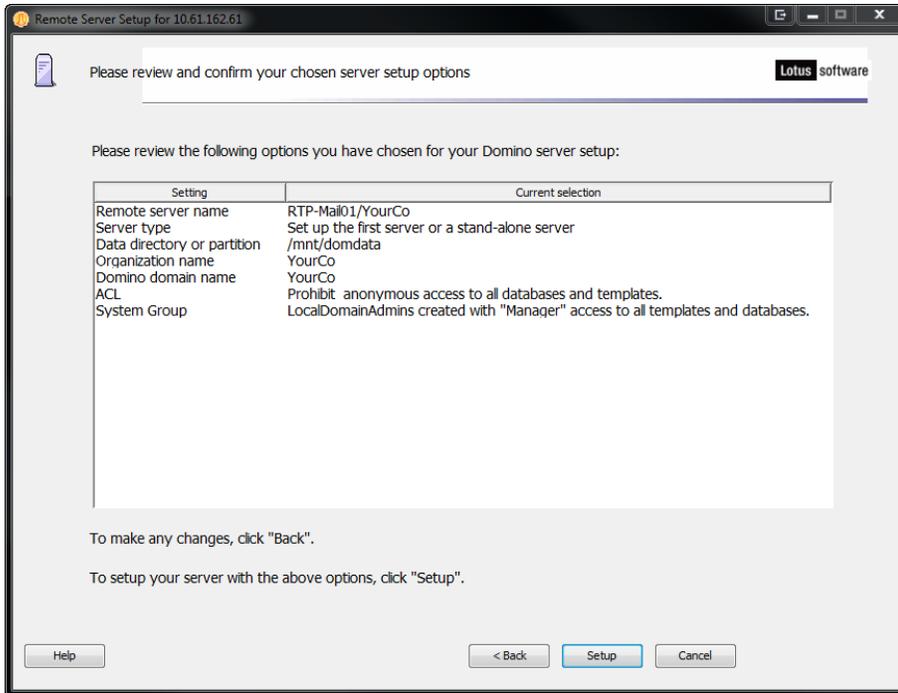
9. Make optional copies of ID files.

**Note:** This screen is seen only when using the Remote Server Setup.

This allows you to make local copies of the created ID files in addition to the ones being created on your server.

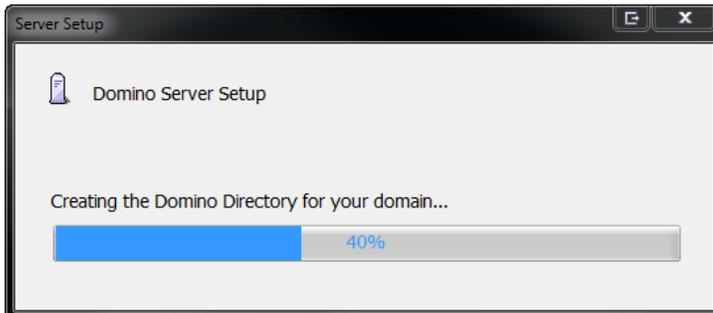


10. Review and confirm your server setup options.

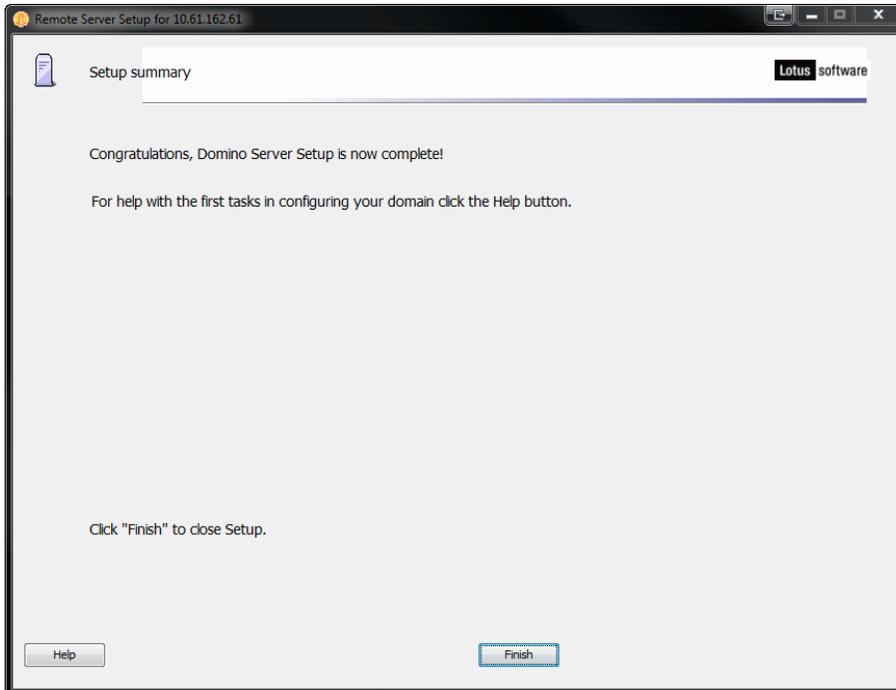


11. Click Setup to begin.

When you click Setup, you see the progress bar while the setup runs.

