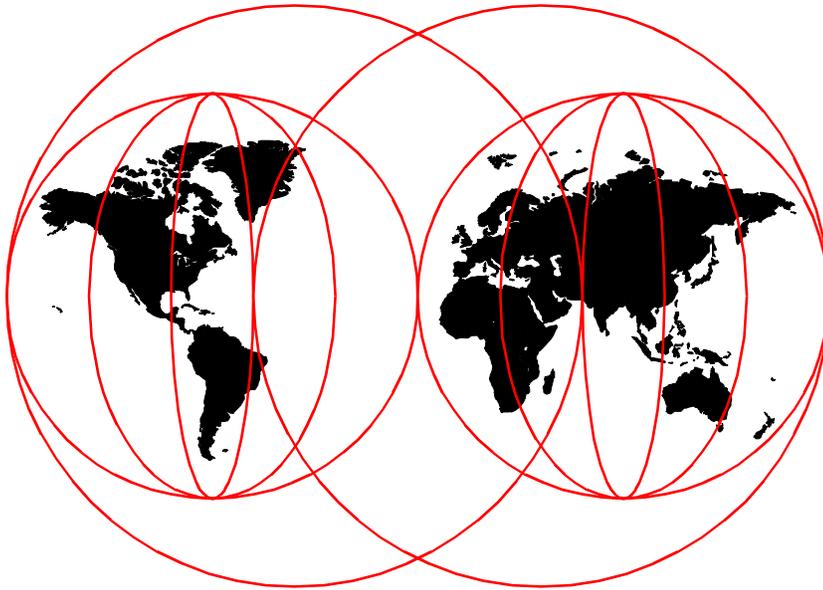IBM

Using ADSM to Back Up Lotus Notes

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International Technical Support Organization

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Using ADSM to Back Up Lotus Notes

July 1998

> **Take Note!**
>
> Before using this information and the product it supports, be sure to read the general information in Appendix B, "Special Notices" on page 143.

Second Edition (July 1998)

This edition applies to Version 3 Release 1 of ADSTAR Distributed Storage Manager for AIX, program 5765-C43; Version 3 Release 1 of ADSTAR Distributed Storage Manager for HP-UX, program 5639-D92; Version 3 Release 1 of ADSTAR Distributed Storage Manager for MVS, program 5655-A30; Version 3 Release 1 of ADSTAR Distributed Storage Manager for Sun Solaris, program 5639-D91; Version 3 Release 1 of ADSTAR Distributed Storage Manager for Windows NT program 5639-C59, Version 2 of the ADSMConnect Agent for Lotus Notes on AIX, program 5765-C45; and Version 2 of the ADSMConnect Agent for Lotus Notes on Windows NT, program 5639-C70.

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Preface

IBM ADSTAR Distributed Storage Manager (ADSM) is an enterprisewide network storage management solution. It provides the marketplace's solution for incremental backup and restore of individual Lotus Notes database documents. This redbook addresses backup and recovery of Lotus Notes 4.5 on OS/2, Windows NT, and AIX.

The book is structured into two parts: Part 1 provides information for the implementation of ADSM, including the ADSM Version 3 Notes Backup Agent on OS/2 and the Version 2 ADSMConnect Agents for Lotus Notes on Windows NT and AIX, and Part 2 shows how ADSM can be exploited in a Notes environment.

This redbook is intended for customers, consultants, IBM Business Partners, and IBMers who are familiar with ADSM and Lotus Notes and want to know how to use ADSM to manage Notes data.

The Team That Wrote This Redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization, San Jose Center.

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Part 1. Implementing ADSM in a Notes Environment

After a brief introduction to Lotus Notes in the first chapter we discuss the challenge of storage management in a Notes environment and how ADSM fulfills the needs for a comprehensive Notes backup solution. The subsequent chapters of Part 1 of this book cover implementation issues of ADSM in a Notes environment. We look at the installation and configuration of the ADSM Notes agents on the supported platforms:

- OS/2

- Windows NT

- AIX

We also look at the operation of the agents both using the command-line interface and the graphical user interface.

Chapter 1. Notes and ADSM

In this chapter, we give a brief introduction to Lotus Notes, its components and interfaces, and Notes as a database system. We discuss the importance of storage management and its requirements to a backup solution.

ADSTAR Distributed Storage Manager (ADSM), the market's best storage manager in a distributed environment, provides a backup solution for a heterogeneous Notes environment, including the backup/archive client and the Notes agent. We show that although each component on its own has limitations in a Notes environment, together they provide a complete backup solution and fulfill the requirements for Notes storage management.

1.1 What Is Lotus Notes?

Notes is an example of a growing genre of software called *groupware.* Groupware, by definition, means that the data for an application is used by members of a group. Its infrastructure comprises technologies for communication (electronic mail, messaging), collaboration (electronic discussions, shared databases, forums), and coordination (workflow automation).

Notes combines an advanced client/server application development environment, a document database, and a sophisticated messaging system. With Notes, people can work together regardless of software or hardware platform and across technical, organizational, and geographical boundaries. It allows users to communicate securely over a local area network (LAN) or telecommunication, and create or access documents residing on a shared computer. Notes-based information can be shared across any distance, at any time.

Notes also provides access to external network services such as host-based mail or fax gateways and the Internet. Using the internal InterNotes Web Navigator, or any third-party navigator such as Netscape or Microsoft Internet Explorer, you can browse the Internet directly. On the other hand, Notes translates Notes documents into HTML documents on the fly, making any Notes server into a Web server

1.1.1 Notes Components and Platforms

Notes is a client/server application that runs on a variety of workstation operating system platforms. There are two product components:

- Notes server

  The Notes server provides services to Notes workstation users and other Notes servers, including storage and replication of shared databases and mail routing. With Notes Release 4.5 you can run Notes server on the following platforms:

  - Windows NT and Windows 95
  - OS/390
  - OS/2
  - NetWare
  - UNIX: IBM AIX, HP-UX, and Sun Solaris

- Notes workstation

  The Notes workstation communicates with one or more Notes servers, providing the interface that allows a Notes user to access shared databases and to read and send mail. With Notes R4.5, you can run Notes workstation on the following platforms:

  - Windows NT, Windows 95, and Windows 3.1
  - OS/2
  - Macintosh System
  - UNIX: IBM AIX, HP-UX, and Sun Solaris

The Notes workstation is required on user workstations that will access databases on a Notes server. However, the Notes workstation is more than just a client. It is a single-user version of a Notes server, providing a very complete subset of the server functions on the user's client workstation. Notes users can work with databases on a Notes server that are shared with other users or have Notes databases on their own client workstation. The local databases on their client workstation look and feel exactly the same as databases on a server. The only limitation is that the database can be accessed only at the user's client workstation, not by other users in the network.

Connectivity between Notes servers and clients is typically over a local or wide area network. Protocols supported include TCP/IP, NetBIOS, IPX/SPX, Apple Talk, Banyan Vines, and X.PC. Dial-in connections are also supported for remote Notes workstations that connect to a server only occasionally.

1.1.2 Notes User Interface

Notes provides a graphical user interface (GUI), also called *Notes workspace*, as shown in Figure 1 on page 5. Users use Notes workspace to access databases or applications. The Notes workspace consists of seven tabbed desktop windows, or folders: six of them contain icons that represent databases. The replicator window enables the user to start and monitor database replications between Notes server and the local Notes workstation.

Users can open databases by clicking on the tab of a folder and then double-clicking on a database icon. Icons can represent databases or applications on either the user's local workstation or a remote Notes server.

Notes databases and Notes applications are synonymous terms. The Notes workspace also has a set of pull-down menus for working with databases and SmartIcons that provide a fast path to many everyday functions. The Notes workspace has the same look and feel across all of the supported client platforms.
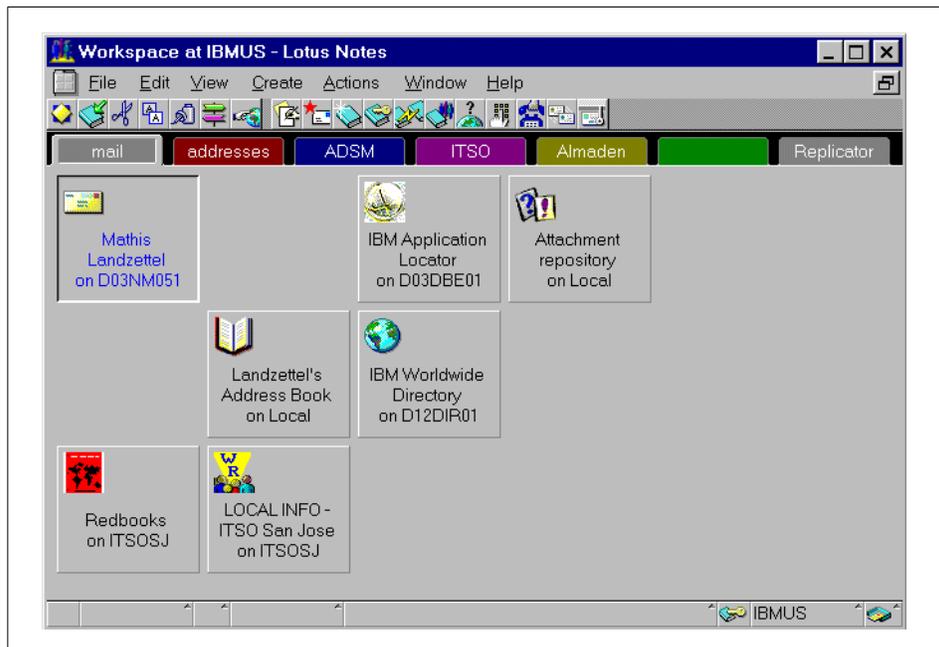
Figure 1. Notes Workspace

1.1.3 Notes Administration

Like any other system, Notes requires administration. Notes provides two main interfaces for administration: the Notes server console and the Notes client workspace.

When a Notes server is started, a full-screen command line console is presented as shown in Figure 2 on page 6. The console displays the server activities, such as scheduled macros and replication. The server console is also the interface for administrators to perform tasks such as loading additional Notes programs, querying server statistics, and setting certain server options. The server console is a window on the physical server screen. A remote console function is also provided through the Notes workspace. It enables remote server administration by suitably authorized users.

```
Lotus Domino r Server, Release 4.5.2 (Intl), 26 June 1997
Copyright c 1985-1997, Lotus Development Corporation, All Rights Reserved

04/02/98 12:58:32 PM  Database Replicator started
04/02/98 12:58:37 PM  Mail Router started for domain ALMADEN
04/02/98 12:58:37 PM  Router: Internet SMTP host malawi in domain almaden.ibm.com
04/02/98 12:58:42 PM  Index update process started
04/02/98 12:58:47 PM  Stats agent shutdown
04/02/98 12:58:52 PM  Agent Manager started
04/02/98 12:58:55 PM  AMgr: Executive '1' started
04/02/98 12:58:57 PM  servwnt/almaden is the Administration Server of the Public
Address Book.
04/02/98 12:58:58 PM  Administration Process started
04/02/98 12:59:02 PM  Schedule Manager started
04/02/98 12:59:02 PM  SchedMgr: Validating Schedule Database
04/02/98 12:59:03 PM  SchedMgr: Done validating Schedule Database
04/02/98 12:59:07 PM  Calendar Connector started
04/02/98 12:59:13 PM  HTTP Web Server started
04/02/98 12:59:18 PM  Database Server started
```

Figure 2. Notes Server Console

Although the server console is the interface for basic administration, most Notes administration is performed by using a special Notes database called *Name & Address database*, from the Notes workspace. The Name & Address database, with a file name of names.nsf, is created on every Notes server and client when the servers and clients are installed. On a Notes server, the Name & Address databases (or *books* as they are also called) are public and contain information about all servers and users within the network. On a Notes client, the Name & Address database is private and contains information pertinent only to that client workstation. Figure 3 on page 7 shows the Notes server Name & Address database, called *Almaden's Address Book*. The selected view is *People,* which lists all registered users in the Notes

domain Almaden. A Notes domain is defined as a collection of users, servers, and groups that share a common Name & Address book within a Notes environment.
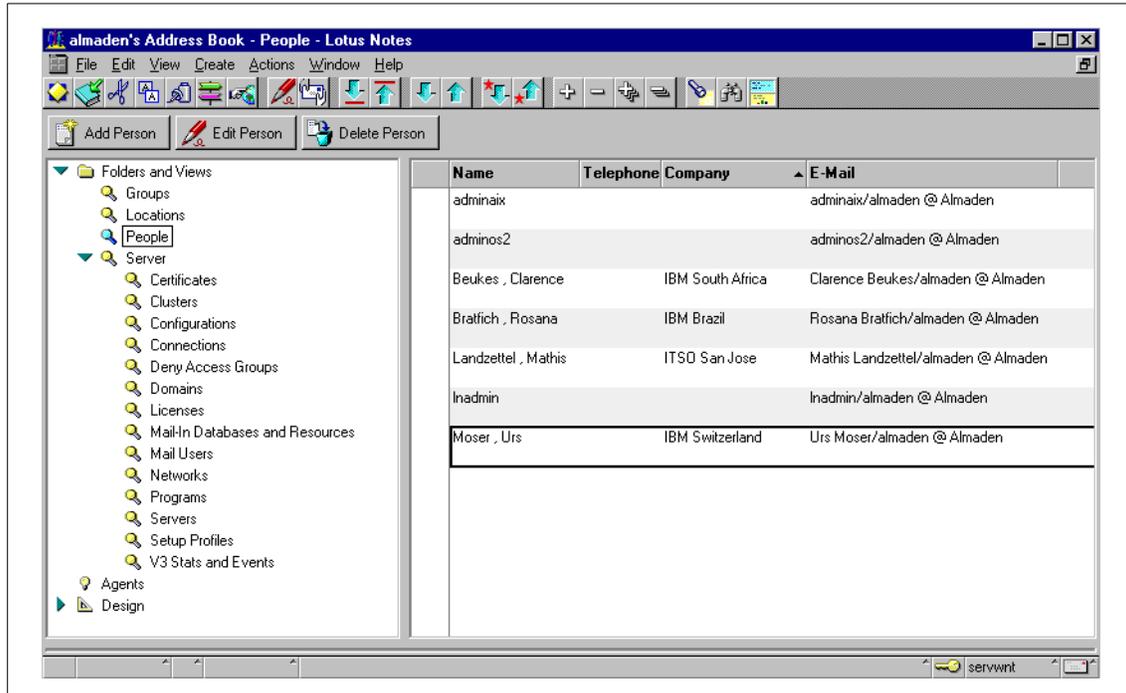
Figure 3. Public Name & Address Book

On a Notes server, the Name & Address database is probably the most powerful directory-services and server-management tool for an administrator. The public Name & Address database as a directory service tool is a directory of all Notes users, servers in a domain, group names for mailing lists, and foreign domains. Servers within a domain have a common Name & Address database that is replicated across all servers in the domain.

As a server management tool, the Name & Address database is used to control server operations. It contains instructions on how servers can communicate with other servers and which tools or programs are run. It is the main Notes scheduling tool to schedule operations such as establishing server-to-server connections for replication.

Notes administrators additionally use the Notes workspace to administer a Notes server. If you select **File - Tools - Server Administration,** a dedicated

administration window appears. From there, administrators can maintain all Notes servers, register new users or servers in the domain, and access the different views of the Name & Address database.
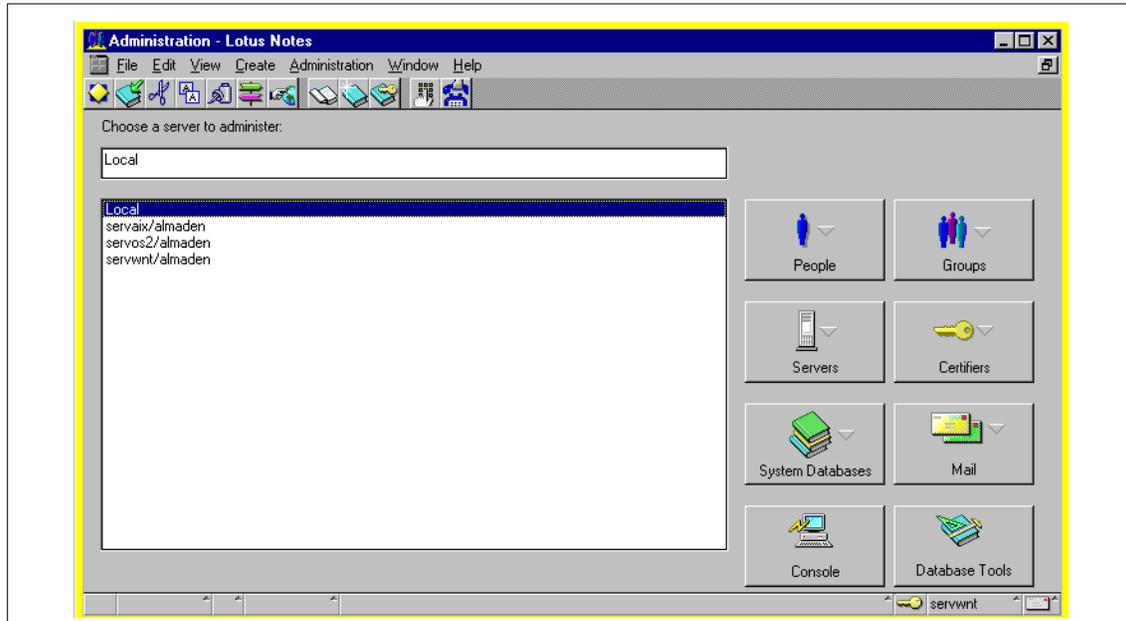
Figure 4. Administration Window on Notes Workspace

1.1.4 Notes Data

A Notes database is the basic component of a Notes application. It is the repository where users create, update, store, and track documents in various formats. The document-oriented information within the files is unstructured and can contain many types of data: text, image, audio, and video. Shared databases reside on one or more Notes servers and can be accessed by multiple users. A local database is resident on a user's client workstation and is accessible only at that workstation. Each icon on the Notes workspace shown in Figure 1 on page 5 represents a database, either on a remote Notes server or on the local workstation. A Notes database created on a Windows client, for example, has the same format as a database created on an OS/2, NetWare, or UNIX Notes server. Thus Notes databases are portable among various Notes servers and clients throughout an enterprise.

A Notes database is stored on a server or client workstation as a single notes structured file with an .nsf file extension. A Notes database is a single, self-contained entity as far as the workstation operating system is concerned.

A workstation operating system such as AIX has no knowledge of the structure or contents of a Notes database. The lack of knowledge is beneficial in terms of portability but presents an interesting storage management challenge. Notes databases can become very large files, often growing to hundreds of megabytes in size.

Beside databases, Notes includes other files. The following are part of your Notes environment:

- notes.ini

  This file is the Notes server and workstation initialization file that defines various configuration and performance variables.

- names.nsf

  This file is the server Name & Address book. It is the central repository for address and server configuration information for users, groups, and servers within a Notes domain.

- log.nsf

  This database is automatically created to record and store information about all types of Notes server activities, and remote workstation communication activities.

- cert.id

  This certifier ID file is used to create new Notes user and server ID files and to cross-certify existing server, user, and other certifier ID files.

- server.id

  This server ID file is used to start and run the Notes server.

- user.id

  This ID file identifies the Notes user when accessing a Notes server.

- desktop.dsk

  This is the configuration file for the Notes workspace.

- catalog.nsf

  This database catalog lists all public databases. It records and stores information about the databases on a Notes server.

- mail.box

  This file is the Notes mail-router mail box.

- ..\mail\user.nsf

  This is a user's mail database. It is used to send and receive electronic mail using Notes. In a large Notes environment, there will be several mail subdirectories including mail databases for all users.

- discuss4.ntf

  Files with the extension .ntf are database template files — in this example, a template file for a Notes discussion forum.

- names.ft

  This is actually a directory with several subdirectories including files. It is the index data for a database, in this example, for the Name & Address database.

1.1.5 Storage Management of Notes

Providing effective storage management services for a Notes system can be a demanding task. All nondatabase Notes data comes under your general storage management policy: Regular backups need to be run against frequently updated data. The challenge with Notes, however, is the storage management of Notes databases.

Notes databases are complex logical structures, often very large, that appear to traditional storage management tools as single workstation files. A backup tool that operates only at operating system level will always back up the entire database. Whenever a single document is updated within a database, an incremental backup would catch the entire database since the modification time stamp of the database has changed. This leads to an enormous amount of data and backup copies on the storage location.

Most backup products can perform incremental backups of files, but this does not hold true with Notes. Incremental backing up of Notes databases has to be performed on document level. This is to enable the administrator to keep a certain number of backup copies for each single document.

Notes itself provides a function for database backups: replication. Replication is the process of updating databases that reside on different servers and clients within a Notes environment simultaneously. Updates to a database can be reflected on all database copies wherever they physically reside. This update works on a document level. If a database or a document within a database is accidentally deleted, it can be recovered as long as a replication database copy is available elsewhere in the Notes environment. However, replication is not a substitute for an effective backup solution. Replication will duplicate user errors throughout a Notes network. If a critical document or

database is erased by accident, replication will, in time erase that same information wherever it is replicated.

Another problem with most backup products is that they do not allow backup of open files. There are several files in Notes that cannot be backed up while the Notes server is running, one of which is the most crucial file, the public Name & Address database. These files will not be backed up unless you stop the Notes server first, or make periodic replica copies that can be backed up.

1.2 ADSM Backup/Archive Client and Notes

The ADSM backup and archive (backup/archive) client is designed to back up and restore and archive and retrieve workstation file system data. As your enterprise system backup solution, ADSM backs up all nondatabase Notes data on both Notes server and workstation. ADSM clients use standard operating system functions to access files within file systems, but they do not understand any logical structure that might exist within a file. This is not a limitation only of ADSM; all other workstation backup products that work at the file system level are similarly limited.

These limitations affect how Notes and other database systems are backed up. Each database appears as an individual NSF file in the server or client file systems. An ADSM backup/archive client running on a Notes server or client can back up restore, archive, and retrieve entire Notes databases. It cannot back up smaller increments.

ADSM clients can be installed wherever there are Notes databases that require backing up. However, that approach could potentially lead to large numbers of duplicate database backup copies if Notes replication is also being used. A more sensible approach is to implement ADSM clients on Notes servers only. If possible, identify those databases on the servers that are replicas from other servers and exclude them from backup. (This approach assumes that backups of those databases have already been performed at the originating database server.)

Other than the issues of size and replication, using an ADSM backup/archive client to back up Notes databases is straightforward. Each database is a self-contained NSF file that is backed up and restored without any problem. ADSM restores a database in its entirety because it is just a file for ADSM. If a database is deleted or corrupted, it is a simple task for ADSM to restore the most recent or any backup copy version of this database from the ADSM server to the Notes server or workstation.

The ADSM backup/archive client, however, does not meet all requirements for an ideal storage management solution in a Notes environment, as discussed in 1.1.5, "Storage Management of Notes" on page 10. The ADSM client backs up databases in their entirety and not on a document level.

1.3 Introducing the ADSM Notes Agent

> **Naming Convention:**
>
> From now on we use the following naming convention: *ADSM Notes agent* or *Notes agent* stands for *ADSM Notes Backup Agent* for OS/2 or *ADSMConnect Agent* for Windows NT or AIX.

The ADSM Notes agent provides an integrated solution for performing document-level incremental backup and restore operations on a Notes database. It is a Notes application that provides backup and restore of individual documents within a Notes database. It therefore provides functions complementary to the standard ADSM backup/archive client. It is not intended as a substitute for the standard ADSM backup/archive client. Table 1 compares the functions provided by either the ADSM backup/archive client or the Notes agent.

Table 1. ADSM Backup/Archive Client and Notes Agent Functions

Function	Backup/Archive Client	Notes Agent
Nondatabase backup/restore	Yes	No
Full database backup/restore	Yes	Yes
Incremental database backup	No	Yes
Restore individual documents	No	Yes
Restore deleted documents	No	Yes

The Notes agent cannot be used to back up or restore any other type of data, such as Notes ID files, or notes.ini, or any other system configuration files. Those files are backed up by the ADSM backup/archive client described in 1.2, "ADSM Backup/Archive Client and Notes" on page 11.

The ADSM Notes agent and the ADSM backup/archive client can run simultaneously on the same Notes server or workstation; however, they are totally separate clients as far as the ADSM server is concerned.

The Notes agent provides the ability to back up Notes databases at the individual Notes document level. The Notes agent is integrated within Notes and recognizes the logical structure of a Notes database.

The Notes agent provides commands to:

- Perform an incremental backup of Notes databases, backing up only those documents that have changed since the previous incremental backup.

- Restore to a database individual documents that have been previously backed up by the Notes agent.

- Restore individual documents that have been deleted from a Notes database.

- Restore an entire Notes database.

- Perform an incremental restore function by merging changed documents into a database.

The Notes agent provides a command line interface for performing backups and restores. The Notes agent commands can be issued either from a command prompt or from a Notes server console. You can invoke the Notes agent GUI from the Notes workspace. Figure 5 shows the ADSM Notes agent embedded in the Notes workspace. See Chapter 5, "Operation of the ADSM Notes Agent" on page 55 for a further discussion on the operation of the Notes agent.
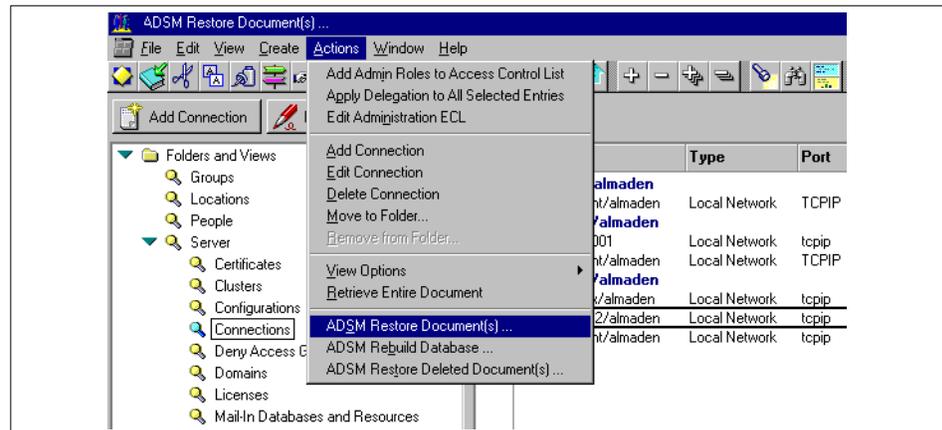
Figure 5. ADSM Notes Agent GUI

The Notes agent uses the Notes API to communicate with the ADSM API. The Notes API enables the Notes agent to understand the structure within a

Notes database and therefore to back up and restore on the document level. The ADSM API, which has a C language interface, can be regarded as a special type of ADSM client. It is designed to provide an interface between a workstation application and an ADSM server. The ADSM API is configured in a way similar to the standard ADSM backup/archive client. An ADSM server views an application using the API as a separate, self-contained workstation client. Figure 6 illustrates the logical components of the Notes agent.
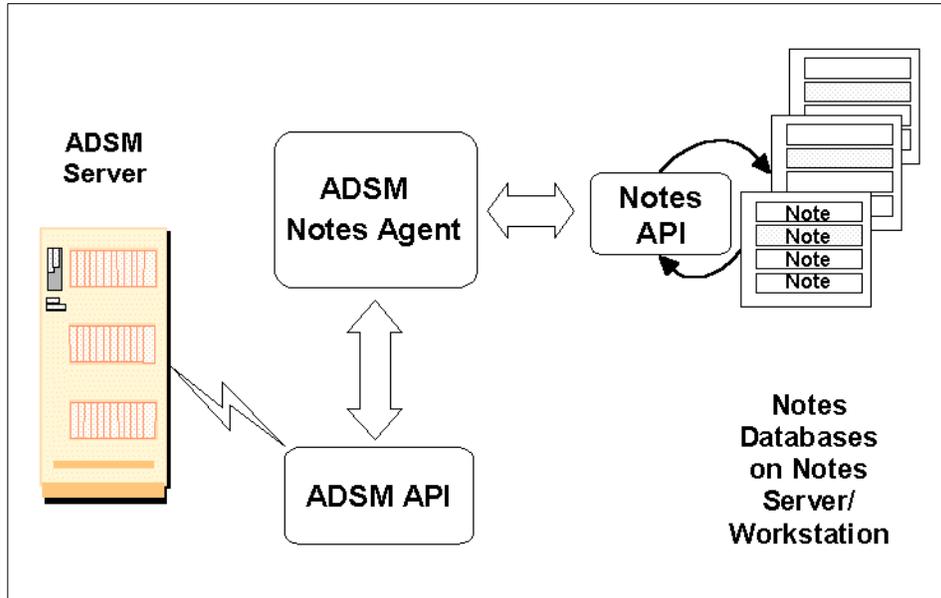
Figure 6. Logical Components of ADSM Notes Agent

Chapter 2. ADSM Notes Backup Agent on OS/2

In this chapter, we cover the installation and configuration of the ADSM Lotus Notes Backup Agent on OS/2. The installation consists of two steps: installation of the ADSM application programming interface (API) and installation of the ADSM Notes Backup Agent. The configuration includes the update of the Notes initialization file, modifications of the OS/2 environment, and the creation of the ADSM client options file. All these steps are required to get the ADSM Notes Backup Agent running and functional on your OS/2 system.

Since the ADSM Notes Backup Agent on OS/2 was introduced in ADSM Version 2, we discuss issues of migration from Version 2 to Version 3.

2.1 Installation

In this section, we describe the steps you need to follow in order to install the Version 3 ADSM Notes Backup Agent on OS/2. Prerequisites are that OS/2 is running on the system and Notes server is already installed and functional. Check the readme file for the latest information about the OS/2 and Notes server versions supported by the ADSM Notes Backup Agent.

The Version 3 ADSM Notes Backup Agent is introduced with ADSM Version 3 R1L0.3. It requires the Version 3 R1L0.3 API or higher.

2.1.1 ADSM API

Before running the ADSM Notes Backup Agent, you must install the Version 3 ADSM API. The ADSM API is part of the standard ADSM backup/archive client Version 3 for OS/2. The ADSM API is installed in the same way as the standard ADSM backup/archive client. The ADSM backup/archive client lists the ADSM API as a fifth optional component to install. Figure 7 on page 16 illustrates the ADSM Backup and Archive Client install window and shows that the ADSM API is selected for installation. Please refer to *ADSTAR Distributed Storage Manager: Installing the Clients* (SH26-0480-00) for a more detailed instruction on how to install the ADSM API on OS/2.

If the Version 2 ADSM API is already installed on the system, for example in c:\adsm\api, and is used for other applications, make sure that you specify a dedicated directory for the installation of the Version 3 ADSM API (for example c:\adsmcv3\api). Otherwise, you will lose the older version of the API. If the Version 3 ADSM API is already installed on the system, make sure

that you have the latest version of the API in order to run the ADSM Notes
Backup Agent successfully.

,
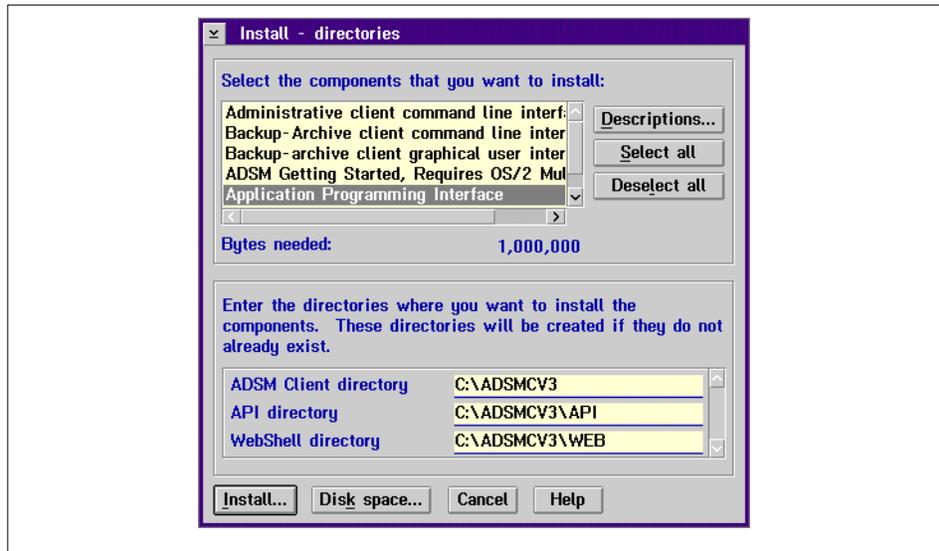
Figure 7. ADSM API Installation on OS/2

2.1.2 ADSM Notes Backup Agent

The following steps will guide you through the ADSM Notes Backup Agent
Version 3 installation on OS/2:

1. On the installation media, change to directory \adsmcli\os2\lnotes. For
   example,

   cd f:\adsmcli\os2\lnotes

2. Type install and press Enter.

3. In instructions screen, click on the **Continue** radio button.

4. An install-confirmation box will pop up. Click on the **OK** radio button.

5. In the **Install-directories** window, as shown in Figure 8 on page 17, click
   on the **Select all** radio button.

   You must define three directories at this point:

   • ADSM Lotus Notes directory

     The directory where you want the ADSM Notes Backup Agent to be
     installed. For example:

c:\dsmnotes

- ADSM option file directory

  You can select the directory where the client options sample file dsm.smp should be located. For example:

  c:\dsmnotes

- Lotus NOTES.INI directory

  The directory is the location where the notes.ini file is already located. For example:

  c:\notes
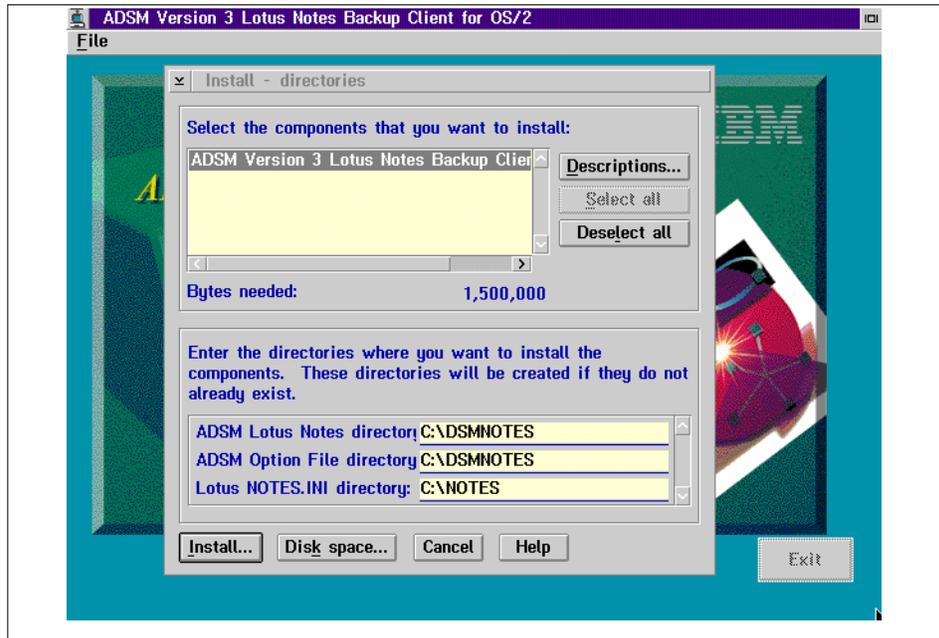
Figure 8. Install Directories on OS/2

6. Click on the **Install** radio button.

7. When the installation is complete, a confirmation box will be displayed; click on **OK**.

8. Shut down and restart your workstation.

During the installation, an icon for the readme file of the Version 3 ADSM Notes Backup Agent is automatically added to the ADSM Version3 folder on the OS/2 desktop.

2.1.3 Licensing

With ADSM Version 3 R1L0.3 the ADSM Notes Backup Agent is packaged with the ADSM Version 3 OS/2 client. The OS/2 client contains the standard ADSM backup/archive client, administration client, ADSM API, Webshell client, and the ADSM Notes Backup Agent. Users select which components to install during the installation process.

The ADSM Notes Backup Agent on OS/2 is not a separately charged feature; instead, it is provided as a no-charge component for the OS/2 client. However, if you configure the ADSM Notes Backup Agent with a separate node name from the ADSM Backup and Archive Client (as we recommend in Chapter 6, "Setting Up ADSM in a Notes Environment" on page 77), the ADSM Notes Backup Agent counts as an additional client connection and is reflected as such in the ADSM server pricing.

2.1.4 ADSM Notes Backup Agent Files for OS/2

By default, all ADSM Notes Backup Agent files are located in the c:\dsmnotes subdirectory and are used for the ADSM Notes Backup Agent to run properly.

Table 2 lists the files that are on your workstation after this installation.

Table 2. ADSM Notes Backup Agent on OS/2: Files

File Name	Description
dsmnotes.exe	Executable for dsmnotes command
dsmnotes.dll	Agent dynamic link library
dsmnoted.dll	Agent resources
dsmln.hlp	Agent help file
readme.dln	Readme file
optionsl.doc	Summary of applicable ADSM options
epfirexx.dll	Needed to determine notes.ini
dsmln.pkg	Installation package file

2.2 Configuration

In this section we provide instructions for configuring the ADSM Notes Backup Agent on OS/2. The configuration comprises setup or updates of the Notes initialization file, notes.ini, the user environment, and the ADSM client options file.

2.2.1 Updating the NOTES.INI File

The following variables are set in the notes.ini file (the AddInMenus variable is required but all other variables are optional):

- **AddInMenus.** The ADSM Notes Backup Agent installation program automatically adds the AddInMenus variable to your notes.ini file. AddInMenus ties ADSM to the Notes workspace. This is required to use the GUI of the ADSM Notes Backup Agent. Figure 5 on page 13 illustrates how ADSM is embedded in the Notes workspace. The specified path name is the fully qualified path name of the dsmnotes.dll file. If this line is not added to the notes.ini file automatically during installation, you can add it manually.

- **DSMNOTES_CONFIG.** This variable takes a fully qualified path name that points to an additional client options file. This variable is recommended especially when you use a separate node name for your ADSM Notes Backup Agent. The ADSM Notes Backup Agent will use this client options file as an additional options file, which will override any of the same options that are included in the ADSM backup/archive client options file.

- **DSMNOTES_LOGDIR.** Log messages are sent to a file called *log.dsm*. Use DSMNOTES_LOGDIR to point to the directory where the log file is located. If you do not set this environment variable, the default location for log.dsm is the Notes data directory. If you do not have a Notes data directory, this environment variable is required. Because this file grows over time, it must be managed as appropriate.

- **DSMNOTES_STATS.** Use DSMNOTES_STATS to send messages to the screen when a command-line function is run. The messages show the current status of the command. If VERBOSE is specified, two types of status indicators might appear on the screen:

  - One or more dots (.), indicating that processing is continuing. Depending on the environment, you may experience delays between dots. For example, delays can occur when searching very large Notes databases for deleted documents. There may also be delays when waiting for off-line media to be mounted.

  - Messages showing the result of the command when the command has completed processing. The messages display information such as the number of documents transferred and whether the dsmnotes command completed without any errors.

  The default value for this option is QUIET: status messages are not displayed on your screen. This can be the appropriate choice in a large Notes environment, since displaying the status messages on your screen slows the performance of command-line operations.

The Version 2 ADSM Notes Backup Agent on OS/2 provides a private password management function. If you specify DSMNOTES_AUTO_PW=ON and DSMNOTES_PWDIR in the notes.ini file, you enable the generation of a new ADSM password when the original expires. The password is stored in a file in the directory that is specified by DSMNOTES_PWDIR. The password file name is dsmnotes.pwd. Version 3 ADSM Notes Backup Agent makes this automatic password handler obsolete. It uses the PASSWORDACCESS option to let ADSM keep track of the agents' password, explained in 2.2.3, "Setting Up ADSM" on page 21.

After you modify the notes.ini file with these environment variables, you have to shut down the Notes workspace and bring it back up for the new changes to be active. Figure 9 shows the part of notes.ini file we used in our environment.

```
[NOTES]
...
AddInMenus=C:\DSMNOTES\DSMNOTES.DLL
DSMNOTES_CONFIG=C:\DSMNOTES\DSM.OPT
DSMNOTES_LOGDIR=C:\DSMNOTES
DSMNOTES_STATS=VERBOSE
...
```

Figure 9. NOTES.INI File Update on OS/2

2.2.2 Setting Environment Variables

The following variables need to be set in the system environment to use the ADSM Notes Backup Agent on OS/2. You can set these variables in the system configuration file config.sys:

- **Path.** During the installation, the ADSM Lotus Notes directory, which is selected during the installation as shown in Figure 8 on page 17, is automatically added to the path statements PATH, LIBPATH, and HELP in the config.sys

- **DSMI_CONFIG.** This ADSM API variable is the fully qualified name for the client options file dsm.opt. To allow the ADSM Notes Backup Agent and the backup/archive client to run simultaneously on the system, make sure that the ADSM Notes Backup Agent uses a dedicated client user options file.

- **DSMI_DIR.** This ADSM API variable points to the location containing the ADSM message file dscameng.txt.

- **DSMI_LOG.** This optional ADSM API variable points to the directory where ADSM stores the API error log file dsierror.log. The error log file contains information about ADSM API errors that occur during processing.

Figure 10 shows the system environment settings in the config.sys of our OS/2 machine.

```
...
SET DSMI_CONFIG=C:\DSMNOTES\DSM.OPT
SET DSMI_DIR=C:\ADSMCV3
SET DSMI_LOG=C:\DSMNOTES
...
```

Figure 10. CONFIG.SYS Update on OS/2

You also can create a command script, including the environment statements, which is executed in an OS/2 window. From there, you then start the ADSM Notes Backup Agent command-line program or the Notes workspace. We recommend doing so if the ADSM API environment variables are already set because they are being used with a different API application.

2.2.3 Setting Up ADSM

The following subsections provide instructions to set up ADSM. We cover only the options essential for creating the ADSM options file using TCP/IP, since this is the communication protocol we use in our environment. See *ADSTAR Distributed Storage Manager: Installing the Clients* (SH26-4080) for more information about the available options and supported communication protocols.

Before the ADSM Notes Backup Agent can connect the server, a dedicated node name and password must be provided by the ADSM administrator. We highly recommend having an individual node name, client options file, and include/exclude list for the ADSM Notes Backup Agent.

2.2.3.1 Creating the Client Options File

The client options file identifies the ADSM server to contact for services and specifies the required communication options for the server. It can also include authorization options, backup and archive processing options, and scheduling options.

The ADSM Notes Backup Agent includes a sample client options file, dsm.smp, which contains the minimum options required to get started using the ADSM Notes Backup Agent. If you choose, you can add other options to the file as part of your initial setup, and you can change or add options later. The file dsm.smp resides in \dsmnotes after the initial code installation. If you rename the file, make sure that the ADSM API environment variable DSMI_CONFIG points to it.

The required options for TCP/IP are:

- **COMMMethod.** The communication method to be used for client/server communications.
- **TCPPort.** The TCP/IP port address used to communicate with the ADSM server. You do not need to set this option if the port is 1500.
- **TCPServeraddress.** The TCP/IP internet address for an ADSM server.

The optional entries are:

- **NODename.** If the ADSM backup/archive client is installed on the same system as the ADSM Notes Backup Agent, we highly recommend keeping the ADSM Notes Backup Agent as a separate node from the ADSM backup/archive client. The separate nodes enable you to manage the file spaces for the two functions individually.
- **PASSWORDAccess.** Specifies whether users are prompted for a password if an ADSM password is required on your workstation. Your ADSM administrator determines whether passwords are necessary.

  If you want ADSM to prompt users for the ADSM password for your workstation each time they request services from the server, use the default value of this option, which is PROMPT.

  If you do not want ADSM to prompt users for a password, use GENERATE. The ADSM password for your workstation is encrypted and stored locally. ADSM automatically generates a new password when the current password expires. We recommend setting PASSWORDACCESS to GENERATE to avoid any need to pass along the password with every ADSM Notes Backup Agent action.

- **PASSWORDDIR.** Use this option to specify the directory in which you want ADSM to store the password file. You use this option only when PASSWORDACCESS is set GENERATE.
- **Include/Exclude.** These two options allow you to include or exclude databases from backup services. This is explained in more detail in 2.2.3.2, "Creating an Include/Exclude List" on page 23.

Figure 11 on page 24 illustrates the client options file we used in our environment.

2.2.3.2 Creating an Include/Exclude List

An include/exclude list contains statements that identify any database files you want to specifically include or exclude from backup services. You can enter broad statements that exclude entire groups of database files. Then, if necessary, you can enter include statements to make exceptions to those broad statements.

Another important use for an include/exclude list is to use include statements to assign one specific management class to all database files. This is different from the ADSMConnect Agent on AIX, where you can assign management classes to specific database files or groups of database files. If you do not create an include/exclude list, ADSM considers all files for backup services and uses the default management class.

```
┌─── Include/Exclude Syntax: ────────────────────────────────────────┐
│                                                                     │
│  Using include/exclude statements, the ADSM Notes Backup Agent on OS/2 │
│  requires the following syntax rules:                               │
│                                                                     │
│   • A drive must be specified with a question mark (?).             │
│                                                                     │
│   • If your data is in the Notes data directory, specify $NOTESDIR and then │
│     the database.                                                   │
│                                                                     │
│   • If your data resides in a subdirectory of the Notes data directory, specify │
│     $NOTESDIR, the subdirectory, and the database.                  │
│                                                                     │
│   • If your data is not in the Notes data directory, you must specify a volume │
│     label, the full path, and the database file name.               │
│                                                                     │
│   • Notes database file names end with \*\*.                        │
│                                                                     │
└─────────────────────────────────────────────────────────────────────┘
```

To create an include/exclude list, follow these steps:

1. Determine your include and exclude requirements.

2. Enter your include and exclude statements into the client options file.

The include/exclude statements you enter are processed from the bottom up. If you enter an include option to assign a particular management class to the databases that are affected by an incremental backup, it must be the first statement in your include/exclude list. The wildcard characters (**) you need

to enter at the end of a database file indicate that the statement applies to all documents in the specified database, both data and nondata documents.

Figure 11 illustrates an example for a client options file with include/exclude statements on OS/2.

```
TCPSERVERADDRESS YELLOW
NODENAME OS2_AGENT
COMMMETHOD TCPIP
PASSWORDACCESS GENERATE
PASSWORDDIR C:\DSMNOTES
INCLUDE ?:\* RESEARCH
EXCLUDE ?:\$NOTESDIR\NAMES.NSF\*\*
EXCLUDE ?:\$NOTESDIR\MAIL\...\*\*
INCLUDE ?:\$NOTESDIR\MAIL\CBEUKES.NSF\...\*\*
EXCLUDE ?:\D_DRIVE\...\TEST.NSF\*\*
```

Figure 11. Client Option File on OS/2

The statements have the following meaning:

1. Assign the *RESEARCH* management class to all Notes database files.

2. Exclude the public Name & Address database names.nsf, which resides in the Notes data directory, from backup services.

3. Exclude any mail database of the mail subdirectory of the Notes data directory from backup services.

4. Regardless of excluding all mail database files in the mail directory, include the database cbeukes.nsf.

5. Exclude any Notes database file on the D_DRIVE that has the file name test.nsf.

After an incremental backup has been run against a database, it is important not to change the management class assigned to that database. When the ADSM Notes Backup Agent backs up a database, it binds each document it backs up to the specified management class. If you subsequently change the assigned management class for a database to a management class that retains backup versions for a different length of time, it may not be possible to restore the entire database.

2.3 Migration Considerations

The migration from Version 2 to Version 3 of the ADSM Notes Backup Agent on OS/2 is straightforward. Databases that are backed up with a previous version of the ADSM Notes Backup Agent can be restored using the latest version. However, databases that are backed up with the latest version cannot be restored with the previous version.

Therefore, you should first deinstall the Version 2 ADSM Notes Backup Agent and then install the Version 3 agent. You may want to use the same directory as with the Version 2 agent, for example c:\dsmnotes.

If you are migrating to Version 3, make sure that you also install the latest level of the Version 3 ADSM API. You cannot run the Version 3 ADSM Notes Backup Agent with the Version 2 ADSM API.

Chapter 3. ADSMConnect Agent for Notes on Windows NT

In this chapter, we cover the installation and configuration of the ADSMConnect Agent for Lotus Notes on Windows NT. The installation consists of two steps: installation of the ADSM API and installation of the ADSMConnect Agent. The configuration includes the update of the Notes initialization file, modifications of the Windows NT environment, and the creation of the ADSM client options file. All these steps are required to get the ADSMConnect Agent running and functional on your Windows NT system.

To be able to run unattended services on Windows NT, you can install the ADSM scheduler service using a utility shipped with the Version 3 ADSM backup/archive client on Windows NT. We cover this installation in 3.3, "DSMCUTIL Utility on Windows NT" on page 39.

3.1 Installation

In this section, we describe the steps you need to follow in order to install the Version 2 ADSMConnect Agent for Notes on Windows NT. Prerequisites are that Windows NT is running on the system and that the Notes server is already installed and functional. Check the readme file for the latest information about the Windows NT and Notes server versions supported by the ADSMConnect Agent. Moreover, the directory path for the Notes library, nnotes.dll, must be included in the PATH environment variable.

You do not need to have the ADSM backup/archive client installed on your system. But since the agent is not able to back up nondatabase data, we highly recommend using the backup/archive client in parallel. If you decide to do so, however, no specific level of the client is required to run it in parallel to the agent since they do not directly interfere.

3.1.1 ADSM API

The ADSMConnect Agent uses the ADSM API to communicate with the ADSM server. The API is packaged and installed together with the ADSMConnect Agent. The API files are stored in the agent directory, so that they do not override any existing API files on the system. This enables you to run several ADSM API applications using different levels of the ADSM API. You do not necessarily need to have the ADSM backup/archive client installed on the system in order to run the ADSMConnect Agent. With Version 2 R1L0.7 of the ADSMConnect Agent, the Version 3 API is shipped and used.

3.1.2 ADSMConnect Agent

The ADSMConnect Agent for Lotus Notes has its own subdirectory structure. All files are in the \win32app\ibm\adsm\agentln\ subdirectory. The product has its own .dll and .txt files shipped with it. The following instructions assume that Windows NT Version 4.0 is already running on the client workstation.

To install the ADSMConnect Agent for Notes on Windows NT, follow these steps:

1. Insert the ADSMConnect Agent CD-ROM in your CD-ROM reader, such as the D-drive. Installation begins and a Welcome window is displayed. Click on the **Next** button.

   In the **Setup options** window, shown in Figure 12, you may select **Typical**.
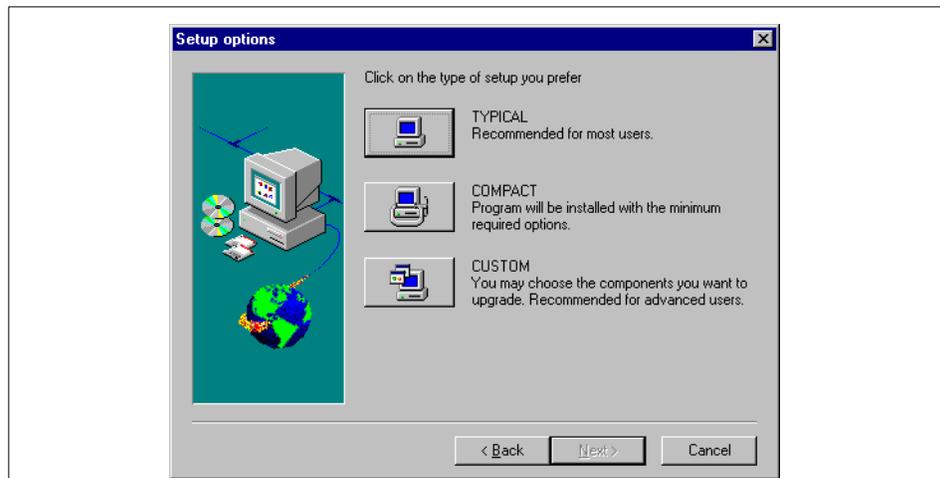
Figure 12. Setup Options Window on Windows NT

2. In the **Select Destination Directory** window, Figure 13 on page 29, specify your destination directory by clicking on the **Browse** button. We selected the default directory c:\win32app\ibm\adsm.
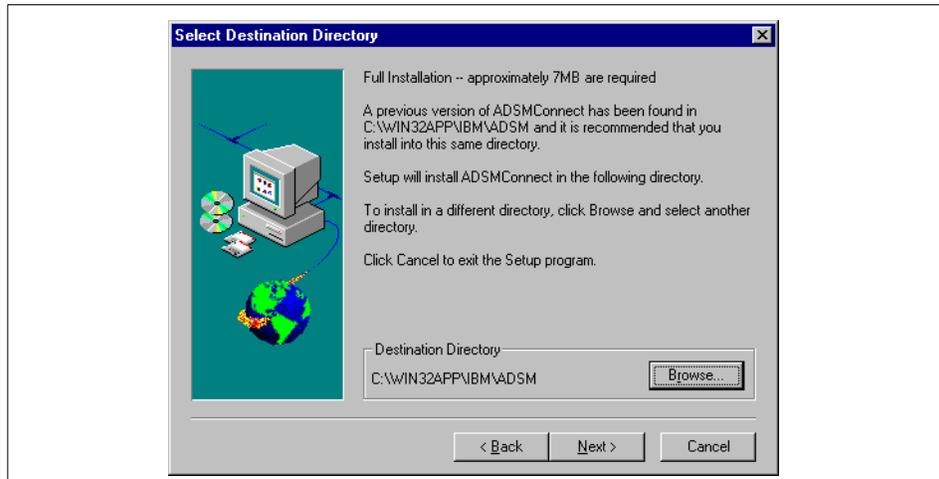
Figure 13. Select Destination Directory Window: Typical on Windows NT

If you select the **Custom** in the **Setup options** window as shown in Figure 12 on page 28, you get to the **Select Components** window as shown in Figure 14, where you can select all components you want to install. You can exclude the documentation if you have already read it.
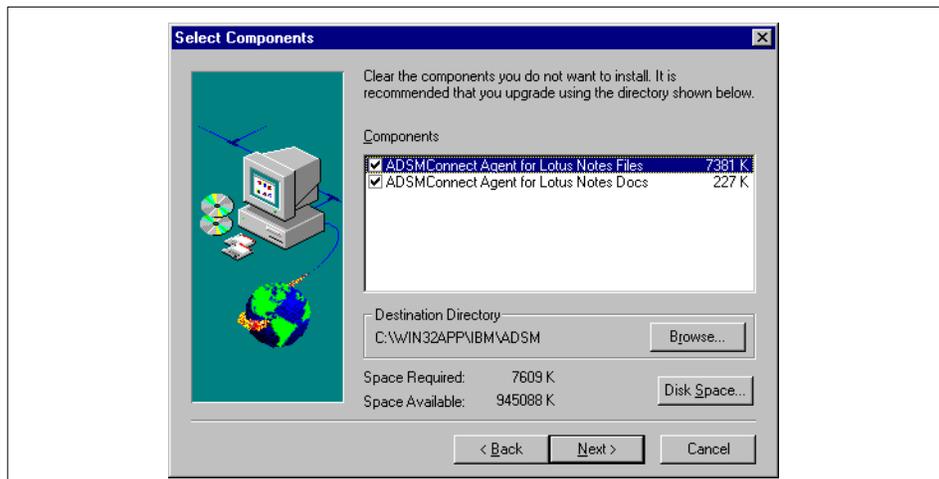
Figure 14. Select Destination Directory Window: Custom on Windows NT

If you select **Compact** in the **Setup options** Window as shown in Figure 12 on page 28, you get to the **Select Destination Directory** compact

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installation window as shown in Figure 15, where you can specify the directory to which you want the executable code copied.
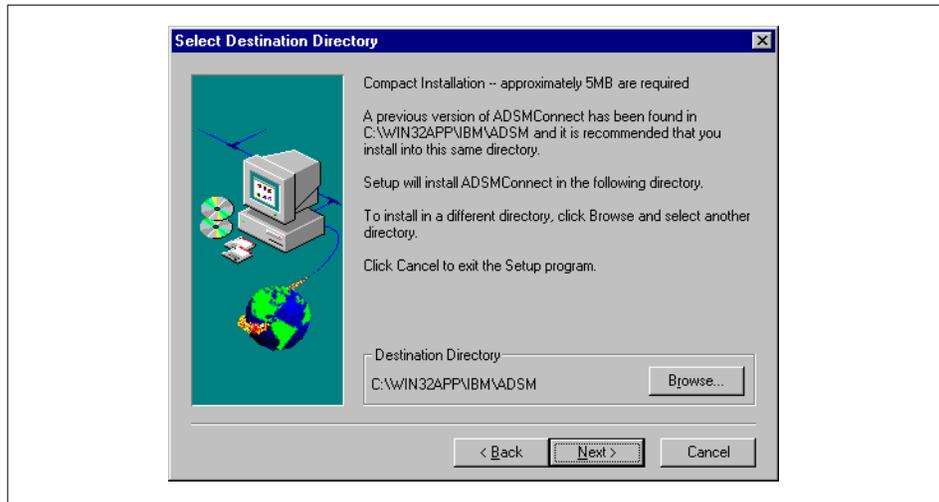
Figure 15. Select Destination Directory Window: Compact on Windows NT

The default directory for the ADSMConnect Agent is win32app\ibm\adsm. The **Choose Directory** window displays. You can specify the

```
Path
Directory or
Drives
```

When you are done with the **Select Destination Directory** window, click on the **Next** button to continue.

3. In the **Select Program Folder** window, you can add program icons to the program folder. You can type a new folder name or select a folder from the folders list.