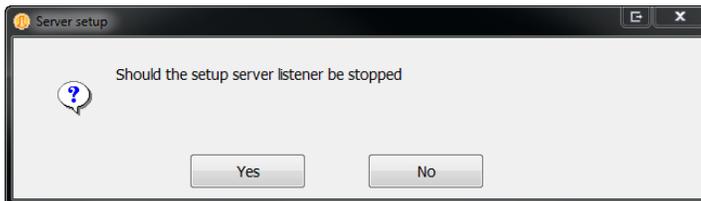


When setup is complete, you see the Setup Summary screen.



12. Click Finish.

If you are running Remote Server Setup, the following prompt appears:



13. Click Yes to conclude 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 by using the Java™ Domino Console
- Starting from 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

It's traditional to start Domino from a terminal window or shell. If you have been following the steps of this technical report, your environmental variables already should be set and all you must do to start the server is enter the command:

```
server
```

If this command fails, first review section 5.4 on setting the PATH environment variable or supply the full path so that Linux 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 Linux program running in the foreground, you must 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. If so, start your Domino server in the background. This requires adding an ampersand (&) 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 feature that allows the administrator to send commands to a server or multiple servers. Only a Domino Internet name and password are required; no Notes ID is required.

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
- 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 are encrypted using Secure Sockets Layer (SSL).

You can start or stop the Java console at any time without affecting the operational status of the Domino server.

To disconnect from the server, select File → Disconnect Controller or File → Exit to exit the Domino console.

**Note:** If you issue the `exit` command at the Domino command prompt, the Domino server quits and ceases operation.

The Java console is available, if installed as part of the Domino Administrator client, in Start → All Programs → Lotus Applications → Lotus Domino Console.

From the main window, select File → Open Server.

Enter the following information:

- Server: Domino server name or IP address
- Port: Use the default of 2050
- User name: This is your Domino administrator, not your local or Linux user; you created this in step 5 of the Domino server setup
- Password: The password for your Domino Administrator



Click OK to connect.

**Note:** You might need to open the proper port in your Linux firewall.

## 6.4 STARTING THE DOMINO SERVER FROM A SCRIPT

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

Sample scripts are provided in the [Lotus Domino 6 for Linux](#) (IBM Redbook) on the IBM Web site and in the appendix “Domino Scripts.”

Another highly regarded script is the freely available Nash!Com Start/Stop script. The Domino on UNIX/Linux Start Script is available on request on the [Nash!Com](#) Web site.

## 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 technical report.

Refer to the appropriate section in Domino Help to find the best way to configure the transactional logs. The section on Transactional Logging can be found in Monitoring → Managing Servers → Transactional logging.

## 8 DOMINO COMPACT BEST PRACTICES FOR NETAPP ENVIRONMENT

### 8.1 LOTUS DOMINO COMPACT OVERVIEW

Lotus Domino contains several server tasks, including one for Database Compaction, or Compact. When documents and attachments are deleted from databases, Lotus Domino tries to reuse the unused space rather than reduce the size of the file on disk. Compact reorganizes the disk usage by each database in order to free unused space. The Compact task can be invoked with the following command:

```
load compact [database] - [optional switches]
```

Where:

- *database* is the full name of the database that you want to compact. You can also run the command against a directory with the Domino data folder.
- *optional switches* is one or more of the switches used to control Compact. A full list of these switches can be found in the appendix “Domino Compact Switches.” If no switch is used, the default behavior of Compact is determined by whether transactional logging is enabled or disabled. This is detailed in the following three sections describing the styles of Compact.

Executing the following command on your Domino console runs Compact against all databases in the mail subdirectory using the switches -b and -S 10:

```
load compact mail\ -b -S 10
```

Additional information about these switches can be found in the appendix “Preinstallation Checklists.”

There are three styles of compaction:

- In-place compaction with space recovery
- In-place compaction with space recovery and file size reduction
- Copy-style compaction

### IN-PLACE COMPACTION WITH SPACE RECOVERY

This style of compaction recovers unused space in a database but doesn't reduce the size of the database on disk. Databases retain the same database instance IDs (DBIIDs), so the relationship between the compacted databases and the transaction log remains intact. Users and servers can continue to access and edit databases during compaction.

When you run Compact without specifying options, Domino uses this style of compaction on all databases that are enabled for transaction logging. Domino also uses this style of compaction when you use the -b option (case sensitive) to compact any databases.

### IN-PLACE COMPACTION WITH SPACE RECOVERY AND FILE SIZE REDUCTION

This style of compaction reduces the file size of databases as well as recovers unused space in databases. It is somewhat slower than in-place compaction with space recovery only. It also assigns new DBIIDs to databases; therefore, if you use this style of compaction on databases with transactional logging enabled, you should perform full backups of the databases shortly after compaction is complete. This style of compaction allows users and servers to continue to access and edit databases during compaction.

When you run Compact without specifying options, Domino uses this style of compaction on databases that aren't enabled for transactional logging. Domino also uses this style of compaction when you use the -B option.

### COPY-STYLE COMPACTION

Copy-style compaction creates copies of databases and then deletes the original databases after compaction completes; therefore, extra disk space is required to make the database copies. This style of compaction essentially creates a new database with a new database ID. If you use copy-style compaction on databases with transactional logging enabled as part of the database compaction process, a new DBIID is assigned. As a result, you should perform full backups of your databases shortly after compaction completes. When you use copy-style compaction, users and servers can't edit databases during compaction and they can only read databases if you use the -L option.

Domino uses copy-style compaction by default when you use an option with Compact to:

- Enable a database property that requires a structural change to a database

- When you run Compact on a database that has a structural change pending

Examples of pending structural changes are enabling or disabling the following database properties:

- Document table bitmap optimization
- Don't support specialized response hierarchy

Table 4 compares the three styles of compaction.

**Table 4) Three styles of Domino compaction.**

Characteristics	In-Place Compaction with Space Recovery	In-Place Compaction with Space Recovery and File Size Reduction	Copy-Style Compaction
Databases that use it when Compact runs without options	Logged databases with no pending structural changes	Unlogged databases with no pending structural changes	Databases with pending structural changes
Databases you can use it on	Current release	Current release	Current release (need -c)
Relative speed	Fastest	Medium	Slowest
Users can read databases during compaction	Yes	Yes	No (unless -L option is used)
Users can edit databases during compaction	Yes	Yes	No
Reduction in file size	No	Yes	Yes
Extra disk space required	No	No	Yes

In addition to reducing file size, Compact is also used to:

- Enable or disable specific database properties
- Run the document archiving tool on server databases that are configured for document deletion and archiving
- Fix up corrupted databases

There is a wide variety of switches that can be used with Compact. See the appendix "Preinstallation Checklists" for a list of all switches.

## 8.2 SNAPSHOT COPIES AND DOMINO COMPACT: CONSIDERATION

A NetApp Snapshot copy is a frozen copy of data block inodes. As long as the blocks remain unchanged in the active file system, the Snapshot copy consumes no space. If the block data is changed, the changed data is written to a new block and the old block is owned by the Snapshot copy. Hence, the Snapshot copy size depends on the number of changed blocks. Domino Compact with certain switches causes data rearrangement, resulting in changed blocks. For example, if you run compact -c, which copies the database to a new location on disk, you touch every block in that database as it is copied to a new location. As a result, the Snapshot copy captures the changed blocks, which with a compact -c is every block. This means that your Snapshot copy is the size of the database.

It is important to be aware of the behavior of Compact with NetApp Snapshot copies and to evaluate the use of Compact in your environment.

### 8.3 SNAPSHOT COPIES AND DOMINO COMPACT: RECOMMENDATIONS

The most important step is to evaluate the way that Compact is currently being used in your environment. Document which switches you are using with Compact and determine why you are using them.

If you are using the default settings, your Compact behavior depends on whether Domino transactional logging is enabled or disabled. With transactional logs enabled, Compact's default behavior is -b, which does not reduce file size and, as a result, does not appear to have a measurable impact on the size of the Snapshot copy. With transactional logging disabled, Compact's default behavior is -B, which performs in-place file size reduction, resulting in changed data blocks and causing larger than normal Snapshot copies as database space is reclaimed.

NetApp recommends that, for most environments, Compact should not be run more frequently than weekly. Customers using the Domino Compact feature should consider allocating appropriate storage space for Snapshot copies.

In addition, any Compact usage should include the -S switch with a threshold of 10% or 15%. This reduces data churn by running Compact only against databases with more than the specified percentage of white space.

You should use compact -c only when implementing a new on-disk structure (ODS) or on certain features that a new ODS makes available, such as Domino attachment and Object Service (DAOS) or data document compression. You can also use compact -c to help resolve database corruption after the fact, but it should not be run regularly as a preventative measure.

## 9 SUMMARY

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 technical report was 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, contact the author.

## 10 APPENDIXES

### 10.1 PREINSTALLATION CHECKLISTS

Table 5) Storage system.