Select **ADSM for Windows NT ADSMConnect Agent for Lotus Notes**, which is the default, then click on the **Next** button.

The **Start Copying Files** window appears as shown in Figure 16 on page 31. This window shows the current settings for setup type, target directory and program folder.
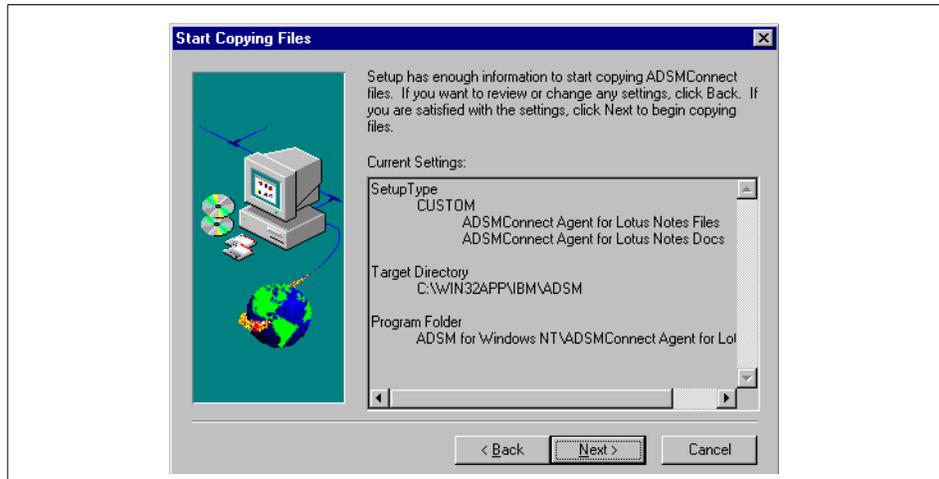
Figure 16. Start Copying Files Window on Windows NT

Click on the **Next** button.

4. The **Setup Complete** window appears. Click on the **Finish** button to complete the installation.

5. From the program folder, you can now access:

   1. The ADSMConnect Agent for Lotus Notes command-line window icon

   2. The installation and user guide

   3. The option file and other icons

All ADSMConnect Agent files, such as the executables and libraries reside in a subdirectory called *agentln* under the specified directory setup in Step 2.

3.1.3 Licensing

The ADSMConnect Agent for Notes on Windows NT fully implements the Try-n-Buy licensing function. You can use it for a limited time as a full-function demonstration. In order to run the ADSMConnect Agent permanently on Windows NT, however, you need a full license. Without a license you cannot access the ADSM server. The license file is installed together with the ADSMConnect Agent and stored as \win32app\ibm\adsm\agentln\agent.lic on Windows NT. The ADSMConnect Agent uses the environment variables to locate the license file. Therefore, you need to set the appropriate environment variables before you use the ADSMConnect Agent. This is explained in more detail in 3.2.2, "Setting Environment Variables" on page 33.

3.1.4 ADSMConnect Agent Files for Windows NT

By default, all ADSMConnect Agent files are located in the
c:\win32app\ibm\adsm\agentln subdirectory. Table 3 lists the files that are on
your workstation after you have installed the ADSMConnect Agent.

Table 3. ADSMConnect Agent for Windows NT: Files

File Name	Description
dsmnotes.exe	Executable for ADSMConnect Agent command-line functions
dsmnoted.dll	ADSMConnect Agent GUI library
notesdlg.dll	ADSMConnect Agent resources
dsmnoted.hlp	ADSMConnect Agent help file
dsm.opt	Options file
readln.txt	Last minute updates and other special information
dscameng.txt	ADSM API message file
agent.lic	License file

3.2 Configuration

In this section, we provide instructions for configuring the ADSMConnect
Agent for Notes on Windows NT. The configuration comprises setup or
updates of the Notes initialization file, notes.ini, the user environment, and
the ADSM client options file.

3.2.1 Updating the NOTES.INI File

The following variables are set in the notes.ini file (the AddInMenus variable
is required but all other variables are optional):

- **AddInMenus.** The ADSMConnect Agent installation program
  automatically adds the AddInMenus variable to your notes.ini file.
  AddInMenus ties ADSM to the Notes workspace. This is required to use
  the GUI of the ADSMConnect Agent for Notes. Figure 5 on page 13
  illustrates how ADSM is embedded in the Notes workspace. The specified
  path name is the fully qualified path name of the dsmnoted.dll file. If this
  line is not added to the notes.ini file automatically during installation, you
  can add it manually.

- **DSMNOTES_LOGDIR.** Log messages are sent to a file called *log.dsm*.
  Use DSMNOTES_LOGDIR to point to the directory where the log file is
  located. If you do not set this environment variable, the default location for

log.dsm is the Notes data directory. If you do not have a Notes data directory, this environment variable is required. Because this file grows over time, it must be managed carefully.

- **DSMNOTES_STATS.** Use DSMNOTES_STATS to send messages to the screen when a command-line function is run. The messages show the current status of the command. If VERBOSE is specified, two types of status indicators might appear on the screen:

  - One or more dots (.), indicating that processing is continuing. Depending on the environment, you may experience delays between dots. For example, delays can occur when searching very large Notes databases for deleted documents. There may also be delays when waiting for off-line media to be mounted.

  - Messages showing the result of the command when the command has completed processing. The messages display information such as the number of documents transferred and whether the dsmnotes command completed without any errors.

  The default value for this option is QUIET: status messages are not displayed on your screen. This can be the appropriate choice in a large Notes environment, since displaying the status messages on your screen slows the performance of command-line operations.

After you modify the notes.ini file with these environment variables, you have to shut down the Notes workspace and bring it back up for the new changes to be active. Figure 17 shows the part of the notes.ini file we used in our environment.

```
[Notes]
...
AddInMenus=C:\WIN32APP\IBM\ADSM\Agentln\dsmnoted.dll
DSMNOTES_LOGDIR=C:\WIN32APP\IBM\ADSM\Agentln
DSMNOTES_STATS=verbose
...
```

Figure 17. NOTES.INI File Update on Windows NT

3.2.2 Setting Environment Variables

The following variables need to be set in the system environment to use the ADSMConnect Agent for Notes. You need to set these variables as system variables for the Windows NT system. To do so, open the system properties

window from the Windows NT control panel. Select the environment folder and set all following variables in the upper system-variables window.

Insert the variables as system variables. If you enter these as user variables, you will not be able to run any unattended services such as ADSM schedules. See 3.3, "DSMCUTIL Utility on Windows NT" on page 39 for further details.

The environment variables are these:

- **Path.** You need to include the following directories to your PATH statement:

  - Notes library directory, containing nnotes.dll

  - ADSMConnect Agent libraries directory, containing dsmnoted.dll, adsmv3.dll, and notesdlg.dll

- **DSMI_CONFIG.** This ADSM API variable is the fully qualified name for the client options file, dsm.opt. To allow the ADSMConnect Agent and the backup/archive client to run simultaneously on the system, make sure that the ADSMConnect Agent uses a dedicated client user options file.

- **DSMI_DIR.** This ADSM API variable points to the location containing the ADSM message file dscameng.txt and the ADSMConnect Agent license file agent.lic.

- **DSMI_LOG.** Select this optional ADSM API variable to point to the directory where ADSM stores the API error log file dsierror.log. The error log file contains information about ADSM API errors that occur during processing.

Figure 18 shows the system environment settings on our Windows NT workstation.
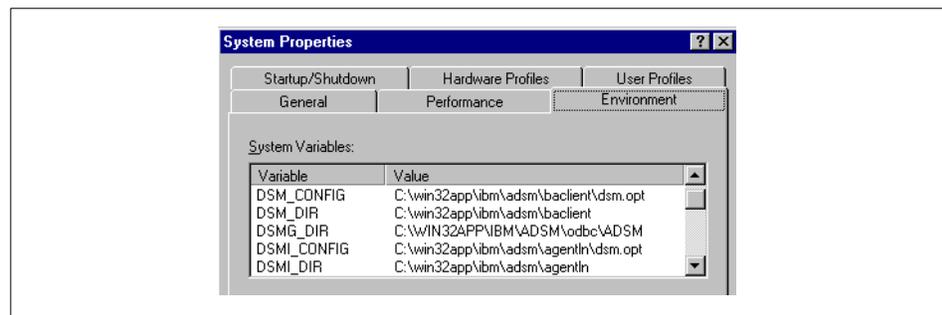
Figure 18. System Properties on Windows NT

You can also create a command script that includes the environment statements and is executed in a command prompt window. From there, you can start the ADSMConnect Agent command-line program or the Notes workspace. We recommend doing so if the ADSM API environment variables have already been set to be used with a different API application.

3.2.3 Setting Up ADSM

The following subsections provide instructions to set up ADSM. We cover only the options essential for creating the ADSM options file using TCP/IP, since this is the communication protocol we use in our environment. See *ADSTAR Distributed Storage Manager: Installing the Clients* (SH26-4080) or the options.wri file in the installation directory for more information about the available options and supported communication protocols.

Before the ADSMConnect Agent can connect the server, a dedicated node name and password must be provided by the ADSM administrator. We highly recommend having an individual node name, client options file, and include/exclude list for the ADSMConnect Agent for Notes.

3.2.3.1 Creating the Client Options File

The client options file identifies the ADSM server to contact for services and specifies the required communication options for the server. It can also include authorization options, backup and archive processing options, and scheduling options.

The required options for TCP/IP are:

- **COMMMethod.** The communication method to be used for client/server communications.
- **TCPPort.** The TCP/IP port address used to communicate with the ADSM server. You do not need to set this option if the port is 1500.
- **TCPServeraddress.** The TCP/IP internet address for an ADSM server.

The optional entries are:

- **NODename.** If the ADSM backup/archive client is installed on the same system as the ADSMConnect Agent, we highly recommend that the ADSMConnect Agent be on a separate node from the ADSM backup/archive client. Separating the nodes enables you to manage the file spaces for the two functions separately.
- **PASSWORDAccess.** Specifies whether users are prompted for a password if an ADSM password is required on your workstation. Your ADSM administrator determines whether passwords are necessary.

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If you want ADSM to prompt users for the ADSM password for your workstation each time they request services from the server, use the default value of this option, which is PROMPT.

If you do not want ADSM to prompt users for a password, use GENERATE. The ADSM password for your node name is encrypted and stored locally in the registry as illustrated in Figure 19. Each ADSM node instance has its dedicated password entry in the registry, in our example, the backup/archive client SERVWNT and the ADSMConnect Agent WNT_AGENT. ADSM automatically generates a new password when the current password expires. We recommend setting PASSWORDACCESS to GENERATE to avoid any need to pass along the password with every ADSMConnect Agent action.
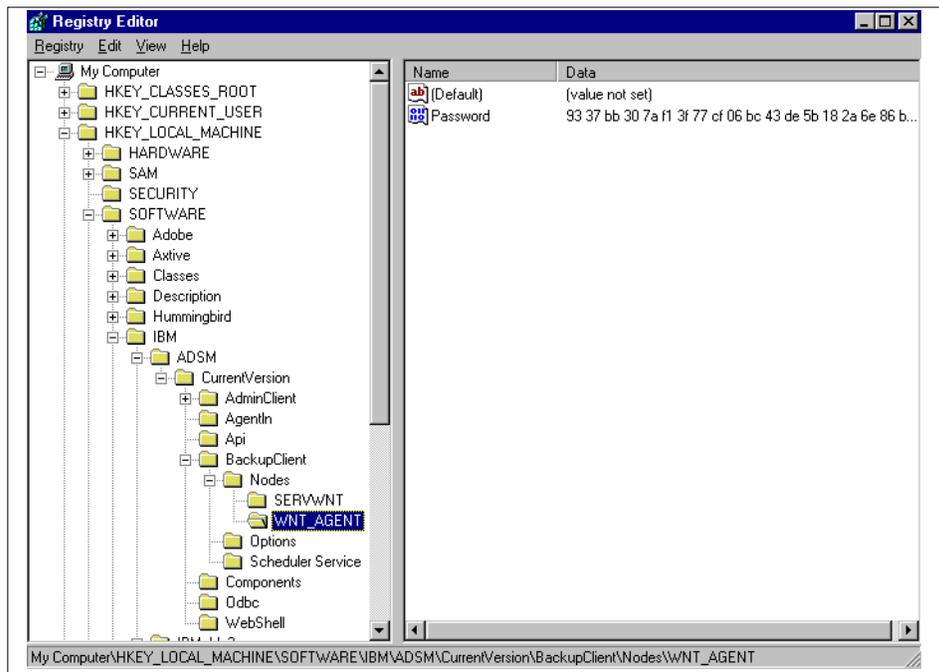
Figure 19. ADSM Password in Registry

The password is stored in the registry under the ADSM node name. Therefore, you can run multiple client instances with PASSWORDACCESS set to GENERATE on the same system, for example, the backup/archive client and the ADSMConnect Agent. ADSM then does not prompt you for any password.

- **Include/Exclude.** These two options allow you to include or exclude databases from backup services. This is explained in more detail in 3.2.3.2, "Creating an Include/Exclude List" on page 37.

Figure 20 on page 39 illustrates the client options file we used in our environment.

The ADSMConnect Agent includes a sample client options file, dsm.opt, which contains the minimum options required to get started using the ADSMConnect Agent. If you choose, you can add other options to the file as part of your initial setup, and you can change or add options later. The file dsm.opt resides in win32app\ibm\adsm\agentln after the initial code installation. If you rename the file, make sure that the ADSM API environment variable DSMI_CONFIG points to it. However, only options supported by the API can be used. For example, the SUBDIR option is not recognized in the client options file by the ADSM API; therefore, if you want to use it, you must specify it in the ADSMConnect Agent command line directly.

3.2.3.2 Creating an Include/Exclude List
An include/exclude list contains statements that identify any database files you want to specifically include or exclude from backup services. You can enter broad statements that exclude entire groups of database files. Then, if necessary, you can enter include statements to make exceptions to those broad statements.

Another important use for an include/exclude list is to use include statements to assign one particular management class to all database files. This is different from the ADSMConnect Agent on AIX, where you can assign management classes to specific database files or groups of database files. If you do not create an include/exclude list, ADSM considers all files for backup services and uses the default management class.

Using include/exclude statements, the ADSMConnect Agent for Notes on Windows NT requires the following syntax rules:

- A drive must be specified with a question mark (?).

- If your data is in the Notes data directory, specify $NOTESDIR and then the database.

- If your data resides in a subdirectory of the Notes data directory, specify $NOTESDIR, the subdirectory, and the database.

- If your data is not in the Notes data directory, you must specify a volume label, the full path, and the database file name.

- Notes database file names end with **.

To create an include/exclude list, follow these steps:

1. Determine your include and exclude requirements.

2. Enter your include and exclude statements into the client options file.

The include/exclude statements you enter are processed from the bottom up. If you enter an include option to assign a particular management class to the databases that are affected by an incremental backup, it must be the first statement in your include/exclude list. The wildcard characters (**) you need to enter at the end of a database file indicate that the statement applies to all documents in the specified database, both data and nondata documents.

Figure 20 on page 39 illustrates an example for a client options file with include/exclude statements on Windows NT.

```
nodename          wnt_agent
commmethod        TCPIP
tcpport           1500
tcpserveraddress  yellow
PASSWORDACCESS    Generate
INCLUDE ?:*         RESEARCH
EXCLUDE ?:\$NOTESDIR\HELP*.NSF\*\*
EXCLUDE ?:\$NOTESDIR\sample\...\*\*
INCLUDE ?:\$NOTESDIR\sample\faqw46.NSF\*\*
EXCLUDE ?:\D_DRIVE\...\test.nsf\*\*
```

Figure 20. Client Options File on Windows NT

The statements have the following meaning:

1. Assign the *RESEARCH* management class to all Notes database files.

2. Exclude from backup services all help database files in the Notes data directory that start with *help*.

3. Exclude from backup services all database files in the sample subdirectory of the Notes data directory.

4. Regardless of excluding all database files in the sample directory, include the database faqw46.nsf.

5. Exclude any Notes database file on the D_DRIVE that has the file name test.nsf.

After an incremental backup has been run against a database, it is important not to change the management class assigned to that database. When the ADSMConnect Agent for Notes backs up a database, it binds each document it backs up to the specified management class. If you subsequently change the assigned management class for a database to a management class that retains backup versions for a different length of time, it may not be possible to restore the entire database.

3.3 DSMCUTIL Utility on Windows NT

The ADSMConnect Agent does not have its own scheduler service. It uses the ADSM backup/archive client scheduler service to run backups automatically. In this section, we show how the ADSM scheduler service is installed on a Windows NT machine.

With Version 3, a new client utility, called *dsmcutil*, is shipped with the ADSM backup/archive client on Windows NT. This utility creates several entries in the registry of Windows NT. It allows ADSM scheduler services to be installed and configured on Windows NT machines. It replaces the Version 2 showpw, updatepw, and dsmcsvci utilities. See the dsmcutil.txt readme file in the backup/archive installation directory for more detailed information.

When you plan to run the ADSM scheduler as a Windows NT service, you have to specify the ADSM environment variables in the system part of the Windows NT environment. If you enter these variables under the user part, you will not be able to run any unattended services. See 3.2.2, "Setting Environment Variables" on page 33 for further information.

To set up ADSM backup/archive client scheduler as a service on Windows NT, you need to run the dsmcutil commands from an account that belongs to the Administrator/Domain Administrator group. For the installation, specify the registered node name and password of the backup/archive client on your Windows NT machine. Figure 21 on page 41 illustrates the command and its output during the installation in our environment.

```
C:\WIN32APP\IBM\ADSM\baclient>dsmcutil install /name:ADSM_SCHEDULER /node:servwnt
/autostart:yes /password:nt


ADSM Windows NT Scheduler Service Configuration Utility
Command Line Interface Version 1.00.d
Last Updated 9-11-1997

Command: Install and Configure ADSM Scheduler Service
Machine: MALAWI (Local Machine)


Installing ADSM Client Service:

        Machine         : MALAWI
        Service Name    : ADSM_SCHEDULER
        Client Directory : C:\WIN32APP\IBM\ADSM\baclient
        Automatic Start  : Yes

The service was successfully installed.


Creating Registry Keys ...

Updated registry value 'ImagePath' .
Updated registry value 'EventMessageFile' .
Updated registry value 'TypesSupported' .
Updated registry value 'OptionsFile' .
Updated registry value 'EventLogging' .
Updated registry value 'ClientNodeName' .
Updated registry value 'ADSMClientKey' .

Generating registry password ...
Authenticating password with ADSM for node SERVWNT ....

Password authentication successful.

The Registry password for node SERVWNT has been updated .
```

Figure 21. ADSM Scheduler Installation Using DSMCUTIL

You can see that the ADSM scheduler service is installed successfully and that the registry entries are updated. Since we are using PASSWORDACCESS GENERATE in the client options file, as shown in Figure 20 on page 39, users do not have to enter a password every time they start an ADSM scheduler session.

This dsmcutil utility also enables you to generate and update encrypted ADSM registry passwords. In Figure 22 on page 42, we show how we generate the ADSM registry password for the ADSMConnect Agent in our environment.

```
C:\WIN32APP\IBM\ADSM\baclient>dsmcutil updatepw /password:nt /node:wnt_agent

ADSM Windows NT Scheduler Service Configuration Utility
Command Line Interface Version 1.00.d
Last Updated 9-11-1997

Command: Update Registry Password
Machine: MALAWI (Local Machine)

Authenticating password with ADSM for node WNT_AGENT ....

Password authentication successful.

The Registry password for node WNT_AGENT has been updated .
```

Figure 22. ADSMConnect Agent Password Generation Using DSMCUTIL

Chapter 4. ADSMConnect Agent for Notes on AIX

In this chapter, we cover the installation and configuration of the ADSMConnect Agent for Lotus Notes on AIX. The installation consists of two steps, the installation of the ADSM API and the ADSMConnect Agent. The configuration includes the update of the Notes initialization file, modifications of the AIX user environment, and the creation of the ADSM client options files. All these steps are required to get the ADSMConnect Agent running and functional on your AIX system.

4.1 Installation

In this section we describe the steps you need to follow in order to install the Version 2 ADSMConnect Agent for Notes on AIX. Prerequisites are that AIX is running on the system and Notes server is already installed and functional. Check the readme file for the latest information about the Windows NT and Notes server versions supported by the ADSMConnect Agent.

You do not necessarily need to have the ADSM backup/archive client installed on your system. But since the agent is not able to back up nondatabase data, we highly recommend using the backup/archive client in parallel. If you decide to do so, however, no specific level of the client is required to run it in parallel to the agent since they do not directly interfere.

4.1.1 ADSM API

The ADSMConnect Agent uses the ADSM API to communicate with the ADSM server. The API is packaged and installed together with the ADSMConnect Agent. The API files are stored in the agent directory, so that they do not override any existing API files on the system. This enables you to run several ADSM API applications using different levels of the ADSM API. You do not necessarily need to have the ADSM backup/archive client installed on the system in order to run the ADSMConnect Agent. With Version 2 R1L0.7 of the ADSMConnect Agent, the Version 3 API is shipped and used.

4.1.2 ADSMConnect Agent

The instructions assume that AIX is already running on the client workstation. The installation directory is /usr/lpp/adsmagent/lnotes.

Before you install the ADSMConnect Agent for Notes on AIX, you must install Notes and the following libraries:

- C/C++ libraries, from the C/C++ compiler
- /usr/lib/libpthreads.a, from fileset bos.rte.libpthreads
- /usr/lib/libc_r.a, from fileset bos.rte.libc
- /usr/lib/libs.a, from fileset bos.rte.libs
- /usr/lib/libDtHelp.a, from fileset X11.Dt.lib
- /usr/lib/libtt.a, from fileset X11.Dt.ToolTalk

The above libraries are shipped with AIX.

Follow these steps to install the ADSMConnect Agent for Notes on AIX from the CD-ROM:

1. If you are installing from the CD-ROM, insert the CD-ROM into the CD-ROM reader on your workstation and go to Step 3.

2. If you are not installing from the CD-ROM, you will need to run the **inutoc** command in the directory where the ADSMConnect Agent images reside to create the **.toc** file in that directory. For example, if your ADSMConnect Agent images reside in the /usr/sys/inst.images directory, then you would enter the following command:

   /usr/sbin/inutoc /usr/sys/inst.images

3. From the AIX command line, enter `smitty install` and press Enter.

4. Select **Install and Update Software** and press Enter.

5. Select **Install and Update from ALL Available Software** and press Enter.

6. Select **INPUT device/directory for software**.

7. Enter **/dev/cd0** (for CD-ROM install) or enter the directory name where the ADSMConnect Agent images reside, for example: **/usr/sys/inst.images**, and press Enter.

8. Select **Software to install**.

9. Press the **F4** key to display a list of ADSMConnect Agent images to install:

10. Select the ADSMConnect Agent image you want to install on your system, and press Enter.

11. Select any option and press Enter to install.

4.1.3 Licensing

The ADSMConnect Agent for Notes on AIX fully implements the Try-n-Buy licensing function. You can use it for a limited time as a full-function demonstration. In order to run the ADSMConnect Agent permanently on AIX,

however, you need a full license. Without a license you cannot access the ADSM server. The license file is installed together with the ADSMConnect Agent and stored as /usr/lpp/adsmagent/lnotes/agent.lic on AIX. The ADSMConnect Agent uses the environment variables to locate the license file. Therefore you need to set the appropriate environment variables before you use the ADSMConnect Agent. This is explained in more detail in 4.2.2, "Setting Environment Variables" on page 48.

4.1.4 ADSMConnect Agent Files for AIX

By default, all ADSMConnect Agent files are located in the /usr/lpp/adsmagent/lnotes subdirectory and are used for the ADSMConnect Agent to run properly.

Table 4 lists the files on your workstation after you have installed the ADSMConnect Agent.

Table 4. ADSMConnect Agent for AIX: Files

File Name	Description
README.DSMNOTES	Last minute updates and other special information
dsmnotes	Main executable file for the command-line interface
dsmlog	Executable file for the maintenance of log files (available in the command-line only)
libLnotesDS.a	Shared ADSM API library
libdsmnotes_r.a	Shared AIX library for the GUI
dsm.sys.smp	Sample ADSM API client system options file
dsm.opt.smp	Sample ADSM API client user options file
options.doc	Documentation for ADSM API client options
dsmtca	V3 ADSM trusted agent program
agent.lic	License file

Table 5 lists all language files stored in /usr/lpp/adsmagent/lnotes/en_US.

Table 5. ADSMConnect Agent for AIX: Language Files

File Name	Description
dsmclientV3.cat	V3 ADSM API message file
dsmlog.1	dsmlog AIX Manual page
dsmlog.cat	dsmlog message file
dsmnotes.1	dsmnotes AIX Manual page
dsmnotes.cat	dsmnotes message file
dsmnotes.sdl	ADSMConnect Agent online help resource file

Table 6 lists all symbolic links created during the ADSMConnect Agent installation.

Table 6. ADSMConnect Agent for AIX: Symbolic Links

Symbolic Link	Physical File
/etc/dt/appconfig/help/C/dsmnotes.sdl	/usr/lpp/adsmagent/lnotes/en_US/dsmnotes.sdl
/usr/share/man/cat1/dsmnotes.1	/usr/lpp/adsmagent/lnotes/en_US/dsmnotes.1
/usr/share/man/cat1/dsmlog.1	/usr/lpp/adsmagent/lnotes/en_US/dsmlog.1
/bin/dsmnotes	/usr/lpp/adsmagent/lnotes/dsmnotes
/opt/lotus/notes/latest/ibmpow/dsmnotes	/usr/lpp/adsmagent/lnotes/dsmnotes
/bin/dsmlog	/usr/lpp/adsmagent/lnotes/dsmlog
/opt/lotus/notes/latest/ibmpow/dsmlog	/usr/lpp/adsmagent/lnotes/dsmlog
/usr/lib/nls/mgs/en_US/dsmnotes.cat	/usr/lpp/adsmagent/lnotes/en_US/dsmnotes.cat
/usr/bin/nls/msg/en_US/dsmnotes.sdl	/usr/lpp/adsmagent/lnotes/en_US/dsmnotes.sdl
/usr/bin/nls/msg/en_US/dsmlog.cat	/usr/lpp/adsmagent/lnotes/en_US/dsmlog.cat
/opt/lotus/notes/latest/ibmpow/libdsmnotes_r.a	/usr/lpp/adsmagent/lnotes/libdsmnotes_r.a

4.2 Configuration

In this section, we provide instructions for configuring the ADSMConnect Agent for Notes on AIX. The configuration comprises setup or updates of the Notes initialization file, notes.ini, the user environment, and the ADSM client options file.

4.2.1 Updating the NOTES.INI File

The following variables should be set in the notes.ini file (the AddInMenus variable is required, but all other variables are optional):

- **AddInMenus.** You need to manually add the AddInMenus variable to your notes.ini file. AddInMenus ties ADSM to the Notes workspace. This is required to use the GUI of the ADSMConnect Agent for Notes. Figure 5 on page 13 illustrates how ADSM is embedded in the Notes workspace.

- **DSMNOTES_LOGDIR.** Log messages are sent to a file called *log.dsm*. Use DSMNOTES_LOGDIR to point to the directory where the log file is located. If you do not set this environment variable, the default location for log.dsm is the Notes data directory. If you do not have a Notes data directory, this environment variable is required. Because this file grows over time, it must be managed carefully.

- **DSMNOTES_STATS.** Use DSMNOTES_STATS to send messages to the screen when a command-line function is run. The messages show the current status of the command. If VERBOSE is specified, two types of status indicators might appear on the screen:

  - One or more dots (.), indicating that processing is continuing. Depending on the environment, you may experience delays between dots. For example, delays can occur when searching very large Notes databases for deleted documents. There may also be delays when waiting for off-line media to be mounted.

  - Messages showing the result of the command when the command has completed processing. The messages display information such as the number of documents transferred and whether the dsmnotes command completed without any errors.

  The default value for this option is QUIET: status messages are not displayed on your screen. This can be the appropriate choice in a large Notes environment, since displaying the status messages on your screen affects the performance of command-line operations.

After you modify the notes.ini file with these environment variables, you have to shut down the Notes workspace and bring it back up for the new changes to be active. Figure 23 shows the part of the notes.ini file we used in our environment.

```
[Notes]
...
AddInMenus=dsmnotes_r
DSMNOTES_LOGDIR=/tmp
DSMNOTES_STATS=verbose
...
```

Figure 23. NOTES.INI File Update on AIX

4.2.2 Setting Environment Variables

The following variables need to be set in the Notes user's environment to use the ADSMConnect Agent for Notes. You either set these variables in the Notes users' system profile (.profile) or in a shell script that is run prior to any agent action. The environment variables are:

- **Path.** You need to include the following directories to your PATH statement:

  - Notes data directory

  - Notes executables

  - dthelpview facility

- **Notes_ExecDirectory.** This environment variable is required because the ADSMConnect Agent uses the Notes APIs. It points to the Notes directory which includes all Notes executables and the Notes API.