Item	Example	Your Environment
Storage System Name	fas3270trv-1	
Storage System IP Address	10.61.161.188	
Storage System Data ONTAP Version	8.0	
Storage System User Account	root	
Storage System User Password	[redacted]	
Lotus Data Directory Volume Name	RedHat6_DomData	
Lotus Data Directory Volume Size	50GB	

Item	Example	Your Environment
Lotus Transaction Log Volume Name	RedHat6_DomTxn	
Lotus Transaction Log Volume Size	20GB	

Table 6) License code.

License Type (FCP, iSCSI, and so on)	License Code

Table 7) Host server.

Item	Example	Your Environment
Server Name	RedHat6_Domino	
Server IP Address	10.61.162.61	
Host Server Lotus User Account	domadmin	
Host Server Lotus User Password	[Redacted]	
Host Server Lotus User Group	notes	
Host Server Lotus Data Directory Mount Location	/mnt/domdata	
Host Server Lotus Transaction Log Mount Location	/mnt/domtxn	

Table 8) Domino server.

Item	Example	Your Environment
Domino Server Name	RTP-Mail01	
Domino Server Title	RTP 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	

## 10.2 DOMINO SCRIPTS

The Domino scripts were created as part of IBM Redbook # SG246835: [Lotus Domino 6 for Linux](#).

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

This appendix contains two sample scripts:

- Domino
- Startserver

## DOMINO

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

```
#!/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
```

## 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_PRELOAD
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 "Finish startup script."
```

### 10.3 DOMINO COMPACT SWITCHES

Table 9) Domino Compact switches.

Switch	Purpose	Affect on Snapshot Copies
-S nn	Compacts database if unused space estimate is greater than nn% free space	Low

Switch	Purpose	Affect on Snapshot Copies
-S nnnK	Compacts database if unused space estimate is greater than nnn kB	Low
-S nnnM	Compacts database if unused space estimate is greater than nnn MB	Low
-daos on	Enables Domino Attachment and Object Service (Domino 8.5 and later)	
-daos off	Disables Domino Attachment and Object Service (Domino 8.5 and later)	
-*	Include *.ntf and *.box when processing a directory (Domino 8.5 and later)	
-b	In-place database compaction without file-size reduction; -b is the only switch that does not change the DBIID	Low
-B	In-place database compaction with file-size reduction	Medium
-c or -C	Copy-style compaction; used to solve database corruption problems or enable features	HIGH
-L or -l	Copy-style compaction; allows access while compacting (if database is edited, Compact is cancelled)	HIGH
-i	Use with -c or -L; enables compacting to continue if errors are encountered	HIGH
-o or -O	Use with in-place compaction; -O checks for overlapping objects and switches to copy style if any are found	
-e or -E	Does not execute Compact but validates syntax	Low
-F	Enables "Document table bitmap optimization" database property; performs copy-style compaction	HIGH
-f	Disables "Document table bitmap optimization" database property; performs copy-style compaction	HIGH
-H	Enables the "Don't support specialized response hierarchy" database property; performs copy-style compaction	HIGH
-h	Disables the "Don't support specialized response hierarchy" database property; performs copy-style compaction	HIGH
-T	Enables Transactional logging	Low
-t	Disables Transactional logging	Low
-U	Enables the "Don't maintain unread marks" database property	
-u	Disables the "Don't maintain unread marks" database property	
-K	Allows a larger UNK table in a database past 64K	
-k	Removes large UNK table in database	

Switch	Purpose	Affect on Snapshot Copies
-V	Disables the “Compress document data” database property; usually used with -c to enable or disable on existing data	
-v	Enables the “Compress document data” database property; usually used with -c to enable or disable on existing data	
-ZU	Converts document attachments using compression type Huffman to LZ1 <b>Note:</b> The database property “Use LZ1 compression for attachments” must be enabled for this switch to be effective.	
-ZD	Converts document attachments using compression type LZ1 to Huffman	
-N	Uncompresses data (Domino 8 and later)	
-n	Compresses data (Domino 8 and later)	
-A	Archives and deletes documents from a database without compacting the database	
-a	Archives and deletes documents from a database, then compacts the database	
-j	Deletes documents from a database, then compacts the database	
-Y	Recurse through subdirectories (default) (Domino 8.5 and later)	
-y	Do not recurse through subdirectories (Domino 8.5 and later)	
-0	Process NSFDB2 databases only; ignores NSF databases and is to be used with other switches (Domino 8.5 and later)	
-D	Compacts databases and deletes any built view indexes	
-R	Compacts databases and changes the ODS version to the previous release file format	

## 11 REFERENCES

- Domino for Linux on x86 Configuration  
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## 12 REVISION HISTORY

Table 10) Revision history.

Date	Comments
March 2008	Original publication
February 2011	Revised TR: <ul style="list-style-type: none"> <li>• Updated to Domino version 8.5, including the use of NetApp System Manager</li> <li>• Added section on Domino Compact</li> </ul>

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