- **DSMI_CONFIG.** This ADSM API variable is the fully qualified name for the client user options file dsm.opt. To allow the agent and the backup/archive client to run simultaneously on the system, you should make sure that the agent uses a dedicated client user options file.

- **DSMI_DIR.** This ADSM API variable points to the location containing the client system options file dsm.sys., the trusted communication agent dsmtca, and the ADSM API language directory en_US. Moreover, make sure that the ADSMConnect Agent license file agent.lic is in the same directory. To allow the agent and the backup/archive client to run simultaneously on the system, you should make sure that the agent uses a dedicated client system options file.

- **DSMI_LOG.** Select this optional ADSM API variable to point to the directory where ADSM stores the API error log file dsierror.log. The error log file contains information about ADSM API errors that occur during processing.

Figure 24 on page 49 shows our Notes users' system profile file. It assumes that the Notes data directory is $HOME/notesr4.

```
...
export LOTUS=/opt/lotus
export PATH=$PATH:$LOTUS/bin:$HOME/notesr4:/usr/dt/bin
export Notes_ExecDirectory=$LOTUS/notes/latest/ibmpow
export DSMI_CONFIG=/usr/lpp/adsmagent/lnotes/dsm.opt
export DSMI_DIR=/usr/lpp/adsmagent/lnotes
export DSMI_LOG=$HOME
...
```

Figure 24. Notes Users' System Profile Update on AIX

You can also create a shell script that includes the environment statements; it is executed in an AIX window. From there, you then start the ADSMConnect Agent command-line program or the Notes workspace. We recommend doing so if the ADSM API environment variables have already been set to be used with a different API application.

4.2.3 Setting Up ADSM

The following subsections provide instructions for the root user to set up ADSM. We cover only the options essential for creating the ADSM options files using TCP/IP, since this is the communication protocol we use in our environment. See *ADSTAR Distributed Storage Manager: Installing the Clients* (SH26-4080) for more information about the available options and supported communication protocols.

Before the ADSMConnect Agent can connect the server, a dedicated node name and password must be provided by the ADSM administrator. We highly recommend having an individual node name, set of client options files, and include/exclude list for the ADSMConnect Agent for Notes.

4.2.3.1 Creating the Client System Options File

The client system options file identifies the ADSM server to contact for services and specifies the required communication options for the server. It can also include authorization options, backup and archive processing options, and scheduling options.

You can define different server stanzas for different server sessions in one client system options file. Users can specify the server they want to contact

by specifying the server in their own client user options file as shown in 4.2.3.2, "Creating the Client User Options File" on page 51.

The ADSMConnect Agent includes a sample client system options file, dsm.sys.smp, which contains the minimum options required to get started using the ADSMConnect Agent. If you choose, you can add other options to the file as part of your initial setup, and you can change or add options later. The file dsm.sys.smp resides in /usr/lpp/adsmagent/lnotes/ after the initial code installation.

To create the client system options file, copy dsm.sys.smp to dsm.sys. The client system options file must reside in the directory where the DSMI_DIR, environment variable points.

The required options for TCP/IP are:

- **SErvername.** A name you want to assign to a server to contact for services. A server name can have as many as eight characters and is not case sensitive.

- **COMMMethod.** The communication method to be used for client/server communications.

- **TCPPort.** The TCP/IP port address used to communicate with the ADSM server. You do not need to set this option if the port is 1500.

- **TCPServeraddress.** The TCP/IP internet address for an ADSM server.

The optional entries are:

- **NODename.** If the ADSM backup/archive client is installed on the same system as the ADSMConnect Agent, we highly recommend making the ADSMConnect Agent a separate node from the ADSM backup/archive client. The separate nodes enable you to manage the file spaces for the two functions individually.

- **PASSWORDAccess.** Specifies whether users are prompted for a password if an ADSM password is required on your workstation. Your ADSM administrator determines whether passwords are necessary.

  If you want ADSM to prompt users for the ADSM password for your workstation each time they request services from the server, use the default value of this option, which is PROMPT.

  If you do not want ADSM to prompt users for a password, use GENERATE. The ADSM password for your workstation is encrypted and stored locally. ADSM automatically generates a new password when the current password expires. The first time you connect to the ADSM server, you must be the root user to establish the password file.

- **PASSWORDDIR.** Use this option to specify the directory in which you want ADSM to store the password file. You use this option only when PASSWORDACCESS is set to GENERATE.
- **INCLExcl.** Allows you to use an include/exclude list. Use this option to specify the path and file name of your include/exclude list.

Figure 25 shows a sample where we use the client system options file with one server, using the TCP/IP communications.

```
SErvername yellow
COMMmethod TCPip
TCPPort 1500
TCPServeraddress 9.1.150.208
NODename aix_agent
Inclexcl /usr/lpp/adsmagent/lnotes/inclexcl.list
```

Figure 25. Client System Options File on AIX

4.2.3.2 Creating the Client User Options File

The ADSMConnect Agent provides a sample client user options file named *dsm.opt.smp*. You use this file if you specify more than one ADSM server in your client system options file. The dsm.opt.smp file resides in /usr/lpp/adsmagent/lnotes. To create a default client user options file, copy dsm.opt.smp to dsm.opt. The DSMI_CONFIG environment must point to the client user options file.

If you use the client user option file, the only required option is **SErvername.** Use this option to specify the server to use for backup-archive services.

Figure 26 shows the client user options file in our test environment.

```
servername yellow
```

Figure 26. Client User Options File on AIX

In the client user options file, you can also set options that determine which formats to use for date, time, and numbers, a language option, and options that affect backup and restore processing. For more information about setting options in your client user options file, see the options.doc file in /usr/lpp/adsmagent/lnotes path. However, only options supported by the API can be used. For example, the SUBDIR option is not recognized in the client

user options file by the ADSM API; therefore, if you want to use it you must specify it in the ADSMConnect Agent command line directly.

4.2.3.3 Creating an Include/Exclude List

An include/exclude list contains statements that identify any database files you want to specifically include or exclude from backup services. You can enter broad statements that exclude entire groups of database files. Then, if necessary, you can enter include statements to make exceptions to those broad statements.

Another important use for an include/exclude list is to use include statements to assign specific management classes to specific database files or groups of database files. ADSM uses a default management class for any database files to which you do not assign a specific management class. If you do not create an include/exclude list, ADSM considers all files for backup services and uses the default management class.

Include/Exclude Syntax:

Using include/exclude statements, the ADSMConnect Agent for Notes on AIX requires that Notes database file names end with /.../*.

To create an include/exclude list, follow these steps:

1. Determine your include and exclude requirements.
2. Create a file with a name of your choice.
3. Enter your include and exclude statements.
4. Enter the name of your include-exclude options file in your client system options file, using the INCLEXCL option.

The include/exclude statements you enter are processed from the bottom up. If you enter an include option to assign a particular management class to the databases that are affected by an incremental backup, it must be the first statement in your include/exclude list. The wildcard characters (/.../*) you need to enter at the end of a database file indicate that the statement applies to all documents in the specified database, both data and nondata documents.

Figure 27 on page 53 illustrates an example for an include/exclude list in a Notes environment on AIX.

```
include * notes_mc
include /notes/notesr4/mail/*.nsf/.../* mail_mc
exclude /notes/notesr4/test/*.nsf/.../*
include /notes/notesr4/test/template.nsf/.../*
exclude /.../test.nsf/.../*
```

Figure 27. Include/Exclude List on AIX

The statements have the following meaning:

1. Assign the management class *notes_mc* to all database files.

2. Assign the management class *mail_mc* to all database files in the mail subdirectory.

3. Exclude all database files in the test directory from backup services.

4. Regardless of excluding all test database files, include the template database template.nsf.

5. Exclude any Notes database that has the file name test.nsf.

After an incremental backup has been run against a database, it is important not to change the management class assigned to that database. When the ADSMConnect Agent for Notes backs up a database, it binds each document it backs up to the specified management class. If you subsequently change the assigned management class for a database to a management class that retains backup versions for a different length of time, it may not be possible to restore the entire database.

Chapter 5. Operation of the ADSM Notes Agent

In this chapter, we focus on the ADSMConnect Agent in a Lotus Notes for Windows NT environment. Thus, all examples are in NT flavor, unless otherwise specified. We give examples for agent operations using the command-line executable, the GUI, and with remote access. All examples assume that the PASSWORDACCESS option in the client option file of the agent is set to GENERATE, to avoid the need to pass the ADSM password along with any agent action.

> **Naming Convention:**
>
> From now on we use the following naming convention: *ADSM Notes agent* or *Notes agent* stands for *ADSM Notes Backup Agent* for OS/2 or *ADSMConnect Agent* for Windows NT or AIX.

5.1 Commands

The Notes agent's single executable program, dsmnotes, provides a number of commands and parameters. It allows the user to back up Notes databases on a document level, to restore an entire database or documents within a database, and to restore within a database documents that were deleted. It also allows the user to change the ADSM password of the Notes agent.

There are two possible ways to run an agent command on a Notes server machine:

- Run the agent command directly from the command prompt of your system.
- Load the agent command as a program from the Notes server console.

5.1.1 Backup of Documents

You can perform a backup of a Notes database through the command-line interface only. If no backup copy of the database exists on the ADSM server, then a copy of the entire database is sent to the server, when first invoked. Subsequent backups back up only those documents that have changed since the last backup.

Both data documents and design elements, such as forms, views, and folders, are backed up. Because each document is backed up as a separate object, individual documents can be restored later. The database header

information, such as replication information, access control lists (ACLs), and the database title are also backed up. Be sure that every document in a given Notes database is assigned to the same management class. If some of the documents in a database are managed in a different manner, you may not be able to rebuild the entire database from the backup copies of the documents.

> **Warning:**
>
> Folders let you store and manage related documents within a database. If a document is added to or deleted from a folder, Notes does not always update the timestamp of the document. Since the incremental backup operation depends on the timestamp changes of the documents, it is possible that insertions and deletions of documents from a folder are not detected by the ADSM Notes agent.

When you implement the Notes agent in an existing Notes environment, there are several performance considerations. The first time you back up an entire Notes database, the operation is significantly slower using the Notes agent than using a regular ADSM backup/archive client. Extra processing occurs with the Notes agent in order to break down the contents of the database into individual documents that can be restored later. Subsequent backups are much faster, since they back up only new or modified documents within the database. You need to decide which option, the backup/archive client or the Notes agent, better serves your purpose for a particular database.

The following examples illustrate the various ways in which Notes databases can be backed up.

Example 1

```
dsmnotes incr *
```

This command performs an incremental backup of all databases in the Notes data directory, which is defined in the notes.ini file by the directory option. On AIX, the wildcard * character is treated as special by most shells and therefore needs to be protected by a backslash (\) character:

```
dsmnotes incr \*
```

If you use a wildcard parameter in the path name to back up multiple databases, statistics on each database, as well as the overall total, are displayed. Figure 28 on page 57 illustrates an incremental backup using a wildcard.

```
C:\WIN32APP\IBM\ADSM\Agentln> dsmnotes incr *
ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
(C) Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
Backing up database c:\notes\data\busytime.nsf
Documents sent: 40
Documents sent: 80
Documents sent: 96
Documents deleted: 5
Backing up database: c:\notes\data\catalog.nsf
Documents sent: 29
Backing up database: c:\notes\data\log.nsf
Documents sent: 15
Documents deleted: 5
Backing up database: c:\notes\data\names.nsf
Documents sent: 40
Documents sent: 53
Documents deleted: 5
Summary:
Database: c:\notes\data\busytime.nsf
Documents backed up: 96, documents deleted: 5
Database: c:\notes\data\catalog.nsf
Documents backed up: 29, documents deleted: 0
Database: c:\notes\data\log.nsf
Documents backed up: 15, documents deleted: 5
Database: c:\notes\data\names.nsf
Documents backed up: 53, documents deleted: 5
Total number of documents backed up: 193
Total number of documents deleted: 15
Total number of bytes sent: 2210.5 KB
ANS09001 dsmnotes completed
```

Figure 28. Incremental Backup Using DSMNOTES

Example 2

```
dsmnotes incr .\ehobbs.nsf -mountwait=no
```

Perform an incremental backup of the EHOBBS.NSF database in the current directory. This also assumes that you don't have to wait for a tape mount.

Example 3

```
dsmnotes incr c:\project -subdir=yes -full=yes
```

Perform a complete backup of all databases in the directory c:\project and all subdirectories.

> **Security Restriction on AIX:**
>
> If a root user backs up a database or documents in a database owned by another AIX user, the root user becomes the owner of the backed up documents on the ADSM server. The user who owns the database cannot restore those documents, unless that user logs on as root user. Because of this security restriction, you should be consistent in choosing the AIX user to perform the backup and restore operations.

5.1.2 Restoring Deleted Documents

Notes documents that are deleted are actually made into so-called *deletion stubs* which cannot be accessed directly but which still reside in the database. The deletion stubs are eventually removed from the database, according to a purge value set by the Notes administrator.

The dsmnotes restdel command allows you to restore all data documents saved on the ADSM server for which there exist valid deletion stubs in the indicated Notes database. This command queries for both active and inactive copies of the deleted documents from the ADSM server. The deleted documents are merged in the Notes database, which must exist.

Notes deletes the deletion stubs after a user-adjustable time period. After a deletion stub is purged, dsmnotes restdel cannot be used to restore the document. Use dsmnotes restore (see 5.1.3, "Restoring Documents and Databases" on page 59) to restore the whole database to an earlier version, and then copy the restored documents to the current database.

The following examples show how the agent can be used to restore documents accidentally deleted from the workspace.

Example 1

```
dsmnotes restdel c:\gino\lnotes2.nsf -days=30
```

Restore all documents that have been deleted in the past thirty days from the lnotes2.nsf database, but not purged.

Example 2

```
dsmnotes restdel d:\appl\mydbs -days=1 -updateall=yes
```

This command restores all documents of databases in the specified location that were deleted since yesterday. Additionally, all documents in the

databases are updated to the current date and time. This forces replication for all replica databases.

5.1.3 Restoring Documents and Databases

The restore command restores all data documents saved on the ADSM server to the indicated Notes database. Nondata documents such as views, forms, and database header information are not restored in an existing database. If the indicated database does not exist on the workstation, the new database is created. In this case, the database header information and all nondata documents are also restored.

5.1.3.1 The dsmnotes Restore Command

The dsmnotes restore command is provided for those times when the Notes workspace is inappropriate. An example is when the restore operation needs to be scheduled. Because no database view is available on the command line, the command-line restore is used:

- To rebuild copies of the database.

- To restore to a database a range of documents.

Restoration of individual documents must be done through the Notes workspace. This is described in 5.2.1, "Restoring Selected Documents from a Database" on page 62.

5.1.3.2 Restore Command of Version 2 Notes Agent

The behavior of the restore command parameters TO and MERGE has changed in the latest version of the Notes agent. In Version 2, which is currently on Windows NT and on AIX, the two parameters cannot be used in combination. There are two different scenarios for the restore command:

- The restore target database already exists on your system.

  A range of data documents is restored into the target database. The target database location must be the same as the original. This implies that you cannot use the TO option, and MERGE=YES is the default and mandatory.

  Example 4

  ```
  dsmnotes restore c:\mydbs\lnotes1.nsf –merge=yes
  –fromdate=1/31/98 –todate=2/1/98 –totime=14:00
  ```

  Restore those documents in the specified database that was backed up within the specified date range, replacing existing documents with the latest available ADSM backup copy.

- The restore target database does not exist on your system.

  A new database is rebuilt and both data and nondata documents are restored. The TO option is required, and MERGE=NO is default and mandatory.

  Example 5

  ```
  dsmnotes restore c:\mydbs\lnotes1.nsf
  -TO=c:\mydbs\lnotes97.nsf -before=1/1/98
  -beforetime=00:00
  ```

  Restore the last version of the database named lnotes1.nsf that was backed up in 1997. Call the new database lnotes97.nsf.

  Example 6

  ```
  dsmnotes restore names.nsf -to=names.nsf
  ```

  Assume the database names.nsf was deleted on your system and you want it restored. You need to use the TO parameter to be able to recreate this database on your system.

Note:

With this restore command, you can also specify a directory that contains one or more Notes databases that are being restored. However, the directory pathname only applies to a restore operation using MERGE=YES (the default).

5.1.3.3 Restore Command of Version 3 Notes Agent

In Version 3, which is currently on OS/2, the functions of the MERGE and TO parameters are separated. You are now able to combine both parameters in one command. The examples for the Version 2 Notes agent are still valid. We investigate again the two different scenarios:

- The restore target database already exists on your system.

  You now have the choice to merge a range of documents into the target database (MERGE=YES) or to override the entire target database with the restore copy (MERGE=NO and DELETEPROMPT=YES). You can do this with and without using the TO option.

  Example 7

  ```
  dsmnotes restore c:\mydbs\lnotes1.nsf -merge=yes
  -to=c:\archive\lnotes1.nsf -fromdate=1/31/98
  -todate=2/1/98 totime=14:00
  ```

Restore those documents in the specified database that was backed up within the specified date range and merge them into the target database c:\archive\lnotes1.nsf, replacing existing documents with the latest available ADSM backup copy.

Example 8

```
dsmnotes restore c:\mydbs\lnotes1.nsf -merge=no -deleteprompt=yes
```

A new parameter is introduced in Version 3: DELETEPROMPT. Assume that the database already exists on your system and you attempt to override it with the restore; you are then prompted to delete the database.

• The restore target database does not exist on your system.

A new database is rebuilt and both data and nondata documents are restored. You may specify the TO option, and MERGE=NO is the default and is mandatory.

Example 9

```
dsmnotes restore names.nsf
```

Assume the database names.nsf was deleted on your system and you want it restored. You do not need to use the TO parameter to be able to recreate this database on your system.

5.1.4 Change of ADSM Password

You can change the ADSM password whenever you run a command by using the parameters ADSMPW and NEWADSMPW. With ADSMPW, you specify the current ADSM password, and with NEWADSMPW you specify the new ADSM password.

You are also able to update the ADSM password without running any backup or restore operation. The ADSM password is changed on the ADSM server. If PASSWORDACCESS GENERATE is used, the password is also changed in the user's password file or registry. Example 10 illustrates how to change the ADSM password using the dsmnotes executable.

Example 10

```
dsmnotes change -adsmpw=nt -newadsmpw=nt_new
```

> **Note:**
>
> On AIX, you have to be root user to be able to change the ADSM password.

5.2 Using the Graphical User Interface

The Notes agent GUI enables you to perform the following tasks:

- Restore selected documents from a database.
- Restore documents that have been deleted but not yet purged.
- Restore a copy of an entire database.
- Set and change the ADSM password.
- Get on-line help.

The graphical user interface is embedded into the Notes workspace, as shown in Figure 29.
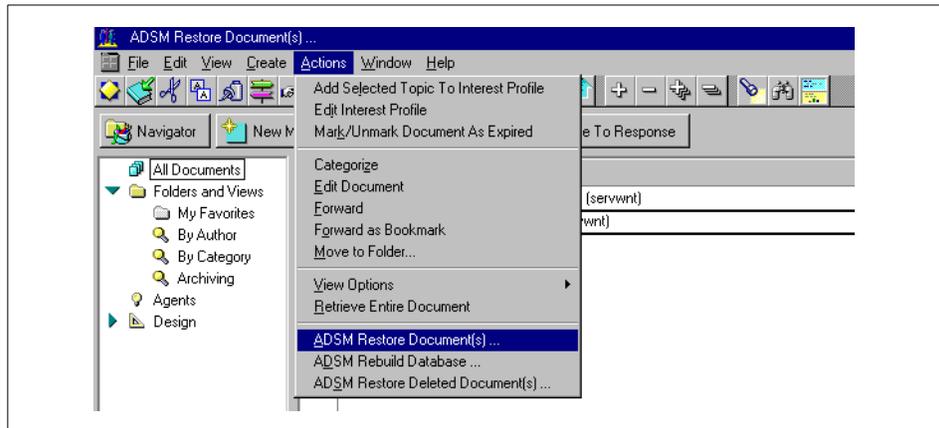
Figure 29. ADSM GUI Embedded in Notes Workspace

When you run the Notes workspace, click on the **Actions** menu to display the following commands in the pull-down menu:

- ADSM Restore Document(s)...
- ADSM Rebuild Database...
- ADSM Restore Deleted Document(s)...

These commands can be selected only when a database is open. If no database is open, the commands are disabled.

5.2.1 Restoring Selected Documents from a Database

You can restore backed up copies of individual documents from the ADSM server to a Notes database on your workstation. The documents must still be

present in the database. This operation is available only from the Notes agent GUI.

Follow these steps to restore selected documents to your Lotus Notes database:

1. Open a view of the database that has the documents you want to restore.

2. Mark the documents you want to restore.

3. Click on the **Actions** pull-down menu.

4. Select **ADSM Restore Documents(s)**

The **ADSM Restore Documents** dialog box appears as shown in Figure 30.
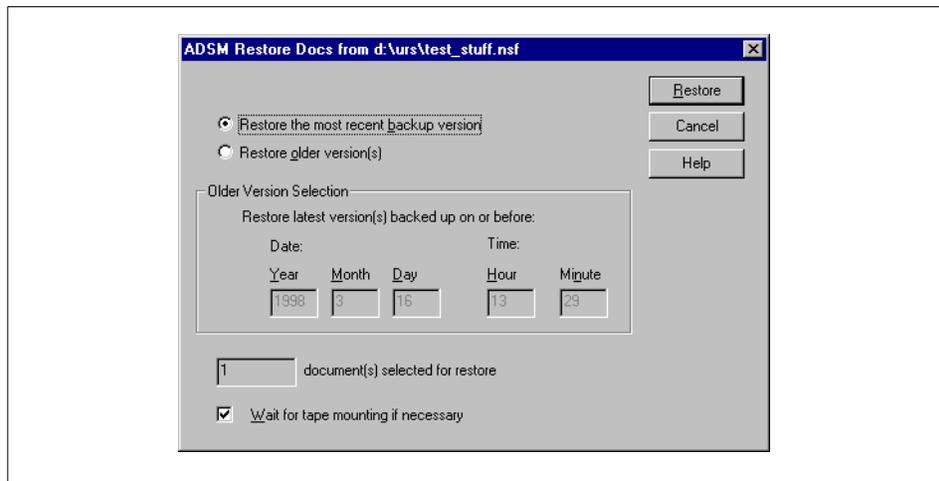
Figure 30. Restoring Selected Documents from the Notes Workspace

5. Select one of these options:

   • **Restore the most recent backup version**. This option restores each of the selected documents with its most recent backup version.

   • **Restore older version(s)**. This option restores each of the selected documents with the latest version that was backed up before the date and time in the **Older Version Selection** box. Type the date and time to which you want to restore in the **Older Version Selection** box.

6. You may deselect the wait for tape mount option if you do not want ADSM to wait for files that are on the tape.

   Also check to make sure the number of documents selected matches the number of documents you check-marked.

7. Click on the **Restore** button to restore the selected documents.

8. To display the restored documents, you need to refresh your database view: click on the **View** menu, then select **Refresh**, or press the F9 function key. The restored documents are marked unread in the database.

5.2.2 Rebuilding a Database

When you restore a backed up Notes database, you can either restore it to a new database or merge the documents from the backed up database into a database that already exists on your workstation.

The Version 2 and Version 3 Notes agent GUIs work the same: you can neither merge a range of documents into another database file, nor can you override an existing database with the restored material. See 5.1.3, "Restoring Documents and Databases" on page 59 for the command-line discussion.

Follow these steps to rebuild a database or merge selected documents into a database that already exists:

1. Open a view of the database that you want to rebuild. If the database no longer exists on your system, you must restore it using the restore command of dsmnotes. For examples of this command, see 5.1.3, "Restoring Documents and Databases" on page 59.

   After performing the command-line restore, return to your Notes workspace.

2. Click on the **Actions** pull-down menu.

3. Select **ADSM Rebuild Database**.

   The **ADSM Rebuild Database** dialog box appears as shown in Figure 31 on page 65.
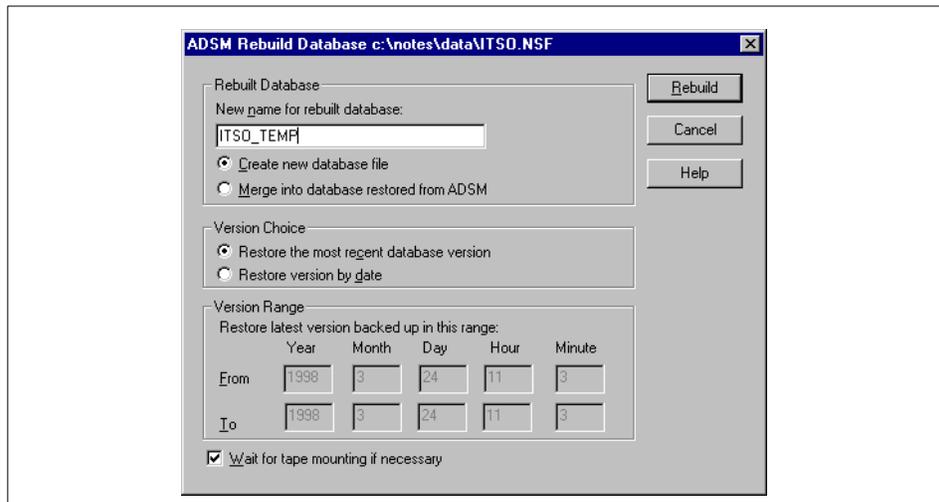
Figure 31. Rebuilding a Database from the Notes Workspace

4. If you want to create a new database, enter a new database name in the **New name for rebuilt database** field. ADSM restores the entire database from backup copies of individual Notes documents into the new database. You must choose a name that is not the same as that of any existing file.

   If you want to merge a range of data documents into the opened database, select **Merge into database restored from ADSM**. You can select this option if you have restored a backup version of the database through the ADSM backup/archive client.

5. If you want to merge the documents into a database, select one of these options in the **Version Choice** box:

   • **Restore the most recent database version**. This option restores all of the documents in the database with their most recent backup versions.

   • **Restore version by date**. This option restores all the documents in the database with the latest versions that were backed up within the dates and times in the **Version Range** box. Enter the From and To dates and times, which you want to restore.

   This option can be used only if **Merge into database restored from ADSM** is selected.

6. You may deselect the wait-for-tape-mount option if you do not want ADSM to wait for files that are on the tape.

7. Click on the **Rebuild** button to rebuild the database.

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8. If you created a new database, open the rebuilt database in the Notes workspace to view the restored documents. If you merged a range of documents into your database, you need to refresh your database view: click on the **View** menu, then select **Refresh**, or press the F9 function key. The restored documents are marked unread in the database.

5.2.3 Restoring Deleted Documents

You can restore deleted Notes documents from ADSM storage, if the deletion stubs have not been purged from the database. This operation queries for both active and inactive copies of the deleted documents from the ADSM server. The deleted documents are replaced with documents backed up on the ADSM server.

Follow these steps to restore documents that have been deleted but not yet purged from your Lotus Notes database:

1. Open a view of the database that contained the deleted documents.

2. Click on the **Actions** pull-down menu.

3. Select **ADSM Restore Deleted Document(s)**.

   The **ADSM Restore Deleted Docs** dialog box appears as shown in Figure 32.
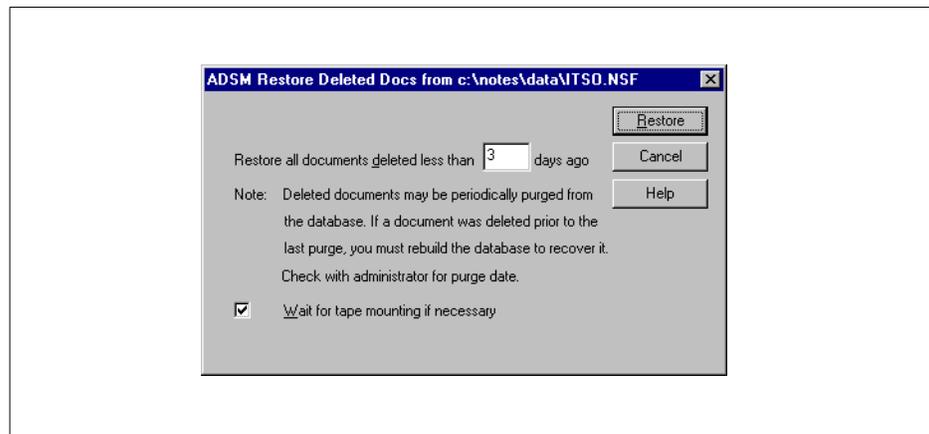
Figure 32. Restoring Data Documents from Deletion Stubs

4. If you want to restore only those documents deleted less than a certain number of days ago, type this number of days in the **Restore all documents deleted less than nnn days ago** field.

If you leave this field blank, it uses the zero default. Then all the deleted, but not yet purged, documents are restored.

5. You may deselect the wait for tape mount option if you do not want ADSM to wait for files that are on the tape.

6. Click on the **Restore** button to restore your documents.

7. To see the restored documents, you need to refresh your database view: click on the **View** menu, then select **Refresh**, or press the F9 function key. The restored documents are marked unread in the database.

5.2.4 Change of ADSM Password

When PASSWORDACCESS is set to PROMPT, which is the default, you are prompted for the ADSM password whenever you attempt to run a Notes agent GUI function. An **ADSM Password** window is displayed. If you want to change the password, click on the **Change** button. You now can enter the current password and the new password you want to select.

> **Note:**
>
> On AIX, you have to be root user to be able to change the ADSM password.

5.3 Remote Recovery

Notes environments can be spread out over a number of geographical locations. Figure 33 on page 68 illustrates a typical Notes environment, with servers based in different geographical locations.
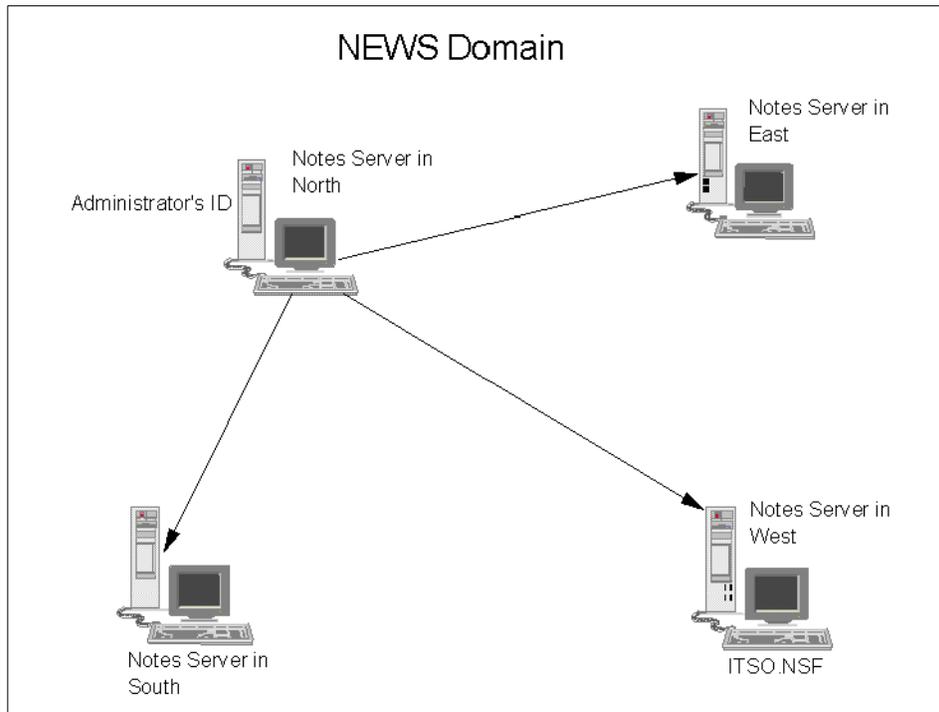
Figure 33. Typical Notes Environment

Remote database and document recovery can be done in two ways:

- Use the Notes workspace to restore documents to a database that resides on remote Notes servers. This can only be done using the OS/2 ADSM Notes Backup Agent to restore a database that was backed up on another OS/2 system or a Windows NT system. Windows NT and AIX do not support remote restores from the Notes workspace.

- Use the remote server console function to:

  - Restore an entire database.

  - Restore deleted documents.

5.3.1 Using the Notes Workspace (on OS/2 only)

> **Note:**
>
> Using the Notes workspace to recover documents of remote databases can only be done on OS/2. The remote database has to reside on OS/2 or Windows NT systems.

As shown in Figure 33 on page 68, the database ITSO.NSF resides on the West Notes server. A couple of important documents in the ITSO.NSF database are corrupted or deleted by accident, and it is a very important database. To further add to the misery of the Notes users, the Notes administrator for the West Notes server called in sick or is out of the office and these documents need to be recovered immediately. How will these documents be recovered? Who can recover these documents? Who has access to recover these documents? Situations like these are likely to come up from time to time. When they do, you should have a plan of recovery in place.

Because Notes security is honored, you cannot read or write documents in a restored database to which the original database would not give you access. ADSM security is also honored. To restore a database from an ADSM server, you:

- Must have backed up the database, or
- Be granted access to the database by the person who backed up the database.

Based on the above rules, the Notes administrator on the West Notes server should grant NSF databases access to users and to other ADSM nodes. Access should be granted once the NSF databases are backed up. To do so, you need to start the ADSM backup/archive client using the same node name as the Notes agent that backed up the databases, for example using the node name WEST_AGENT. From the ADSM backup/archive client command line:

1. Enter `query filespace` to see the names of the file spaces backed up on the ADSM server, for example $NOTESDIR\itso.nsf.

2. Use the set access command to grant other nodes backup access to the file spaces. You can grant access to a specific NSF database. For example:

   `set access backup {$NOTESDIR\itso.nsf}\*\* NORTH_AGENT`

This command will grant the NORTH_AGENT node on the North Notes server access to the backup version of the itso.nsf database. You can also grant access to all backed up NSF databases. For example:

```
set access backup * NORTH_AGENT
```

Referring back to Figure 33 on page 68, any of the other Notes administrators for the remote nodes can restore the documents in the itso.nsf database. Let us assume that the Notes administrator of the North Notes server is contacted and asked to do the recovery. The Notes administrator uses the North Notes server's workspace interface to restore the documents to the itso.nsf database on the West Notes server. The Notes administrator then follows these steps to recover the documents:

1. Open a view of the remote itso.nsf database from the North servers workspace.

2. Click on the **Actions** pull-down menu, which is shown in Figure 29 on page 62.

3. Select **ADSM Restore Deleted Document(s)**.

4. The **ADSM Remote Node** box appears as shown in Figure 34. Type in the node name of the remote Notes server's agent where the database is located. In our example, enter WEST_AGENT, and click on the OK button.
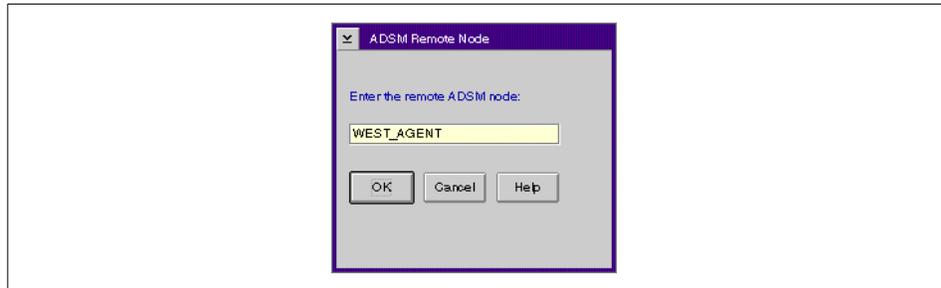
Figure 34. ADSM Remote Node Window

The **ADSM Restore Deleted Docs** box displays as shown in Figure 35 on page 71.
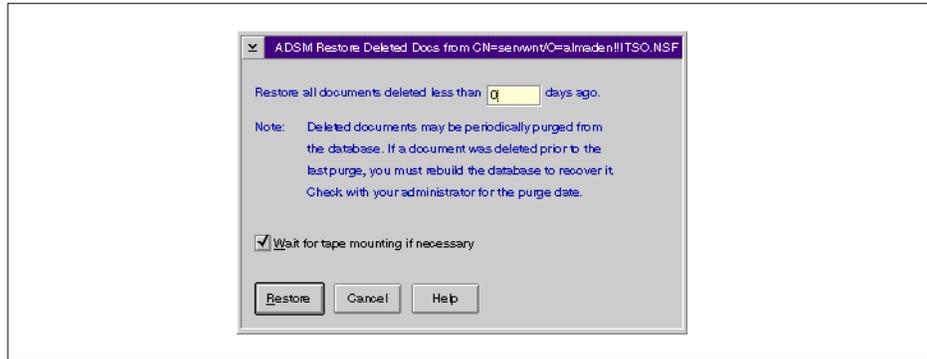
Figure 35. Restoring Data Documents from Deletion Stubs on Remote Server

5. Leave the **Restore all documents deleted less than nnn days ago** field blank. This way it uses zero as default and the latest deleted documents will be restored. If the documents have been purged already, then the Notes administrator has to fill in the number of days since the purge date.

6. You may deselect the wait-for-tape-mount option if you do not want ADSM to wait for files that are on the tape.

7. Click on the **Restore** button to restore the documents.

8. To see the restored documents in the open database view, click on the **View** menu and select **Refresh** or press the function key F9.

5.3.2 Using the Remote Server Console

The remote server console can be used on all platforms to issue Notes console commands on a remote Notes server. You can issue Notes commands or dsmnotes commands. The Notes server console provides a command, LOAD, which enables administrators to run programs on the Notes server. You use this command to issue a dsmnotes command on the Notes console. For example:

```
load dsmnotes restore itso.nsf
```

Why would you want to use the remote server console for ADSM functions? Notes administrators can issue backup or restore commands on Notes servers which are in a different city, for instance, or in the absence of the remote Notes server's administrator.

There are also access restrictions linked to the remote server console function. Access to remote Notes servers has to be granted to a Notes ID

from the first server in a Notes domain. Figure 36 shows the remote server console with the load command.
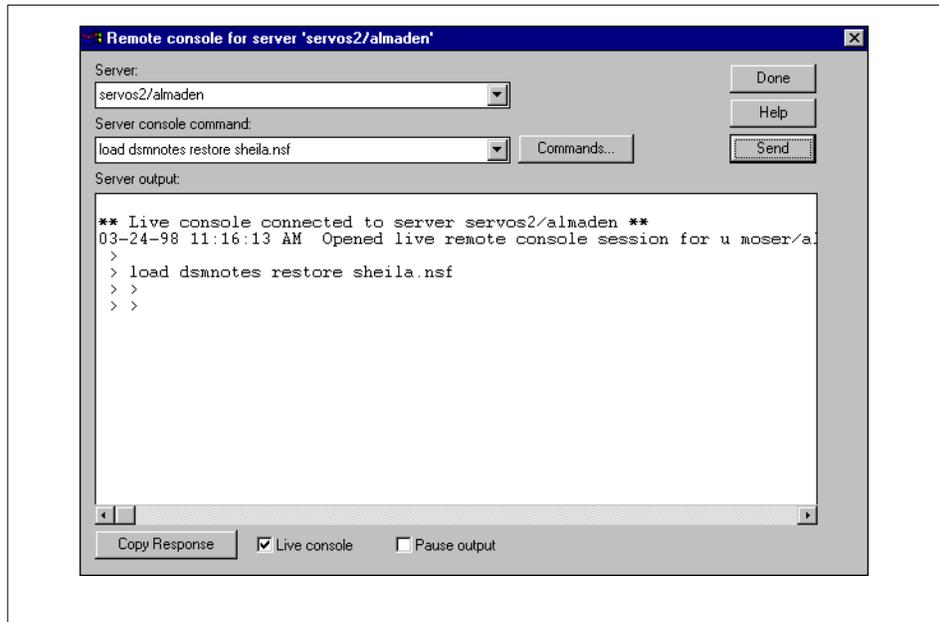
Figure 36. Remote Server Console

5.4 Summary Tables

The ADSM Notes agent provides a rich set of functions for the OS/2, Windows NT, and AIX Notes environment. It provides functions above and beyond those available from ordinary workstation backup products. Table 7 lists the Notes agent functions for each user interface.

Table 7. ADSM Notes Agent Functions Summary by User Interface

Function	dsmnotes	GUI
Incremental database backup	Yes	No
Restore selected documents	No	Yes
Restore deleted documents (not purged yet)	Yes	Yes
Restore database (recover original database)	Yes	No
Restore database (create database at new location)	Yes	Yes
Merge database restore	Yes	Yes

The Notes agents on the three platforms slightly differ in certain functions. Table 8 gives an overview of the different behavior among the three Notes agent platforms, OS/2, Windows NT, and AIX.

Table 8. ADSM Notes Agent Functions Summary by Platform

Function	OS/2	WNT	AIX
Remote restore operation to OS/2 machine	Yes	No	No
Remote restore operation to Windows NT machine	Yes	No	No
Remote restore operation to AIX machine	No	No	No
Restore of documents backed up by OS/2 agent	Yes	No	No
Restore of documents backed up by Windows NT agent	Yes	Yes	No
Restore of documents backed up by AIX agent	No	No	Yes
Automatic log collection to Notes database	No	No	Yes
ADSM API support of PASSWORDACCESS option	Yes	Yes	Yes
Management class assignment to selected databases	No	No	Yes

The ADSM Notes agent, in conjunction with the standard backup/archive client, provides a comprehensive solution to storage management in the OS/2, Windows NT, and AIX Notes environment.

Part 2. Exploiting ADSM in a Notes Environment

In Part 2 of this book we look at how ADSM can be exploited in a Lotus Notes environment. This comprises considerations on how to set up ADSM in a Notes environment and the steps on how to recover your Notes data after a data loss or disaster. We also discuss how well Notes and ADSM get along with each other.

The scenarios and configurations described here are based on our experiences during the residency. They are heavily influenced by the Notes configuration we implemented. We try to address some of the considerations for other configurations. These are, however, largely based on our observations rather than practical testing.

Chapter 6. Setting Up ADSM in a Notes Environment

In this chapter we show how ADSM can be implemented in a Lotus Notes environment. Our results are based on the experiences and observations we made working with a sample Notes environment during our residency.

Before you set up ADSM, you need to investigate your Notes databases. Several considerations are needed to optimize your ADSM backup of Notes databases. The considerations determine where you want to implement the ADSM Notes agent and how to configure the ADSM server to suit your purposes. Additionally, we discuss the recommended ADSM backup policy, how you can schedule it, and how you can automate the backup processing. We then illustrate the available log files and give examples for ADSM server queries.

6.1 Sample Notes Environment

Obviously, there are many very different Notes environments in real life. In this book, we cannot provide Notes backup solutions for all of these. Our objective in this part of the book is to discuss both Notes and ADSM issues we think you should consider when planning and processing Notes backup with ADSM.

During the residency, we built a sample environment which enabled us to simulate a typical midsize Notes environment. This typical environment is illustrated in Figure 37 on page 78. It results from information we gathered from Notes administrators.

In this environment we implemented a server replication method which is based on a common concept, called *hub and spoke*. The hub and spoke method uses a central Notes server that schedules and initiates all replication with the other servers, the spokes. Using this method, you can allow the same databases to be updated simultaneously on different servers and then replicated with the hub server, which keeps the updated database and uses replication to deliver the updated database to all spoke servers. You may allow only the hub server to update databases. In this case, the hub server pushes changes to spokes servers. No new or modified documents are allowed to be transferred from spokes servers to the hub server.
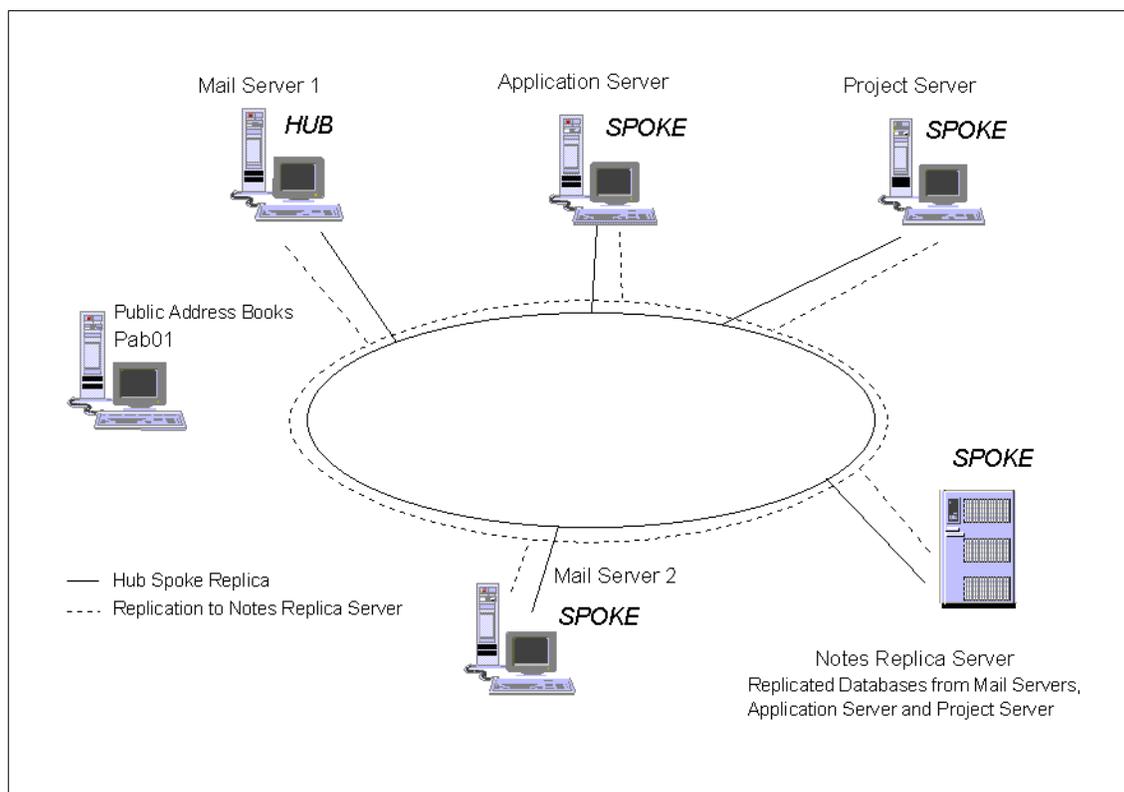
Figure 37. Notes Sample Environment

In this environment we have the following servers:

- **Mail Server 1.** This is the first server in the domain, also called the hub. This server is resident to the original names.nsf database. All updates to the names.nsf database are made at the hub. These updates are then replicated to all the spokes. This server is also resident to mail databases.

- **Notes Replica Server.** Some Notes administrators prefer to use a server like this as an "internal Notes backup solution." This simply means that Notes servers that have nondisruptive databases and databases that have a high level of document changes, replicate these identified databases to the Notes replica server. This way, for example, a corrupted database can be recovered by replicating it from the Notes replica server. This server is also a spoke in the hub and spoke topology. It receives replicas of the names.nsf database from the hub, mail server 1. In our environment this server receives replicas of the nondisruptive databases, as well as

replicas of databases that have a high level of document changes, such as the names.nsf database, marketing, and payroll databases.

- **Mail Server 2.** This mail server is a spoke in the hub and spoke topology. It receives replicas of the names.nsf database from the hub, mail server 1. This server houses mail databases.

- **Application Server.** This server is a spoke in the hub and spoke topology. It receives replicas of the names.nsf database from the hub, mail server 1. The application server has some Notes applications, such as marketing, payroll, treasury, and employee payables. The marketing, payroll, and treasury databases are nondisruptive databases, and are thus replicated to the Notes replica server.

- **Project Server.** This server is a spoke in the hub and spoke topology. It receives replicas of the names.nsf database from the hub, mail server 1. This server contains research and development projects databases. Some of these might also be replicated to the Notes replica server.

- **Pub01.** This server has been excluded from the hub and spoke topology. The sole purpose of this server is to keep replicas of public Name & Address books of other remote Notes domains. These databases are rather large and are used for mailing purposes only. This server does not need to replicate databases to the Notes replica server because all the databases on this server belong to other Notes domains around the world. If a database is lost, it can always be replicated from the original server where that database resides.

6.2 ADSM Implementation Considerations

Before you implement ADSM in your Notes environment, you need to do a comprehensive investigation of your Notes databases. The following are questions you may want to consider first:

- Which are the crucial databases you need to be recovered as soon as possible after a loss of data?
- Which are the databases with a very high rate of changes per day?
- Which databases are very large?
- Which databases are replica databases?
- Which databases cannot be backed up when the Notes server is running?
- For which databases do I need a document level recovery?

You need to consider these before you start the implementation of ADSM in your Notes environment. Without the answers, you could end up with an impractical or dangerous Notes storage solution.

For your implementation, you need a concept that takes into account both the business needs of your enterprise and performance issues of the ADSM backup facilities. In the case of a data disaster, you need to recover your systems immediately. Crucial data has to be restored as soon as possible. On the other hand, there are performance differences between the backup/archive client and the Notes agent, and those differences affect the backup policy you need in your environment.

The two ADSM backup facilities differ not only in function but also in performance. The backup/archive client backs up Notes databases in their entirety, treating them as any workstation file. This backup process is quick compared with the process of the Notes agent. The agent backs up the database on a document level. For large databases, this results in slow performance compared to the backup/archive client.

Databases crucial to the business, such as the company's public Name & Address book, names.nsf, or important project databases, are therefore not suitable for backup by the agent. In the case of a database loss, you need a quick recovery of the database. This can easily be done with the backup/archive client.

Databases that include many documents with a high change rate are also better backed up using the backup/archive client, because an incremental backup of such a database with the Notes agent can take so long. You could then miss your backup window.

Large databases with a modest level of database and document update activity are most appropriate for Notes agent backup and recovery. The agent sends to the ADSM server only the data that has actually changed within the database. This reduces the amount of data stored on the server and speeds up the backup.

It is unlikely that you would want to back up replica databases. These are database copies of remote databases, which are updated on a regular basis. If you lose a replica database, you can easily recover your local copy by initiating a new replication to take place. The replication process can take a while, though, so you may want to recover the replica using the backup/archive client.

On AIX, when the Notes server is running, there are opened databases which are usually locked by the Notes server. The AIX Notes agent cannot open these databases for backup unless it is run from the Notes server console using the LOAD command. This means that ADSM schedules of the Notes agent fail when attempting to back up these opened databases. In this case, you can use the Notes server to schedule the Notes agent operation as discussed in 6.5, "Automation of ADSM Backups" on page 95.

Alternatively, a Notes replicate server, as illustrated in Figure 37 on page 78, circumvents the problems with on-line backups. Once you replicate the database to this server, you can shut down the Notes server on the Notes replica server and then run an off-line backup with the Notes agent while the original database is still on-line and available for production purposes.

Similar problems may occur using the backup/archive client (on all platforms). When a database has a high rate of change, the backup/archive client may skip this database during backup. This depends on the serialization setting in the ADSM backup copy group. It is possible that the backup of such a database may fail over time. If you replicate this database to the Notes replica server, however, you can successfully back up the replica copy without any traffic. Figure 38 illustrates an example from the ADSM scheduler log file: the crucial Notes database names.nsf is not backed up using the backup/archive client since it is changed during the backup operation:

```
...
11/07/1997 23:58:53 Normal File-->
5,570,560 D:\NOTES\DATA\names.nsf  Changed
11/07/1997 23:59:50 Retry # 1  Normal File-->
5,570,560 D:\NOTES\DATA\names.nsf  Changed
11/08/1997 00:01:13 Retry # 2  Normal File-->
5,570,560 D:\NOTES\DATA\names.nsf  Changed
11/08/1997 00:02:41 Retry # 3  Normal File-->
5,570,560 D:\NOTES\DATA\names.nsf  Changed
11/08/1997 00:03:40 Retry # 4  Normal File-->
5,570,560 D:\NOTES\DATA\names.nsf  Changed
11/08/1997 00:04:41 ANS4228E Send of object
'D:\NOTES\DATA\names.nsf' failed
11/08/1997 00:04:41 ANS4940E File 'D:\NOTES\DATA\names.nsf'
changed during backup.  File skipped.
...
```

Figure 38. Failed Backup of NAMES.NSF

Use the ADSM Notes agent to back up those databases that require document-level backup granularity daily. We recommend that you use the agent only on those databases that do not have a high level of document update activity. Otherwise, the agent may take too long to back up such databases, and may interfere with daily Notes activities. A combination of weekly use of backup/archive client and daily incremental Notes agent backups seems to be an optimum solution.

These considerations lead to the result that you want to divide your Notes databases into three categories:

- Category 1: databases you want to back up daily using the ADSM backup/archive client.
- Category 2: databases you want to back up using the ADSM Notes agent.
- Category 3: databases you do not want to back up in your Notes environment.

These results can easily be configured in the ADSM environment using include/exclude lists, as explained in 6.4.3, "Include/Exclude Lists" on page 93. In general, we recommend using both the backup/archive and the Notes agent on all machines. Combined they provide a comprehensive storage solution for each Notes environment.

In accordance with the above considerations, we implemented ADSM in our Notes sample environment as shown in Figure 39 on page 83.
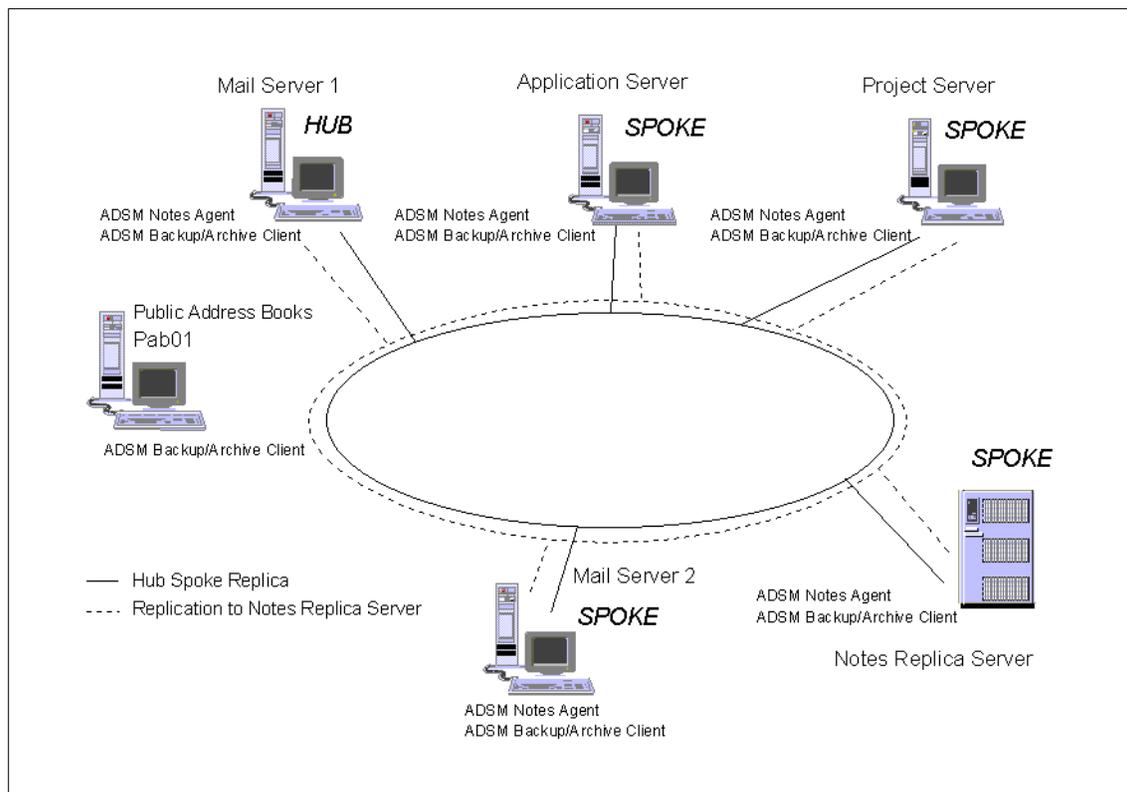
Figure 39. Notes Sample Environment with ADSM Implementation

There are particular reasons for replicating some databases to the Notes replica server:

- Nondisruptive databases can be backed up off-line while the original databases are still on-line and available for production. This is especially important in an AIX environment: some databases are locked for the Notes agent command-line interface when executed from the command prompt. Using ADSM scheduling, you cannot back up these databases with the Notes agent as long as the Notes server is up and running.

- Replication can allow you to balance the load of the ADSM server and the network traffic. The Notes replica server can be backed up during the day, while the other servers are scheduled to be backed up at night.

- Replication can prevent backup problems when using ADSM backup/archive client for databases with a very high level of document update activity. The ADSM backup/archive client tries a certain number of

times to back up a database, but if the database has constant changes during backup, the ADSM backup/archive client will skip the database.

6.3 ADSM Backup Policy for a Notes Environment

The ADSM backup/archive client backs up and restores a Notes database as a single workstation file. It is a fast, self-contained solution ideal for protecting against database and server loss. However, it does not provide individual document backup or the associated document-level recovery. The ADSM backup/archive client is appropriate for:

- Server disaster recovery

- Recovery of those databases that do not have a high rate of changes.

The ADSM backup/archive client can also back up all data on a Notes server, not just databases. It therefore has value beyond its role of performing Notes database recovery.

The ADSM Notes agent can also back up entire Notes databases. However, it performs incremental backups at the document level. You can restore individual documents that are deleted by accident or earlier versions of documents if you want to roll back a document. This backup capability does, however, have drawbacks: because the ADSM Notes agent backs up individual documents, a database backup or restore with the ADSM Notes agent initially takes longer than with the ADSM backup/archive client. After the first backup, subsequent incremental backups are quicker than full database backups. Therefore, the ADSM Notes agent is most suitable for those databases that:

- Require document-level recovery

- Are of medium size and have a modest level of databases and document update activity.

For databases with a high level of document update, the ADSM backup/archive client may still be the most appropriate tool.

The ADSM Notes agent can back up Notes databases only. It cannot back up other data, such as database search indexes that are held separately from the database or nondatabase files on Notes servers.

We recommend that you use both the ADSM backup/archive client and the ADSM Notes agent in your Notes environment with the following backup policy, using the schedule shown in Figure 40 on page 85.
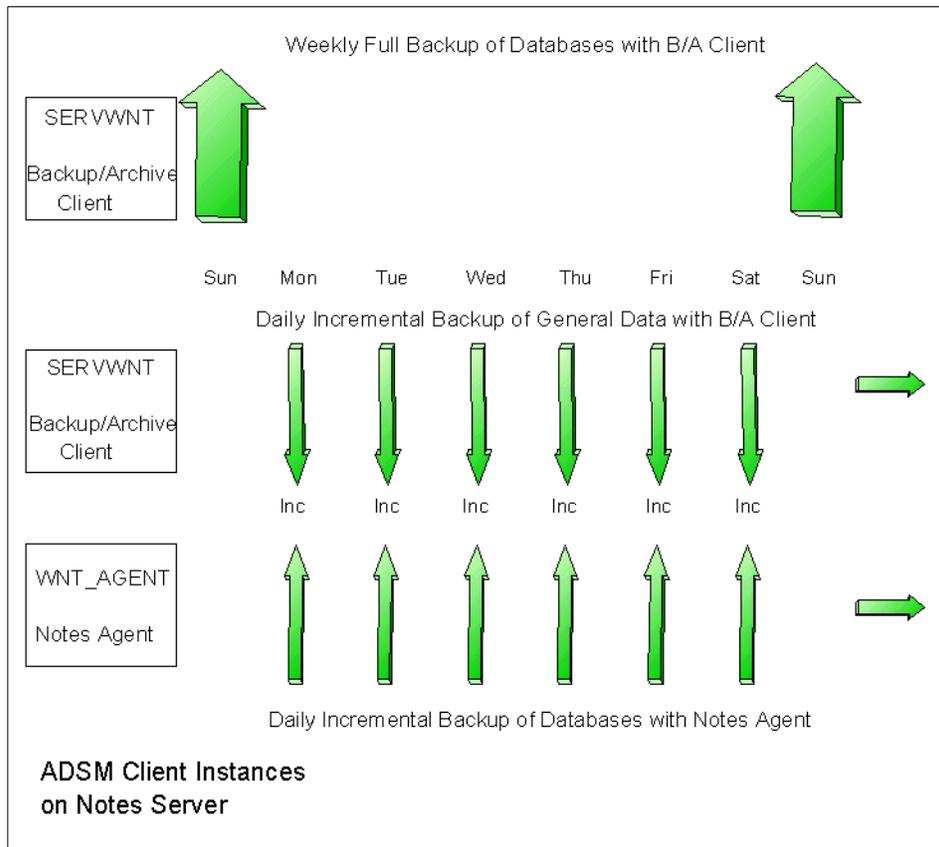
Figure 40. Weekly Full and Daily Incremental Backup Schedules

- Use the ADSM backup/archive client to back up general nondatabase files in your Notes environment, such as ID files, the notes.ini, and desktop.dsk. This has to be done daily. Additionally, include those Notes databases, you want to back up using only the backup/archive client, such as names.nsf

- Use the ADSM backup/archive client to back up all remaining Notes databases you want to back up. You may want to exclude several replica databases from this backup operation. We suggest running this backup once a week, on Sundays for example

- Use the ADSM Notes agent to perform daily incremental backups of those databases that require document-level backup.

6.4 ADSM Configuration in a Notes Environment

In this section, we discuss the ADSM configuration issues. These comprise the selection of node names for the backup/archive client and the Notes agent in order to connect to the ADSM server, ADSM policy settings, and include/exclude lists for your backup operations.

6.4.1 Node Names

ADSM clients have a node name defined in the client options file dsm.opt on Windows NT and OS2 systems, and in the client system options file dsm.sys on AIX systems. The node name identifies the workstation client to the ADSM server. The name must be unique for every client on an ADSM system.

Notes implements a concept of domains. A Notes domain is a group of Notes servers that share a common public Name & Address book (names.nsf). The public Name & Address book enables a Notes administrator to maintain multiple servers by using one Name & Address database. Also domains play a significant role in security management.

In our sample environment, we have one Notes domain, Almaden, comprising several Notes servers on different platforms (OS/2, Windows NT, and AIX). There is a common public Name & Address database for all servers. Updates to the common public Name & Address book are made on one server only, known as the *first server* of the domain. The updates are then replicated across all servers.

ADSM does not recognize the concept of Notes domains. An ADSM client running on mail server 1 can back up only those databases that physically reside on that server. When you are using the ADSM backup/archive client and ADSM Notes agent to do the backup of your Notes environment, usually you have both the backup/archive client and the Notes agent installed on the same server system. In this case, we highly recommend that you use different node names for the backup/archive client and the Notes agent. Figure 41 on page 87 illustrates our mail server 1 with its two node names. In our example, we created the node name SERVWNT for the backup/archive client, and WNT_AGENT for the Notes agent.
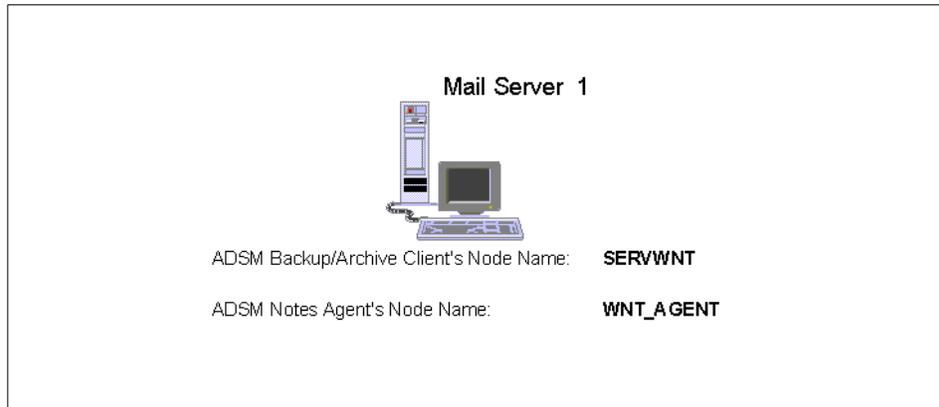
.

Figure 41. Mail Server 1 Node Names

Using a unique node name for the Notes agent has a number of potential benefits:

- Different management policies can be defined for the Notes agent and the backup/archive client.

- The Notes agent's inventory on the ADSM server is separate from the backup/archive client's inventory.

- The risk of ADSM users trying to restore Notes agent incremental backup data with a standard backup/archive client is reduced.

- Different client authentication methods can be used for each client.

6.4.2 Policy Considerations

ADSM allows you to manage the backup and archive process based on policies you establish for your enterprise. In our environment, we used the ADSM backup/archive client and ADSM Notes agent. We recommend that you use different policy domains, policy sets, management classes, and copy groups for the backup/archive client and for the Notes agent. This gives you more flexibility to configure the clients that have similar storage management requirements in terms of storage pool destination, serialization options, backup frequency, mode, and number of backup versions. Figure 42 on page 88 shows the ADSM server policies for our environment.
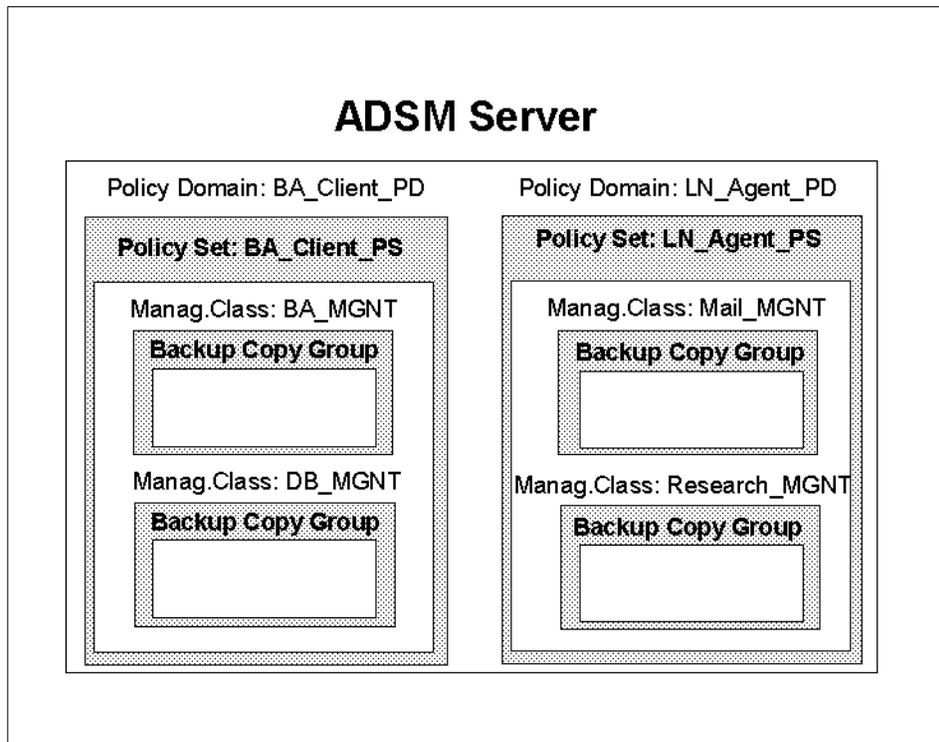
```
                    ADSM Server

  Policy Domain: BA_Client_PD      Policy Domain: LN_Agent_PD

    Policy Set: BA_Client_PS          Policy Set: LN_Agent_PS

     Manag.Class: BA_MGNT              Manag.Class: Mail_MGNT
        Backup Copy Group                Backup Copy Group



     Manag.Class: DB_MGNT           Manag.Class: Research_MGNT
        Backup Copy Group                Backup Copy Group
```

Figure 42. ADSM Server Policy Domains

We defined two policy domains, one for the backup/archive clients
(BA_Client_PD), and one for the Notes agents (LN_Agent_PD). Each domain
contains its own policy set (BA_Client_PS and LN_Agent_PS), and its
individual set of management classes and copy groups, allowing you to treat
the clients on the ADSM server separately. The Notes agent uses the backup
copy group.

We defined two management classes for the ADSM backup/archive client:

- BA_MGNT defines the backup process settings for all data that are backed
  up daily. This includes all general system data, Notes nondatabase data,
  and some individual Notes databases.

- DB_MGNT defines the backup process settings for all Notes databases
  that are backed weekly, using the backup/archive client.

We also defined two management classes for the ADSM Notes agent:

- MAIL_MGNT defines the backup process settings for all mail databases that are backed up daily, using the Notes agent.
- RESEARCH_MGNT defines the backup process settings for all research databases.

> **Note:**
>
> On AIX, you are able to assign a management class to selected databases that are affected by an incremental backup session.
>
> On OS/2 and Windows NT, you are able to assign a management class to all databases only.

Before you configure your ADSM environment, consider that the backup/archive client treats Notes databases as workstation files. It backs them up in their entirety. On the other hand, the Notes agent backs up individual documents within a Notes database. This must be accounted for in your ADSM configuration planning.

Different management classes for your Notes databases will result in different copy groups. When configuring copy groups, it is important to think about how many backup versions of the databases you want to keep, and how you want to treat data that is changed during the backup process (serialization mode). The management class contains a number of policy definitions that you must consider when backing up Notes databases:

- **Storage Destination.** Notes databases are generally large, possibly many megabytes each. Therefore it would be sensible to use a storage pool destination that includes a tape storage pool. Notes documents are rather small portions of data. For both data types, backups can go directly to tape; however, a storage pool hierarchy that contains both disk and tape pools provides a more flexible and responsive ADSM system. Over time, a number of backup copies for various databases will accumulate, and thus there could be large quantities of backup data for each Notes ADSM client. To facilitate effective ADSM tape usage and speed client recovery in the case of a disaster, you could use tape collocation. In that way you would ensure that all backup copies for a given client are stored together on a minimum number of tape volumes.
- **Serialization.** The file serialization options for a management class define how ADSM handles files that other applications use during backup operations. For Notes databases and documents, a serialization option of shared static is the most appropriate. It permits ADSM backup/archive clients to back up Notes databases (and the Notes agents to back up

documents) that are opened while maintaining the integrity of the backup copy. If the database (document) is modified (written to) during the backup operation, the backup operation is retried a defined number of times to obtain a static backup copy. The number of the times that ADSM retries the backup is specified by the CHANGINGRETRIES option in the client options file. If a static backup copy cannot be obtained, a backup is not taken. Both ADSM backup facilities happily back up Notes databases or documents opened by users. Notes keeps certain databases, such as names.nsf and log.nsf, open all of the time it is running. The shared static option ensures that consistent backups are taken while Notes is running.

To set the shared static serialization option, use the DEFINE COPYGROUP administration command with the default parameter SERIALIZATION=SHRSTATIC.

- **Backup Frequency and Mode.** Management classes are also used to define the frequency and mode of the backup. The backup frequency specifies the number of days that must elapse between incremental backups. For example, if the frequency is seven days, an incremental backup operation will not back up files until seven days have elapsed since the last backup copy was taken, even if the files are modified many times during those seven days. By default, the backup frequency is zero, with the result that files can be backed up many times each day.

  A Notes database is flagged as updated every time a user modifies a database document, form, or view. Additionally, Notes administration processes update the modification stamp of some databases frequently. As a general rule, it would be wise to limit backups to a frequency of once a day, unless there is a specific requirement to perform more frequent backups. For some databases, typically the more inactive ones, a backup frequency beyond once a day may be appropriate.

  The backup mode defines whether a file should be backed up according to whether it has changed since the last backup. We recommend using modified mode, the default, which backs up files only if they have changed since the last backup. Modified mode can reduce backup traffic significantly. Using a combination of modified mode and a backup frequency of once a day or beyond ensures that daily backups are taken only when databases are modified.

  To set the frequency and mode options use the DEFINE COPYGROUP command with the FREQUENCY=1 and MODE=MODIFIED parameters.

- **Number of Backup Versions.** The final management class option you need to consider is the number of backup copies to keep. For the backup/archive client, this option defines the number of backup copies of a database, while for the Notes agent it defines the number of backup

copies of a document within the database. It is difficult to suggest an appropriate number. The number of copies depends on factors such as the volatility of the files and their importance to the business. If databases are being backed up for disaster recovery purposes, it may be appropriate to keep only one or two backup copies. However, if the objective is to provide some form of individual document recovery, it is probably necessary to keep many backup copies.

To set the number of backup copies use the DEFINE COPYGROUP command with the VEREXISTS and VERDELETED parameters.

The three screens shown in Figure 43 on page 91, Figure 44 on page 92, and Figure 45 on page 92 show the management class settings in our ADSM environment.

```
adsm> q copygroup BA_CLIENT_PD BA_CLIENT_PS BA_MGNT f=d

            Policy Domain Name: BA_CLIENT_PD
               Policy Set Name: BA_CLIENT_PS
               Mgmt Class Name: BA_MGNT
               Copy Group Name: STANDARD
               Copy Group Type: Backup
          Versions Data Exists: 7
         Versions Data Deleted: 1
         Retain Extra Versions: 30
           Retain Only Version: 60
                     Copy Mode: Modified
            Copy Serialization: Shared Static
                Copy Frequency: 0
              Copy Destination: BACKUPPOOL
 Last Update by (administrator): SERVER_CONSOLE
         Last Update Date/Time: 05/05/1998 13:41:14
```

Figure 43. Management Class Settings: BA_MGNT

```
adsm> q copygroup BA_CLIENT_PD BA_CLIENT_PS DB_MGNT f=d

            Policy Domain Name: BA_CLIENT_PD
               Policy Set Name: BA_CLIENT_PS
              Mgmt Class Name: DB_MGNT
              Copy Group Name: STANDARD
              Copy Group Type: Backup
          Versions Data Exists: 4
         Versions Data Deleted: 1
         Retain Extra Versions: 30
           Retain Only Version: 60
                     Copy Mode: Modified
            Copy Serialization: Shared Static
               Copy Frequency: 0
              Copy Destination: BACKUPPOOL
 Last Update by (administrator): SERVER_CONSOLE
          Last Update Date/Time: 05/05/1998 13:41:14
```

Figure 44. Management Class Settings: DB_MGNT

```
adsm> q copygroup LN_AGENT_PD LN_AGENT_PS MAIL_MGNT f=d

            Policy Domain Name: LN_AGENT_PD
               Policy Set Name: LN_AGENT_PS
              Mgmt Class Name: MAIL_MGNT
              Copy Group Name: STANDARD
              Copy Group Type: Backup
          Versions Data Exists: 7
         Versions Data Deleted: 1
         Retain Extra Versions: 30
           Retain Only Version: 60
                     Copy Mode: Modified
            Copy Serialization: Shared Static
               Copy Frequency: 0
              Copy Destination: AGENTPOOL
 Last Update by (administrator): SERVER_CONSOLE
          Last Update Date/Time: 05/05/1998 13:41:14
```

Figure 45. Management Class Settings: MAIL_MGNT

> **Note:**
>
> After an incremental backup has been run against a database, it is important not to change the management class assigned to that database. When the ADSM Notes agent backs up a database, it binds each document to the specified management class. If you subsequently change the assigned management class for database to a management class that retains backup versions for a different length of time, it might be impossible to restore the entire database.

6.4.3 Include/Exclude Lists

An include/exclude list contains statements that identify any data you want to specifically include or exclude from backup services. The list can also contain a statement that assigns a particular management class to a range of files affected by an incremental backup. The include/exclude statements are part of the client options file. Please note the different syntax using the include/exclude statements for the backup/archive client and the Notes agent. In our sample environment, each backup operation needs to process an individual include/exclude list:

- Daily incremental backup using the backup/archive client

  This process backs up all general data on your machine and includes some selected Notes databases you want to back up using the backup/archive client only — for example, names.nsf and several crucial project databases. Therefore, you first need to exclude all Notes databases, and then include the selected databases for the backup process. Include the following statements in the client options file of the backup/archive client on your system:

  ```
  exclude ?:\...\*.nsf
  include c:\notes\data\names.nsf
  include c:\notes\data\project\important.nsf
  include d:\gene\payroll.nsf
  ```

- Weekly full backup of Notes databases using the backup/archive client

  This process backs up the remaining Notes databases only. No other system data is backed up. You need to schedule a separate backup process for this, as explained in more detail in 6.5, "Automation of ADSM Backups" on page 95. Include the following statements in a separate client options file for your backup/archive client:

  ```
  exclude ?:\...\*
  include c:\notes\data\...\*.nsf
  ```

```
include d:\gene\...\*.nsf
exclude c:\notes\data\names.nsf
exclude c:\notes\data\project\important.nsf
exclude d:\gene\payroll.nsf
```

- Daily incremental backup of databases using the Notes agent

  This process backs up all Notes databases where a document-level restore operation is required. You include the statements in the Notes agent's client options file as described in 2.2.3, "Setting Up ADSM" on page 21 for OS/2, in 3.2.3, "Setting Up ADSM" on page 35 for Windows NT, and in 4.2.3, "Setting Up ADSM" on page 49 for AIX. The same Notes databases are processed as in the weekly backup process using the backup/archive client. Include these statements:

```
exclude ?:\$NOTESDIR\names.nsf\*\*
exclude ?:\$NOTESDIR\project\important.nsf\*\*
exclude ?:\D_DRIVE\gene\payroll.nsf\*\*
```

On AIX, you add a pointer to the include/exclude list (which is a separate file) into the client system options file, dsm.sys, under your server stanza. The pointer is the option INCLEXCL. Although you have only one client system options file for the backup/archive client, you need a second pointer to process the two backup sessions with your backup/archive client. Therefore, you need to add a second server stanza to the client system options file, including the second INCLEXCL statement that points to another include/exclude file. Doing so allows you to run the two backup sessions processing different include/exclude lists.

Figure 46 on page 95 is an example for such a client system options file on AIX: you define two server stanzas with individual server names, ADSM_1 and ADSM_2, even though you are pointing to the same physical server instance. In each server stanza, you point to an individual include/exclude list, /usr/lpp/adsm/bin/inclexcl_daily.lst and /usr/lpp/adsm/bin/inclexcl_weekly.lst.

```
servername adsm_1
COMMmethod TCPip
TCPServeraddress yellow
Passwordaccess generate
Inclexcl /usr/lpp/adsm/bin/inclexcl_daily.lst
NODename SERVWNT

servername adsm_2
COMMmethod TCPip
TCPServeraddress yellow
Passwordaccess generate
Inclexcl /usr/lpp/adsm/bin/inclexcl_weekly.lst
NODename SERVWNT
```

Figure 46. Client System Options File on AIX: Two Server Stanzas

6.5 Automation of ADSM Backups

In this section we show how backup processing can be automated. Regular backups are required to provide a high degree of availability down to the individual document level. To successfully restore individual documents, particularly older versions, requires regular backups, taking place at known times. The best way to achieve regularly scheduled backups is to perform automatic scheduling of backups with the Notes agent. Two main methods for automatic backups are:

- Using the scheduling command with the Notes Name & Address book
- Using the ADSM scheduler.

On AIX, when the Notes server is running, there are opened databases which are usually locked by the Notes server. The AIX Notes agent cannot open these databases for backup unless it is run from the Notes server console using the LOAD command. This means that ADSM schedules of the Notes agent fail when attempting to back up these opened databases. In this case, you should use the Notes server to schedule the Notes agent operation.

> **Note:**
>
> When scheduling Notes agent commands, ensure that you specify commands that can run unattended. For ADSM, you can either provide the ADSM password with every scheduled command or run with the option PASSWORDACCESS set GENERATE.
>
> Notes prompts you for your Notes password when you attempt to restore documents to a new database. To bypass this Notes password prompt, go to the **File - Tools - User ID** menu on your Notes workspace and select the **Share password with Notes add-ins** option.

6.5.1 Notes Scheduling Using the Name & Address Book

The Notes server Name & Address database, names.nsf, is the primary Notes server management tool. This database is used to perform all sorts of management tasks on a Notes server. One management task is to schedule programs to run automatically.

To set up automatic scheduling of a program, open the names.nsf database on the Notes server and select **Server - Programs - Add Program** from the Notes workspace. You get a list of server document types that are created as shown in Figure 47 on page 97.
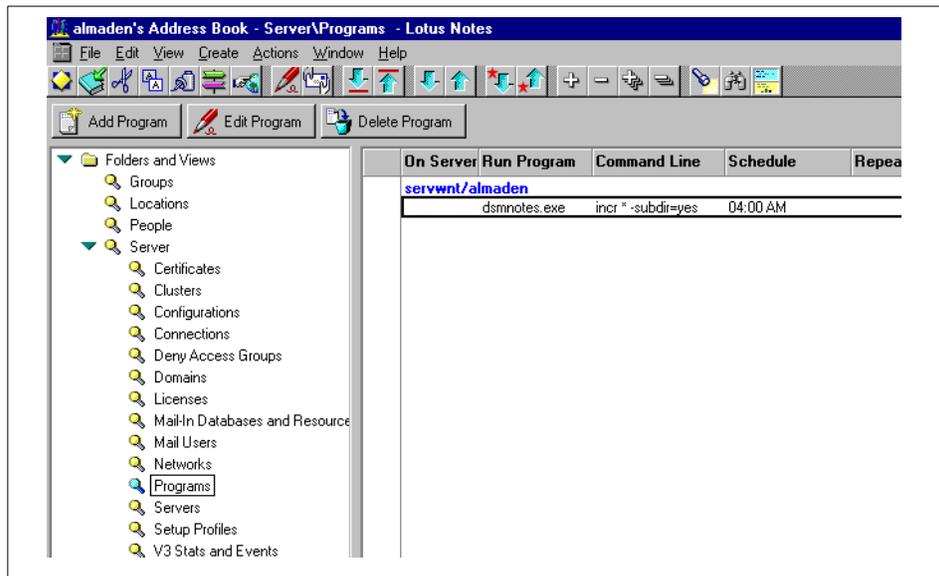
Figure 47. Notes Server Programs on Notes Workspace

To create a server document in the names.nsf file, you must have the appropriate authority, which is controlled through ACLs for the database. You typically must be a server administrator to create server documents. Figure 48 shows a completed program document.
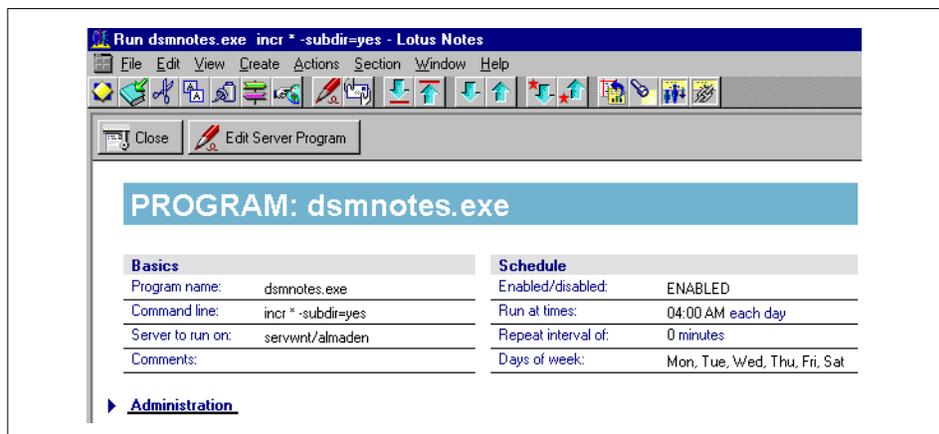

Figure 48. Setup of Notes Program for ADSM Notes Agent Backup

The document shown in Figure 48 on page 97 automatically runs an incremental backup for all databases using Notes agent's command-line interface, dsmnotes. It backs up all databases in the Notes data directory and subdirectories except those that are excluded with exclude options in the client options file. It is set to run at 4:00 a.m., seven days a week. This is a very simple method of scheduling commands, but powerful. In our example, we run an incremental command. Any Notes server task can be scheduled by using a Notes program document.

Similarly, you can schedule the execution of a command script. This allows you to run several Notes agent commands with one schedule program. You just need to create a script file, for example *run_inc.cmd,* including the dsmnotes commands you want the Notes server to execute. Then you create a program document as illustrated in Figure 48 on page 97, but specifying the script file name as program name. Figure 49 gives an example for a command script file including several Notes agent commands that you can easily schedule with one program document in the Notes server:

```
rem RUN_INC command script for Notes scheduler
rem
rem
dsmnotes incr * -su=yes -adsmpw=mypw
dsmnotes incr d:\gene -adsmpw=mypw
```

Figure 49. Command Script RUN_INC.CMD for Notes Scheduler

Note:

The Notes scheduler is available only on a Notes server, not on a Notes workstation. The server has to be up and running in order to execute scheduled tasks. Only the Notes agent's command-line interface can be scheduled through the names.nsf. The GUI cannot be scheduled.

To run automatic backups on a Notes workstation, you need to use the ADSM scheduler.

6.5.2 ADSM Scheduling

Scheduling the Notes agent with the ADSM command scheduler is somewhat complex. The ADSM backup/archive clients can run in a scheduled mode (using the scheduling daemon) and are easily scheduled with ADSM. The

Notes agent cannot run in a scheduled mode, however. To schedule the Notes agent with ADSM, you must schedule a backup/archive client on the Notes server to execute the dsmnotes command. The backup/archive client runs in a scheduled mode, as shown in Figure 50.
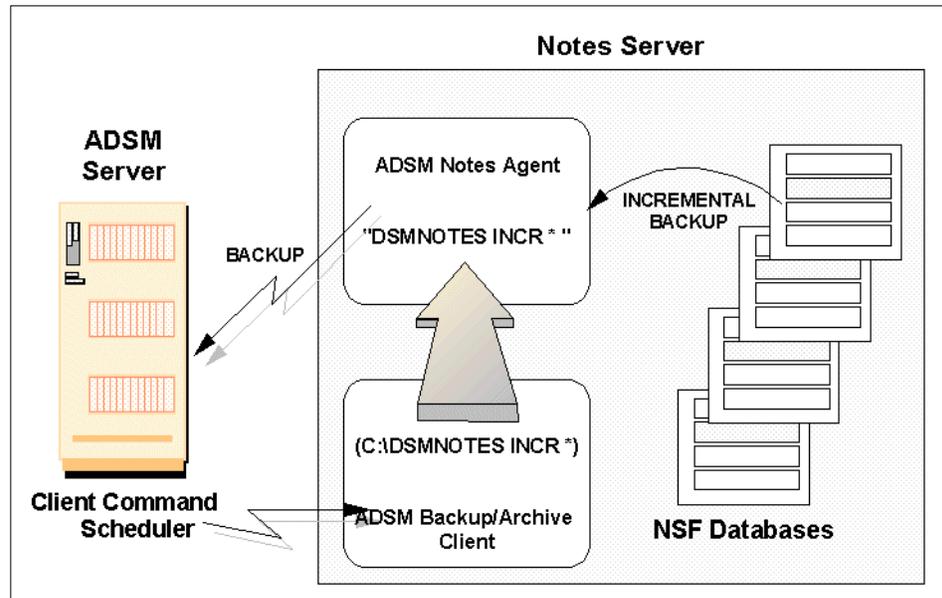

Figure 50. Scheduling DSMNOTES Commands with the ADSM Scheduler

Figure 50 shows the backup/archive client and the Notes agent implemented on the Notes server. They are defined to the ADSM server with different node names. The backup/archive client is set up to run in scheduled mode; it waits to perform scheduled operations defined on the ADSM server. Client functions, including backups, archives, restores, and retrieves, can be scheduled, as can ordinary operating system commands. A schedule can be defined on ADSM that, when invoked, runs dsmnotes as a system command on the Notes server. The ADSM server thinks it is scheduling the backup/archive client, but, in reality, it is starting the ADSM Notes agent. For that you need to define the scheduler specifying ACTION=COMMAND.

The above method uses ADSM to schedule an application that uses the ADSM API such as the Notes Agent. The approach may seem overly complex because the server Name & Address book could be used instead. However, in practice, the backup/archive client also schedules normal full backups of Notes databases and other files on the Notes server, so the ADSM scheduler can be used to run Notes agent backups as well.

You need three different scheduler commands on your Notes server:

- Daily incremental backup using the backup/archive client

  This process backs up all general data on your machine and includes some selected Notes databases you want to back up using the backup/archive client only — for example, names.nsf and several crucial project databases. On the ADSM server, you define a schedule using ACTION=INCREMENTAL; for example,

  ```
  define schedule BA_CLIENT_PD DAILY_DATA action=incremental
  objects="c:\* d:\*" starttime=02:00 starttime=03/17/1998
  ```

- Weekly full backup of Notes databases using the backup/archive client

  This process backs up only the remaining Notes databases. No other system data is backed up. Since you need to process a different include/exclude list from the above command, you must define a schedule using ACTION=COMMAND; for example,

  ```
  define schedule BA_CLIENT_PD WEEKLY_DB action=command
  objects="c:\adsm\scheds\weekly_db.cmd" starttime=06:00
  starttime=03/17/1998 dayofweek=sunday
  ```

  In our example, the command script includes the following statements:

  ```
  set DSM_DIR=c:\win32app\ibm\adsm\baclient
  set DSM_CONFIG=c:\win32app\ibm\adsm\baclient\dsm.weekly_db.opt
  c:\win32app\ibm\adsm\baclient\DSMC SELECT c:\*.nsf
  ```

  You need to point to a separate client options file, such as dsm.weekly_db.opt, in order to process a different include/exclude list. On AIX, you specify another server in this file to process the different include/exclude file in the server stanza.

- Daily incremental backup of databases using the Notes agent

  This process backs up all Notes databases where a document-level restore operation is required. The same Notes databases are processed as in the weekly backup process using the backup/archive client. Again, you must define a schedule using ACTION=COMMAND; for example,

  ```
  define schedule BA_CLIENT_PD DAILY_AGENT action=command
  objects="c:\adsm\scheds\daily_agent.cmd" starttime=02:00
  starttime=03/17/1998
  ```

  In our example, the command script includes the following statements:

  ```
  set DSMI_DIR=c:\win32app\ibm\adsm\agentln
  set DSM_CONFIG=c:\win32app\ibm\adsm\agentln\dsm.opt
  c:\win32app\ibm\adsm\agentln\dsmnotes incr * -subdir=yes
  c:\win32app\ibm\adsm\agentln\dsmnotes incr d:\gene\* -subdir=yes
  ```

6.6 ADSM Logs and Server Queries

This section describes the logs produced by the ADSM backup/archive client and the ADSM Notes agent and explains how to manage the logs by importing them into a Notes database (on AIX only). The technique of importing ADSM logs into Notes databases provides an automated way of managing logs, deleting logs over a certain age, and giving administrators remote access to the logs from anywhere in a Notes network.

We show how to create ADSM server queries of backed up Notes databases and documents. This can be done in two ways: by using the Notes agent, or by issuing commands from the ADSM administrator client.

6.6.1 ADSM Client Logs

The ADSM backup/archive client automatically generates two logs:

- A client error log, dsmerror.log
- A client scheduler log, dsmsched.log.

6.6.1.1 Client Error Log

The client error log, dsmerror.log, contains details of all the errors that occur during backup/archive operations. It is a plain text file that is appended to when errors occur. The ADSM backup/archive client, by default, places the error log in the current directory. You can specify an alternative error log directory by defining an optional variable, DSM_LOG, in your system environment:

```
DSM_LOG=d:\adsm\log
```

The DSM_LOG in the above example places the dsmerror.log file in the d:\adsm\log directory. The name of the log cannot be changed.

The client error log grows as errors occur. You can prune the size of the log by specifying the ERRORLOGRETENTION option in the client user options file (on OS/2 and Windows NT) or the client system options file (on AIX):

```
ERRORLOGRETENTION 30 S
```

ERRORLOGRETENTION defines the number of days to keep entries in the error log and the action to perform for the entries that are pruned. In the above example, the entries are kept for 30 days, and the pruned entries are saved in another log in the same directory, dsmerlog.pru. The pruning activity is invoked when a backup/archive client or scheduled client operation starts.

6.6.1.2 Client Scheduler Log

The client schedule log file, dsmsched.log, is a text file that records all backup/archive client activity that the ADSM server's central scheduling facility initiates. For example, dsmsched.log contains a history of all of the backed up files from a scheduled incremental backup.

Figure 51 illustrates an example for a schedule log. The backup/archive client is scheduled to execute a script, *daily_agent.cmd*. This script may contain commands for the Notes agent as discussed in 6.5.2, "ADSM Scheduling" on page 98.

```
...
03/26/1998 08:32:58 Session established with server DB2: AIX-RS/6000
03/26/1998 08:32:58   Server Version 3, Release 1, Level 0.1
03/26/1998 08:32:58   Server date/time: 03/26/1998 08:35:30  Last
access: 03/26/1998 08:35:30

03/26/1998 08:32:58 Querying server for next scheduled event.
03/26/1998 08:32:58 Next operation scheduled:
03/26/1998 08:32:58
------------------------------------------------------------
03/26/1998 08:32:58 Schedule Name:         INC_DAILY
03/26/1998 08:32:58 Action:                Command
03/26/1998 08:32:58 Objects:
C:\win32app\ibm\adsm\baclient\start daily_agent.cmd
03/26/1998 08:32:58 Options:
03/26/1998 08:32:58 Server Window Start:   08:33:00 on 03/26/1998
03/26/1998 08:32:58
------------------------------------------------------------
03/26/1998 08:32:58
Executing scheduled command now.
03/26/1998 08:32:58
Executing Operating System command or script:
   C:\win32app\ibm\adsm\baclient\start daily_agent.cmd
03/26/1998 08:32:58 Finished command.  Return code is:
   1
...
```

Figure 51. Scheduler Client Log

The ADSM backup/archive client, by default, places the schedule log in the current directory. You can change the directory path and file name by using the SCHEDLOGNAME option in the client user options file (on OS/2 and Windows NT) or the client system options file (on AIX):

```
SCHEDLOGNAME d:\adsm\log\schedlog.jan
```

The schedule log grows as scheduled operations occur. It can potentially grow into a very large file because it is an activity log with details of all scheduled client activity. You can prune the schedule log by specifying the SCHEDLOGRETENTION option in the client user options file (on OS/2 and Windows NT) or the client system options file (on AIX):

```
SCHEDLOGRETENTION 30 S
```

SCHEDLOGRETENTION defines the number of days to keep entries in the schedule log and the action to perform for the entries that are pruned. In the above example, the entries are kept for 30 days, and the pruned entries are saved in another log in the same directory, dsmsched.pru. The schedule log is pruned after a scheduled event completes.

6.6.2 ADSM Notes Agent Logs

The Notes agent does not use the same logs as the backup/archive client because it uses the ADSM API client as illustrated in Figure 6 on page 14. The Notes agent stores error and activity information in two logs:

- The ADSM API client error log, dsierror.log
- The Notes agent log, log.dsm.

6.6.2.1 API Client Error Log

The API client error log file, dsierror.log, contains information about ADSM API errors that occur during processing. It is a plain text file that is appended to when errors occur. The ADSM API client, by default, places the error log in the current directory. You can specify an alternative error log directory by defining an optional variable, DSMI_LOG, in your system environment:

```
DSMI_LOG=d:\adsm\log
```

The DSMI_LOG in the above example places the dsmerror.log file in the D:\ADSM\LOG directory. The name of the log cannot be changed.

The API client error log grows as errors occur. You can prune the size of the log by specifying the ERRORLOGRETENTION option in the API client user options file (on OS/2 and Windows NT) or the client system options file (on AIX):

```
ERRORLOGRETENTION 30 S
```

ERRORLOGRETENTION defines the number of days to keep entries in the error log and the action to perform for the entries that are pruned. In the above example, the entries are kept for 30 days, and the pruned entries are

saved in another log in the same directory, dsmerlog.pru. The pruning activity is invoked when an API client operation starts.

6.6.2.2 Notes Agent Log

The Notes agent log, log.dsm, is a text file that contains activity and error information for the ADSM Notes agent. It is, by default, located in the Notes data directory. You can specify an alternative log directory by defining an optional variable, DSMNOTES_LOGDIR, in the notes.ini file:

```
DSMNOTES_LOGDIR=d:\adsm\log
```

The DSMNOTES_LOGDIR in the above example places the log.dsm file in the d:\adsm\log directory. The name of the log cannot be changed. Because this file grows over time, it must be managed as appropriate.

Figure 52 on page 105 illustrates an example for a Notes agent log. It displays information and results of an incremental backup operation run by the Notes agent. For each processed database, a little statistic is given of how many documents got backed up, and how many got deleted. Databases, that are excluded from the backup operation are also shown with an appropriate message.

```
03/02/98 11:27:27 AM ADSMConnect Agent for Lotus Notes - Version 2.1.7
03/02/98 11:27:27 AM dsmnotes incr start
03/02/98 11:27:27 AM Database c:\notes\data\names.nsf
03/02/98 11:27:28 AM Database c:\notes\data\log.nsf
03/02/98 11:27:28 AM ANS1115W (RC185) File 's excluded by
include/exclude list
03/02/98 11:27:28 AM Database c:\notes\data\admin4.nsf
03/02/98 11:27:28 AM Database c:\notes\data\busytime.nsf
03/02/98 11:27:29 AM Database c:\notes\data\catalog.nsf
03/02/98 11:27:30 AM Database C:\NOTES\DATA\NAMES.NSF
03/02/98 11:27:30 AM Documents backed up: 3; documents deleted: 0
03/02/98 11:27:30 AM Database C:\NOTES\DATA\LOG.NSF
03/02/98 11:27:30 AM Documents backed up: 0; documents deleted: 0
03/02/98 11:27:30 AM database c:\NOTES\DATA\ADMIN4.NSF
03/02/98 11:27:30 AM Documents backed up: 0; documents deleted: 0
03/02/98 11:27:30 AM Database C:\NOTES\DATA\BUSYTIME.NSF
03/02/98 11:27:30 AM Documents backed up: 0; documents deleted: 0
03/02/98 11:27:30 AM Database C:\NOTES\DATA\CATALOG.NSF
03/02/98 11:27:30 AM Documents backed up: 2; documents deleted: 0
03/02/98 11:27:30 AM Total Number of documents backed up: 5
03/02/98 11:27:30 AM Total Number of documents deleted: 0
03/02/98 11:27:30 AM Total Number of bytes send: 23.8 KB
03/02/98 11:27:30 AM ANS0900I dsmnotes completed
```

Figure 52. Notes Agent Log

6.6.3 Automating ADSM Log Collection (on AIX only)

Four different logs are potentially created for a Notes server that uses both the ADSM backup/archive client and ADSM Notes agent: the two error logs dsmerror.log and dsierror.log, the schedule log dsmsched.log, and the Notes agent log log.dsm. These logs are text files that are located in a Notes server file system. The files are appended over a period of time and can potentially grow to a very large size. Administrators must have access to the Notes server on which a log is created in order to view the log. The log size may occupy valuable Notes server file system space. The two error logs and the schedule log can be automatically pruned, but the Notes agent log cannot.

On the AIX platform, you can use Notes itself as a repository for the ADSM logs to aid in log viewing and to save log space. Notes is ideally suited for this purpose because it is simple to import text files into Notes databases, and Notes provides a way of remotely viewing and managing logs.

> **Note:**
>
> The date and time stamp format on your operating system has to match the date and time stamp format on the Notes server. Otherwise no ADSM client log can be imported to a Notes database.

On AIX, you use the *dsmlog* executable that is a part of the ADSMConnect Agent. You use it to automatically import ADSM logs into a Notes database and optionally delete them from the local file system. The following is an example of how to import the Notes log into a Notes database:

```
dsmlog /notes/notesr4/log.dsm log.nsf -d
```

The Notes log file log.dsm is imported as a document into the Notes log database log.nsf. The -D parameter causes the ADSMConnect Agent to delete the log file from the local file system. The log file is not deleted unless the entries can be copied to the database without errors.

The executable is designed to use a standard Notes log database without modification. This Notes database could be the Notes log, log.nsf, created on every Notes server and workstation or a separate database created by using the standard Notes log template. In either case, the log database must already exist; the imported logs are displayed in the Miscellaneous Events view of the database. Figure 53 on page 107 shows the imported ADSM logs in the Notes log database.

.
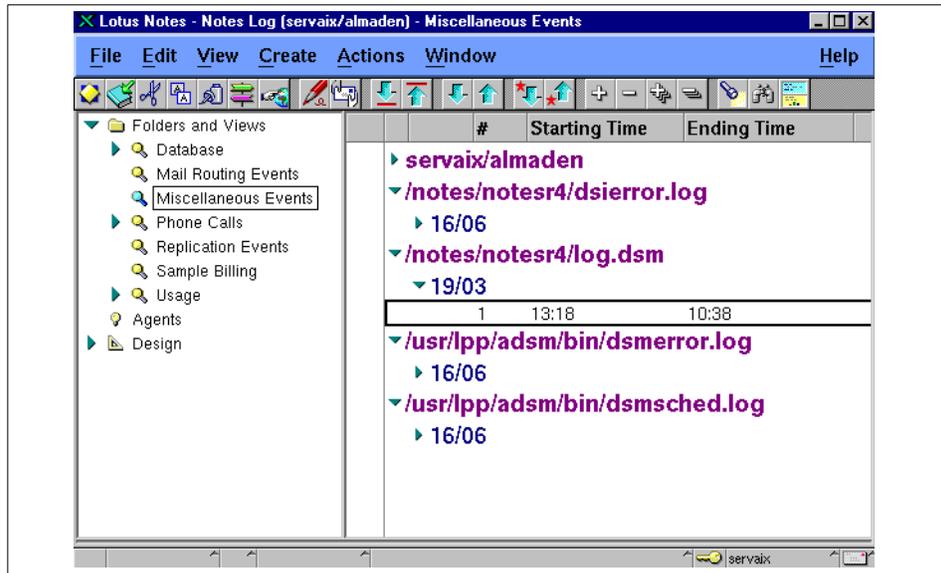
Figure 53. ADSM Logs Imported Into a Notes Log Database

Once they have been imported to a database, you can display the contents of
the ADSM logs by opening the documents. Figure 54 on page 108 shows the
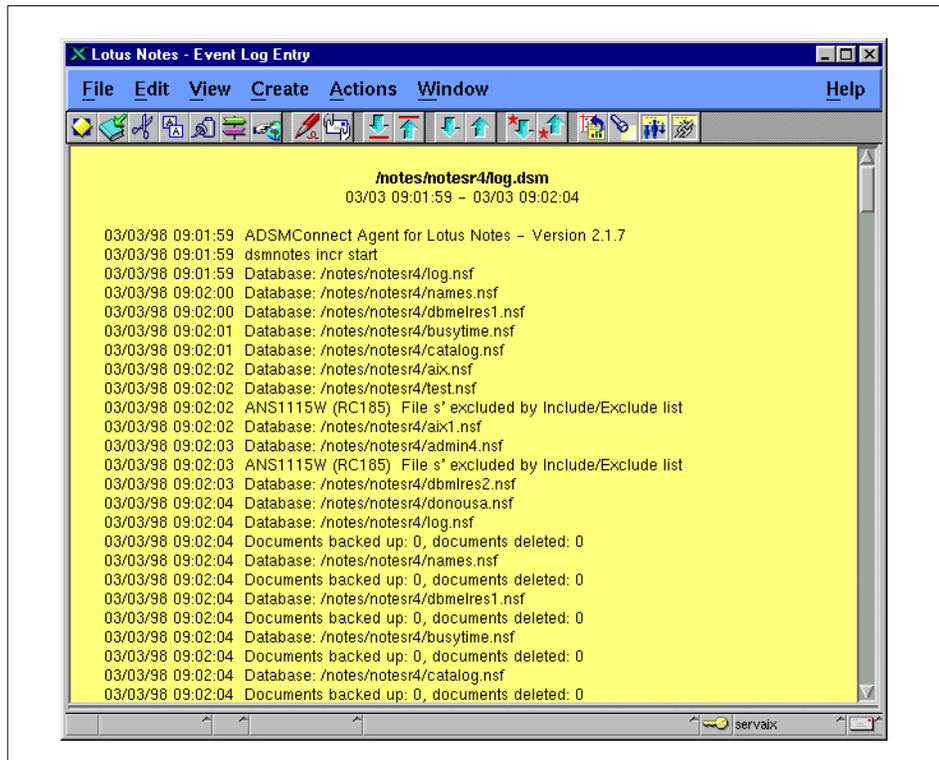contents of the ADSM Notes agent log.

Figure 54. Open ADSM Notes Log Database

The document contents are the same as the contents of the ADSM log before it was imported to Notes. The log can be viewed and maintained from the Notes server on which it normally resides.

This ADSM log collection can be automated in the same way as Notes agent operations are scheduled. You can either use the ADSM scheduler facility or the internal Notes scheduling to do so. See 6.5, "Automation of ADSM Backups" on page 95 for further information on automated operations.

Notes has a facility that deletes from database documents over a certain age. This facility is configured for individual NSF databases. You can set up the database which holds the ADSM logs to delete documents that are more than 14 days old, for example. Only the last 14 days' worth of ADSM logs are retained.

6.6.4 ADSM Server Queries

An ADSM client stores backup copies on an ADSM server in file spaces. For the backup/archive client, a file space corresponds to a drive label or file system name. For example, an OS/2 or Windows NT client may have file spaces for drive label names like C_DRIVE and DATA, while an AIX client may have names for file systems like /usr and /home. The file spaces contain individual files that have been backed up.

The Notes agent is again different from the backup/archive client with regard to file spaces. The Notes agent creates a file space on the ADSM server for every Notes NSF database it processes. It backs up documents that reside in databases. It treats a database as a file system and creates a file space on the server for the database. The format of the file space name differs among the three supported platforms.

The Notes agent creates a file space for every database it processes. Unlike the previous agent version, the agent now sends file space information such as capacity and utilization to the server. Even those databases that have been excluded from backup operation by include/exclude statements are represented by a file space on the server, but without any file space statistics. Differences among different operating systems are as follows:

- **OS/2 and Windows NT**

   The format for the file space is interesting. If the processed database resides in the Notes default data directory (in our example c:\notes\data) or any of its subdirectories, then the logical path of the database starting with $NOTESDIR is used. If it is not a part of the Notes data directory (resides for example, on another drive), then the absolute path of the database is used starting with the drive label name. Figure 55 on page 110 illustrates an output of the **query filespace** command for a Windows NT Connect Agent.

```
adsm> query filespace wnt_agent

Node Name                      Filespace   Platform Filespace Capacity  Pct
                               Name                 Type       (MB)  Util
------------------------------ ----------- -------- --------- -------- -----
WNT_AGENT                      $NOTESDIR\- WinNT    API:Lotus    2.0  73.6
                                 NAMES.NSF          Notes FS
WNT_AGENT                      $NOTESDIR\- WinNT    API:Lotus    2.3  88.6
                                 MAIL\LNAD-          Notes FS
                                 MIN.NSF
WNT_AGENT                      D_DRIVE\PR- WinNT    API:Lotus    1.0  59.4
                                 OJECTS\P9-          Notes FS
                                 8.NSF
```

Figure 55. ADSM Server File Spaces: Windows NT

Because the drive label name is used to create the file space on the
ADSM server, you should ensure that all drives containing Notes
databases have unique labels. Otherwise, there will be unintended
collisions on the ADSM server. For example, suppose drives C: and D:
both have label NSFDATA. Then data for both databases c:\names.nsf and
d:\names.nsf are stored in file space {NSFDATA\NAMES.NSF} on the
ADSM server.

• **AIX**

On AIX, the file space naming on the ADSM server is different. The
absolute path of the processed database is used for the file space. The
following is an output of the query file space command on AIX.

```
adsm> query filespace aix_agent

Node Name                      Filespace   Platform Filespace Capacity  Pct
                               Name                 Type       (MB)  Util
------------------------------ ----------- -------- --------- -------- -----
AIX_AGENT                      /notes/not- AIX      API:Lotus    1.0  50.3
                                 esr4/log.-          Notes FS
                                 nsf
AIX_AGENT                      /notes/not- AIX      API:Lotus    2.0  92.2
                                 esr4/name-          Notes FS
                                 s.nsf
AIX_AGENT                      /tmp/mathi- AIX      API:Lotus    0.8  65.1
                                 s.nsf               Notes FS
```

Figure 56. ADSM Server File Spaces: AIX

Given all these file spaces, how can an ADSM administrator keep track of the
actual ADSM server storage that the Notes agents use? The ADSM **query**

occupancy command shows what actually has been backed up for the various databases.

```
adsm> query occupancy

Node Name        Type  Filespace   Storage      Number    Physical   Logical
                       Name        Pool Name     of Files    Space     Space
                                                          Occupied  Occupied
                                                             (MB)      (MB)
---------------- ----  ----------  ----------   ---------  ---------  ---------
WNT_AGENT        Bkup  $NOTESDIR-  BACKUPPOOL        134       0.96       0.96
                       \NAMES.N-
                       SF
WNT_AGENT        Bkup  $NOTESDIR-  BACKUPPOOL        123       1.78       1.78
                       \MAIL\LN-
                       ADMIN.NSF
WNT_AGENT        Bkup  D_DRIVE\M-  BACKUPPOOL         82       0.40       0.40
                       ATHIS\Q.-
                       NSF
```

Figure 57. ADSM Server File Space Occupancy

The **query occupancy** command output shows the number of documents (Number of Files) backed up for each NSF database. It also shows the storage pool space used (Space Occupied) in the server storage pools for those documents.

There is no practical way for an ADSM administrator to interrogate the contents of these file spaces in more detail. Notes documents do not have names; they have ID numbers, called *Note IDs*, that are very long. You can display the IDs from the Notes workspace, and they remain constant for individual documents. The documents are stored in the ADSM storage pool with the same IDs.

You can display the IDs on the ADSM server by using the ADSM **query content** command. It is possible, but again not practical, to use these IDs to identify individual documents on the ADSM server. Appendix A.1, "ADSM Query Content Command Output" on page 135 contains a typical output of the **query content** command for a Notes file space.

The ADSM Notes agent provides an unsupported utility, **dsmnotes query**, that enables you to query all backed up versions of both data and nondata documents in a database. The difference from the ADSM **query content** command output is that it shows you the backup time stamp for each document and, if it is an inactive copy, when it will expire. This enables you to check whether any document copies exist on the ADSM server from a certain

time frame. Appendix A.2, "ADSM Notes Agent Query Output" on page 137 contains a typical output of the Notes agent query command for a Notes database.

Chapter 7. Notes Features and ADSM

In this chapter, we discuss several Lotus Notes features and how they interact with ADSM backups using the backup/archive client and the Notes agent. We cover the following features:

- Replication
- Access control lists
- Directory and database links
- Full text indexes
- Shared mail
- Notes calendar and scheduling
- Internal database IDs

7.1 Replication

Replication is the functional component of Notes that periodically synchronizes databases spread across multiple servers and workstations. Replication is the process of exchanging modifications between multiple copies of a single database, called *replicas*. Through replication, Notes makes all of the replicas essentially identical over time. Users can make changes to a replica on their server at the same time that users at another location make changes to the same database on their server. When the servers replicate, each replica is updated with the information from the replica on the other server.

Replication between servers is a process where changes are pulled from one server to the other. Either server can initiate the process. Replication can also be performed between Notes servers and workstations. In that case, the replication process is initiated by the workstation, which pushes and pulls database changes to and from the Notes server.

A replica database has the same ID as the original database. This distinguishes a replica from a copy of a database because the common ID lets you replicate changes between the replica and the original database. If you copy a database, a new database ID is created.

Using replication in your Notes environment, the following questions arise:

- Which databases should I back up?
- How does replication interact with ADSM?

- When do I schedule replication to occur?

When you implement hub and spoke servers, it is necessary to decide when and where to back up replicated databases. If a server is replicating a database to the other servers, you may want to back up this database on the hub server only. Backing up the database on all servers would result in the same data being backed up from multiple Notes servers, an unnecessary duplication of backups, overuse of space, and excessive network loading.

When you recover databases, restored databases or documents are marked as unread. The modification time stamps of the documents are also updated. If the database is using replication, restoring the database triggers a considerable amount of database replication activity.

Situations can occur in which the backup of a database using the backup/archive client fails during replication. This is because replication changes the databases and, depending on the serialization mode set for the backup copy group, the backup/archive client does not back up open files. If this happens often, you end up with an incomplete sequence of backup copies for these databases on the ADSM server. You can circumvent this problem by replicating these individual databases to a Notes replicate server, as illustrated in Figure 37 on page 78. You then can shut down the Notes server on the Notes replicate server and back up these databases off-line while the original databases are on-line and in production.

The ADSM Notes agent is not able to execute a database backup operation at the same time existing databases are being replicated. This is due to the fact that both processes use the same lock mechanism. If the Notes replication process opens a database before the Notes agent, the replication process locks the database and blocks the Notes agent from accessing it, and vice versa.

Since replication and ADSM backup operations interact with each other, you need to plan a noninterfering schedule for both operations. Replication and ADSM backup should not occur simultaneously for any individual database. Using a dedicated Notes replica server seems to be a solution: once the selected databases are replicated to this server, the Notes server is shut down, and ADSM schedules can run without interference to the replication process.

7.2 Access Control Lists

Access control lists (ACLs) are a security feature that determines the level of access that people and servers have to a database. Although the names of

access levels are the same for users and servers, the names assigned to users determine the tasks that users can perform on a database while those assigned to servers determine what information within the database the servers can replicate. A role is a means of specifying a subset of names in the access control list to further restrict database access to specific components, such as views, folders, or documents. Figure 58 shows how access control lists are defined.
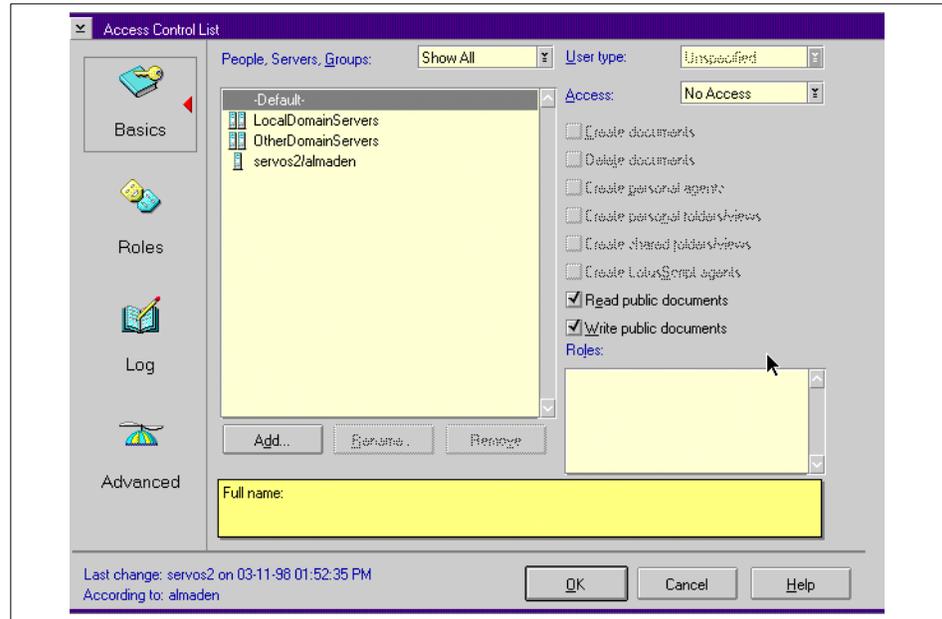
Figure 58. Access Control Lists

For example, in our sample environment (illustrated in Figure 37 on page 78), we implemented the hub and spoke replication topology. This simply means that mail server 1 is the hub (residence of the names.nsf) and the spokes are mail server 2, application server, project server, and the Notes replica server. The names.nsf file is centrally managed at mail server 1. All updates to names.nsf are replicated to the spokes. The names.nsf appears locally to the spokes.The hub administrator defines ACLs on the names.nsf database. These ACLs will restrict the spokes to edit or delete the names.nsf.

ADSM fully supports ACLs of Notes databases. The backup/archive client backs up the ACLs whenever it backs up a database. It also restores them. The ADSM Notes agent can back up and restore individual documents in the Notes database. It also backs up ACLs of the Notes databases. Because

there is no way to know whether the database header information was changed or not, all of the header information is backed up every time the database is backed up, even if no notes are actually backed up. This provides the latest header information on the ADSM server.

Because Notes security is honored, you cannot read or write documents in a restored database that the original database would not give you access to. If you try to restore the database into a newly created Notes database, the Notes access restrictions apply in the newly created database.

7.3 Directory and Database Links

As a Notes administrator you, as well as the managers of individual databases, are responsible for putting databases into production and maintaining databases on the server. Database maintenance involves monitoring database activity and size, fixing corrupted databases, updating full-text indexes, and moving and replicating databases to other servers, when necessary.

Notes implements a logical view of the database location within a Notes system. The logical Notes database location is implemented within the physical file system.

When Notes is installed, it creates a default data directory where all of the Notes executable files are located. The data directory is also the default database location. For example, if Notes is installed on the C: drive, the data directory is typically c:\notes\data. When Notes users open a database from the Notes workspace by selecting **File** from the action bar and then **Database - Open**, a list of databases residing on the local Notes server is presented. The databases located in the Notes data directory are listed as well as the subdirectories below the data directory. The subdirectories may or may not contain databases.

When a user opens a database, it appears that all Notes databases are in the directory or its subdirectories. The inability to place databases on other drives or file systems may appear to be a limitation of Notes. It is not, however. Notes provides a solution: directory or database links. Directory links point to directories containing databases on other drives or file systems. Database links are explicit pointers to a specific database at a fixed location. Figure 59 on page 117 illustrates how directory and database links work. Users can also specify alternative locations without links if they specify the full database path and file name.
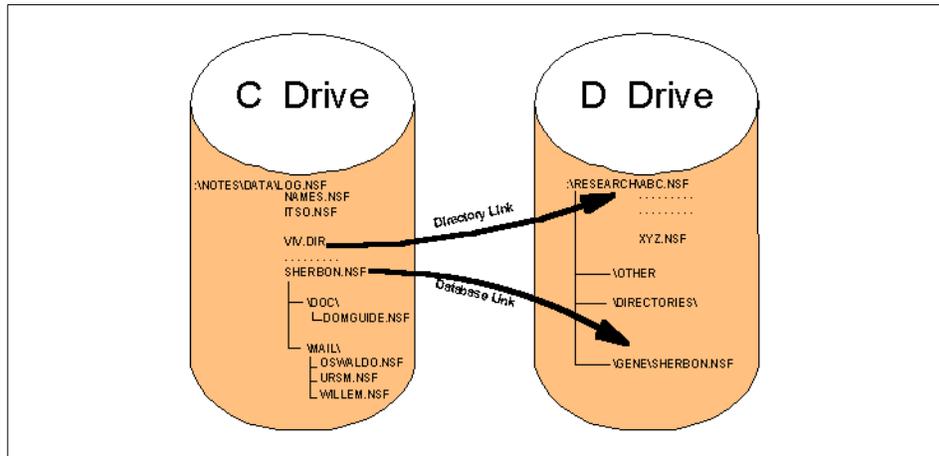
Figure 59. Notes Logical Directory Structure: Directory and Database Links

In our example, Notes is installed in c:\notes\data, the Notes data directory
that contains several databases–log.nsf, names.nsf, itso.nsf, and sherbon.nsf,
which also appears to be a database. The Notes data directory also has
several subdirectories that contain databases, such as the doc subdirectory,
which contains the domguide.nsf database, and the mail subdirectory, which
contains the oswaldo.nsf, ursm.nsf, and willem.nsf databases. There is also a
file, viv.dir, which is a Notes directory link that points to a different drive
location, d:\research. When users open a database (**File-Database-Open**),
they see a directory called *viv* containing the databases that physically reside
in the d:\research directory, abc.nsf, ..., xyz.nsf. The file viv.dir is a simple text
file containing a drive and path pointer to the real directory location — in our
example, d:\research.

Looking at Figure 59, we see that viv is a subdirectory. If we double-click on
viv (or single click on **viv** and click on the **Open** push button), we see the
database names that correspond to the abc.nsf, ..., xyz.nsf databases.

A database link is a link to a specific database that appears to users to
actually reside in the data directory. In our example, there is a Notes
database in d:\gene called sherbon.nsf. In the Notes data directory,
c:\notes\data, there is also a file called sherbon.nsf, but it is not a database; it
is a text file containing the path to the database of the same name. Notes
recognizes sherbon.nsf as a pointer to a database rather than as an actual
database. To a user, sherbon.nsf would appear to reside in the Notes data
directory because it is listed with all of the other databases that actually do
reside in the Notes data directory (see Figure 59).

In summary, Notes has its own logical directory structure for databases. You can think of the default data directory as the virtual root point of the structure. Databases can reside in the default data directory or in subdirectories. You can create directory links to other file systems or drives. Directory links are similar to virtual mount points in a UNIX NFS file system. Alternatively, you can use database links to reference specific databases in other file systems. This concept is similar to the UNIX soft links.

The ADSM Notes agent recognizes the logical directory structure, but it imposes some limitations when it comes to the backup process and to include/exclude filter lists. When you run an incremental backup of a directory that includes a directory link file, the Notes agent does not interpret the directory link file as a pointer to another subdirectory. Given the directory structure in Figure 59 on page 117, the backup operation fails with the error message shown in Figure 60.

```
C:\WIN32APP\IBM\ADSM\Agentln> dsmnotes incr * -subdir=yes
ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
<C> Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
...
...
Backing up database c:\notes\data\viv.dir\abc.nsf
ANS0923E Database pathname is invalid
...
...
Summary:
...
...
Database: C:\NOTES\DATA\VIV.DIR\ABC.NSF
Documents backed up: 0, documents deleted: 0
...
...
ANS0944E dsmnotes error(s) occurred
...
```

Figure 60. Error Message Resulting When Notes Agent Finds a Directory Link

Unfortunately, you cannot exclude a directory link from backup processing using the include/exclude statements. Therefore, you need to neglect the error message shown in Figure 60. In order to successfully run backups of databases in the directory link directory, you need to run an additional backup command specifying the directory link as shown in Figure 61 on page 119.

```
C:\WIN32APP\IBM\ADSM\Agentln> dsmnotes incr viv.dir
ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
<C> Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
Backing up database d:\research\abc.nsf
Documents sent: 40
Documents sent: 80
Documents sent: 83
Documents deleted: 0
...
```

Figure 61. Additional Backup Command Specifying the Directory Link

The databases behind the directory link are stored on the ADSM server under
their original physical location. For example, the database abc.nsf behind the
directory link viv is stored on the ADSM server as d:\research\abc.nsf. This is
important to consider if you need to restore the database or documents of
that database.

When you run an incremental backup of a directory that includes a database
link, the Notes agent does not interpret the database link file as a pointer to a
database. Given the directory structure in Figure 59 on page 117, the backup
operation fails with the error message shown in Figure 62.

```
C:\WIN32APP\IBM\ADSM\Agentln> dsmnotes incr * -subdir=yes
ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
<C> Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
...
...
Backing up database c:\notes\data\sherbon.nsf
ANS0923E Database pathname is invalid
...
...
Summary:
...
...
Database: C:\NOTES\DATA\SHERBON.NSF
Documents backed up: 0, documents deleted: 0
...
...
ANS0944E dsmnotes error(s) occurred
```

Figure 62. Error Message Resulting When Notes Agent Finds a Database Link

Even when you specify the database link itself for the backup, the Notes
agent does not recognize the physical database behind the link. As with a
directory link, you cannot exclude a database link from backup processing

using the include/exclude statements. Therefore, you need to neglect the error message shown. In order to run a successful backup of this database, you need to specify the physical database name with the backup command, for example specifying d:\gene\sherbon.nsf itself rather than the database link.

7.4 Full Text Indexes

Notes allows you to create full-text indexes to search databases for information. When the full-text index for a database is created, Notes stores the index file in a subdirectory to the Notes data directory that holds the database. The name of this subdirectory is the name of the indexed database with the suffix .ft, excluding the .nsf extension. Each time Notes creates or updates a full-text index, Notes places an incremental index file in the index subdirectory.

You can index a single database or multiple databases. Figure 63 shows a full-text index panel on a single database, itso.nsf.
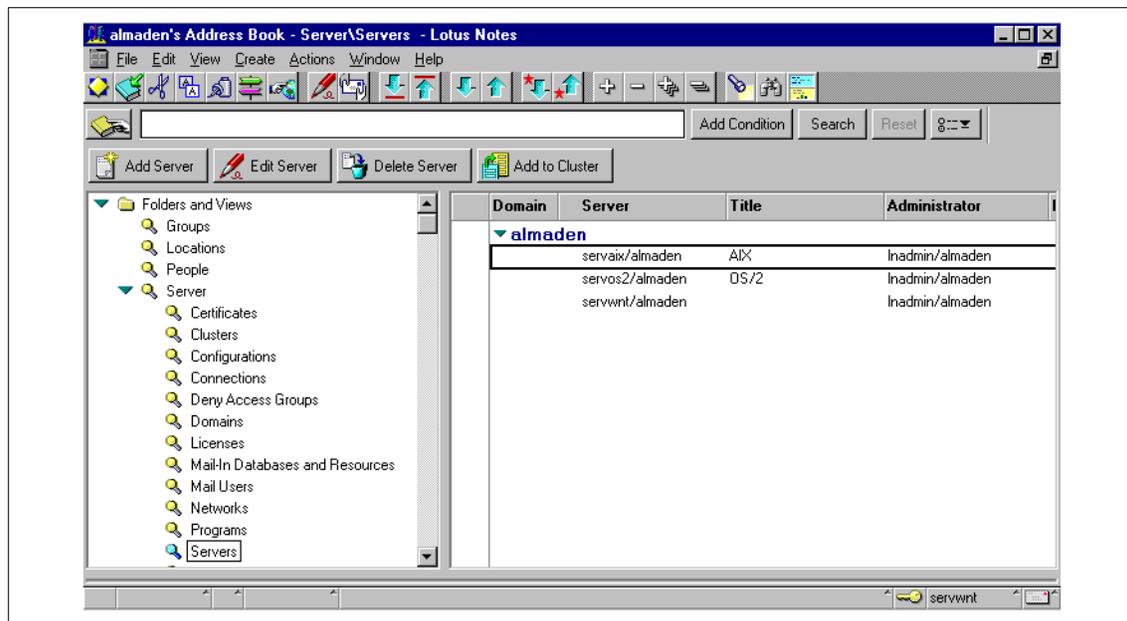
Figure 63. Full-Text Index Panel in Database View

A single database full-text index can take up significant disk space and multidatabase full-text indexes almost always do. It is better to consult the

Notes administrator before creating full-text indexes on databases or before enabling a database for multidatabase indexing.

Full-text indexes do not replicate; you must create a full-text index separately on each database replica. You can create an index when you create a replica of a database; if the original database has a full-text index, the index options selected carry over to the new replica.

The ADSM Notes agent does not back up text indexes. The indexes are held separately from the databases in the Notes data directory, for example, c:\notes\data\itso.nsf. The index will not be deleted if you delete the indexed database from the Notes workspace or the command line. A database that had an index before deletion will be restored to its original state, but without the index.

The ADSM backup/archive client happily backs up and restores an indexed database as well as the index directory, since the backup/archive client is able to back up all workstation data.

7.5 Shared Mail

After you set up Notes mail on your system, you can set up a shared mail database on each mail server. Shared mail allows a server to maintain only one copy of each message delivered, whether it is addressed to one person or several hundred. A shared mail database is a space-saving feature that stores single copies of mail messages in a central database to which all message recipients who have that server as their mail server have access.

Users can delete, reply, change the view or folder, edit, save, resend, and perform all the same tasks with a mail message stored in a shared mail database as they would with the message stored in their own mail files. Each user can edit, save, and resend the original message, without affecting how the message is presented to the other users. Using a shared mail database is completely transparent to users.

By using a shared mail database to store a message that is mailed to more than one user instead of storing the complete message in each user's mail file, Notes conserves disk space. To keep the shared mail database small, the object-collect task purges an obsolete message from the shared mail database after all the recipients have deleted it from their mail files.

If shared mail is enabled for a Notes server, two new files are created: the first is the shared mail database, the second, mailobj.nsf, is a database link pointing to the shared mail database.

The ADSM Notes agent officially does not support shared mail. However, in our simple residency environment, we were able to successfully back up and restore the shared mail database using the Notes agent. After the restore, users were able to access their mail documents which were located in the shared mail database. The additional file, mailobj.nsf, could be backed up and restored using the backup/archive client since a database file is a simple text file as discussed in 7.3, "Directory and Database Links" on page 116.

But again, shared mail is officially not supported by the Notes agent. If shared mail is enabled in your Notes environment, use the ADSM backup/archive client to back up all mail databases including the shared mail database.

7.6 Notes Calendar and Scheduling

The most anticipated feature in Notes 4.5 is the calendar and scheduling function. The Notes calendar function has these features:

- Appointment
- Invitation
- Event
- Reminder
- Anniversary

The calendar is a feature embedded in the mail database of users. It allows you to set up your calendar, check your colleagues' free time, set up meetings, and send invitations. Each calendar entry into the calendar is saved as a separate document within the Notes mail database. The ADSM Notes agent backs up and restores these calendar entries like all other documents within a database.

7.7 Internal Database IDs

The MATCHDBID=value parameter can be used with the backup command using dsmnotes as described in 5.1.1, "Backup of Documents" on page 55. This parameter allows you to specify whether the internal database ID of the database being backed up must match the internal database ID of the database stored on the ADSM server. The ADSM Notes agent compares the database ID of the database that was backed up against the database ID of the current database of the client. If they do not match, then you will get the ADSM error message, ANS0955E. One way this condition could occur would be through the following scenario:

1. Database itso.nsf is created. Notes assigns itso.nsf an internal database ID of 882565C0:007C5C83, as shown in Figure 64.
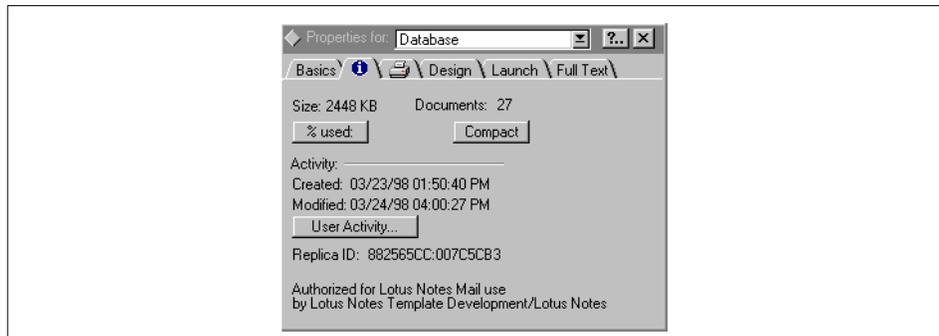
Figure 64. Replica ID in Database Properties Window

2. The ADSM Notes agent backs up the itso.nsf database using the following command:

   `dsmnotes incr itso.nsf`

   If itso.nsf is being backed up for the first time, then the -MATCHDBID value will be No, which is the default.

3. Database itso.nsf is renamed to itsonew.nsf. This database still has the internal database ID of 882565C0:007C5C83.

4. A new itso.nsf database is created. Notes assigns a new internal database ID to this database: 882565C6:007AD674.

5. The ADSM Notes agent tries to back up the newly created itso.nsf using the following command:

   `dsmnotes incr itso.nsf –matchdbid=yes`

   This command fails because of the internal database ID mismatch. The previous backup was for internal database ID 882565C0:007C5C83, but the current internal database ID is 882565C6:007AD674.

The comparison of the internal database ID is used to preserve database integrity. It is the user's responsibility to avoid using the same name for two different databases, or else data corruption could occur.

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Chapter 8. Recovery Scenarios

In this chapter, we give some examples for recovery scenarios you may face in your Lotus Notes environment. The recovery of a document whether you just want an earlier version or you accidentally deleted it on your workspace is straightforward. The recovery of a lost or damaged database, however, is more complex since you use both the backup/archive client for the quick full restore of an older version of the database, and the Notes agent for merging more recent document copies into the database. In 8.3, "Notes Server Recovery" on page 133, we briefly summarize recovery considerations when you have lost your Notes server environment completely.

8.1 Document Recovery

You can easily recover individual documents in a Notes database by using the ADSM Notes agent. You can restore the most recent backup copy or an earlier backup version. Additionally, you can also recover documents that have been deleted.

8.1.1 Restore Selected Documents

Figure 65 on page 126 illustrates the process that can be followed when a user needs to restore a specific document.
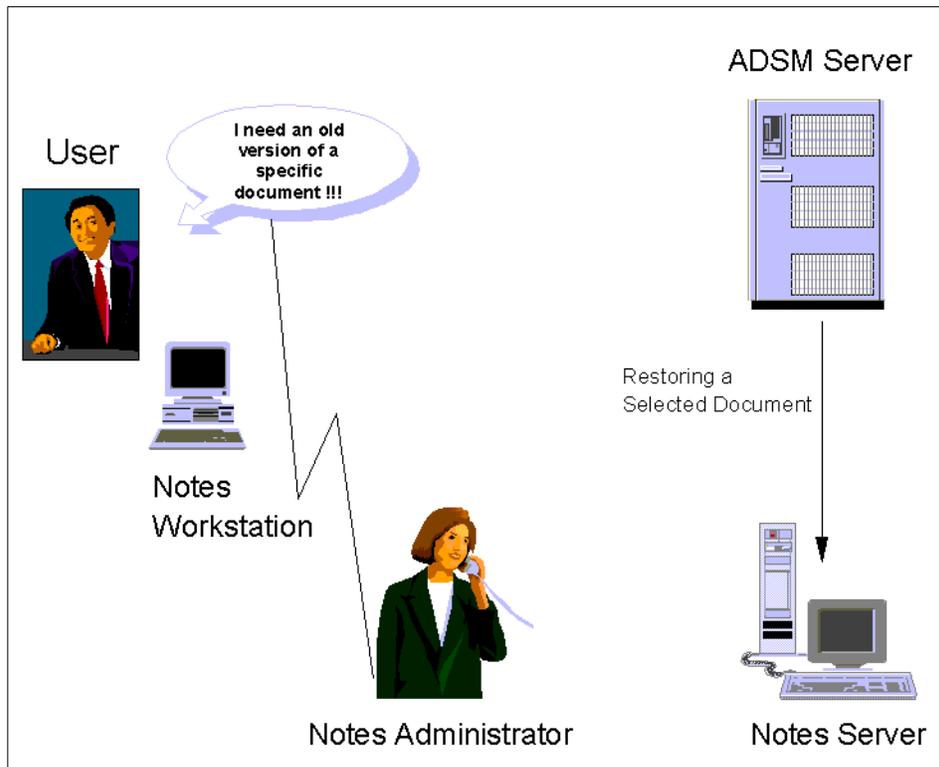
Figure 65. Scenario 1: Restoring a Selected Document

You can use the ADSM Notes agents GUI only to restore selected documents within a database. It must run on the Notes server. Follow these steps to restore selected documents to your Notes database:

1. Open a view of the database that has the documents you want to restore.

2. Select all documents you want to restore by marking them in the current document view.

3. Click on the **Actions** menu.

4. Select **ADSM Restore Document(s).** The **ADSM Restore Documents** dialog box appears as shown in Figure 66 on page 127.
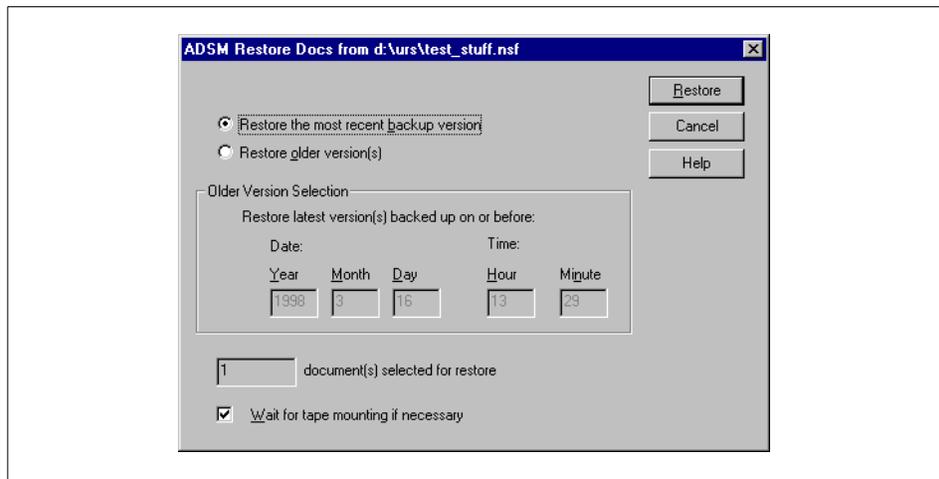
Figure 66. Restoring Selected Documents from a Database

5. Select one of these options:

- **Restore the most recent backup version**. This option restores the most recent backup version of the selected documents.

- **Restore older version(s)**. This option restores the latest backup version of the selected documents that was backed up before the date and time specified in the **Older Version Selection** box. Type in the date and time from which you want the documents to be restored.

  You may check to make sure the number of documents selected matches the number of documents you marked.

6. Click on **Restore** to restore your documents.

7. To see the restored documents, click on the **View** menu, then select **Refresh,** or press the F9 function key.

Click on the **Cancel** button at any time to exit the dialog box without restoring any documents.

8.1.2 Restore Deleted Documents

Databases and documents can be accidentally deleted as a result of human error. When documents are deleted from a Notes database view, Notes keeps a stub for each of the deleted documents so that they can be removed from the replica databases the next time replication takes place. The ADSM Notes agent uses these deletion stubs to identify the document ID and thus restore

a backup copy from the ADSM server. Figure 67 illustrates the process that can be followed to restore deleted documents.
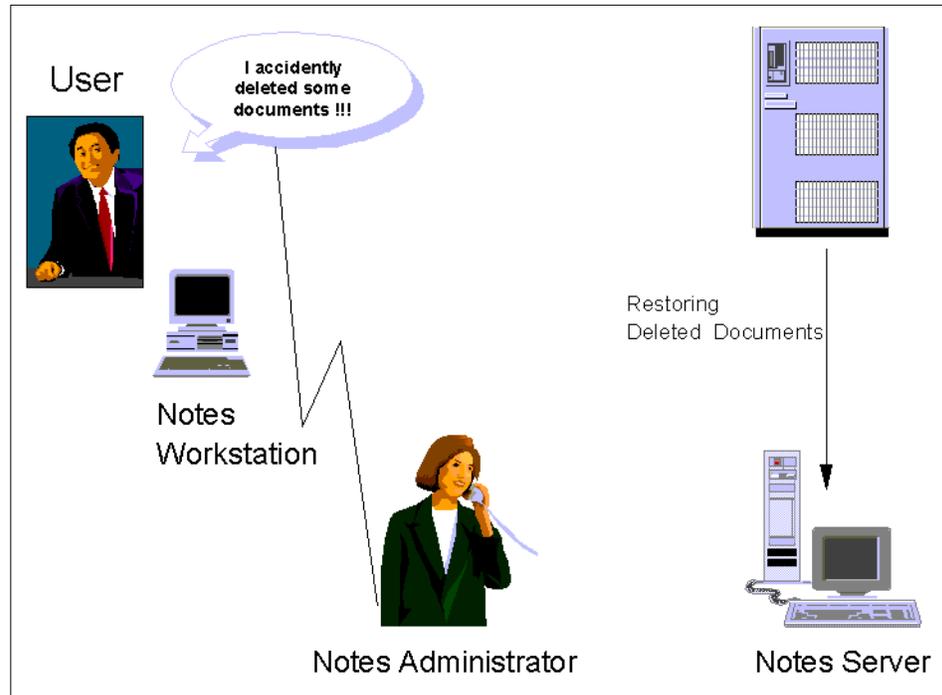
Figure 67. Scenario 2: Recovery of Deleted Documents

This restore, however, works only if there is a backup copy of the document on the ADSM server and if the deletion stub is not purged. It is the responsibility of the Notes administrator to set the purge interval for databases. If it is set for such a short interval that the deletion stubs have been purged, ADSM cannot restore the documents.

The restore operation can be initiated from either the Notes agent executable dsmnotes or the Notes agent GUI in the workspace. You may want to use the command line to restore deletion stubs. A database that contains a large number of deletions stubs to restore can tie up the user's GUI. No other action can be done until all the documents have been restored.

Follow these steps to restore deleted documents to your Notes databases:

1. Open a view of the database that contained the deleted documents.

2. Click on the **Actions** menu.

3. Select **ADSM Restore Deleted Document(s)**.

4. The **ADSM Restore Deleted Docs** dialog box appears.
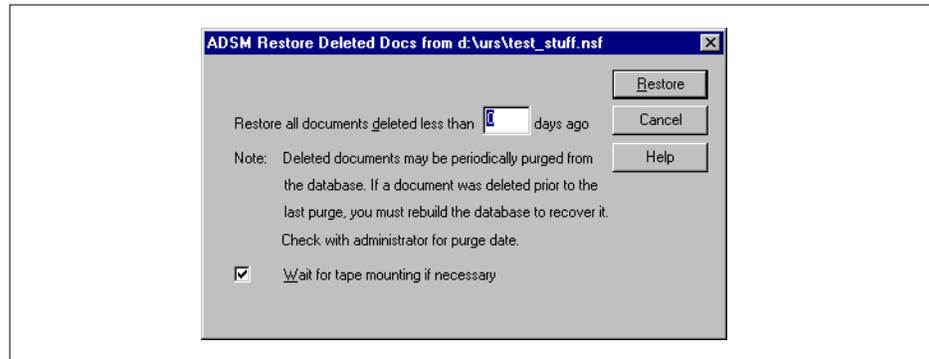
Figure 68. Restoring Data Documents from Deletion Stubs

5. If you want to restore only those documents deleted less than a certain number of days ago, type the number of days in the **Restore all documents deleted less than nnn days ago** field.

   If you leave this field blank, it uses the zero default. Then all the documents that have been deleted but not yet purged are restored.

6. Click on **Restore** or press **Enter** to restore your documents.

7. To see the restored documents, click on the **View** menu and select **Refresh,** or press the F9 function key.

Click on the **Cancel** button at any time to exit the dialog box without restoring any documents.

8.2 Database Recovery

Individual document recovery is relatively straightforward with the ADSM Notes agent. Recovering an entire database is more complex and presents a number of options:

- Recover the database using an ADSM backup/archive client
- Recover the database using an ADSM Notes agent
- Recover the database using a combination of both.

The first option, that of using the ADSM backup/archive client, is simple. The ADSM backup/archive client restores an entire database as a single .nsf file,

using either its original directory path (replacing the original if it is still there) or a different directory if the old database must be preserved. The backup/archive client restores the database as a file; it does not touch any of the documents within the database. This is a nice, clean restore. However, it may not provide the required granularity. With this approach, you would probably have to back up the database daily, which could be a problem if it is large.

In our sample environment, most databases are backed up weekly using the backup/archive client, on Sundays, for example. If a failure occurred on Thursday, the database would be restored by using the previous Sunday's backup. However, any documents updated since Sunday would not be included in the restored database.

The second option, that of using the ADSM Notes agent, provides greater granularity. Backups are performed as often as required. The ADSM Notes agent restores a complete database by rebuilding the database from all of the backed up documents. Databases can be rebuilt to a specific point in time, independent of any other backup sources, such as the backup/archive client. Using the ADSM Notes agent provides a high level of granularity but may have backup and restore performance implications. Backups initially take longer with the ADSM Notes agent than with the ADSM backup/archive client. Full database restores also take longer with the ADSM Notes agent than full database restores with the backup/archive client. Therefore, when choosing between using the backup/archive client or the ADSM Notes agent, you are making a trade-off between speed and function.

In view of the above, a combination of both techniques is the most appropriate way of meeting the requirements of your Notes databases. Use weekly full backups to provide a quick, full-database restore. Use the ADSM Notes agent to apply subsequent document incremental backups.

Figure 69 on page 131 illustrates a hypothetical scenario for our sample database, itso.nsf. The Notes server is backed up weekly, with the ADSM backup/archive client. In addition, daily incremental backups are done with the ADSM Notes agent.
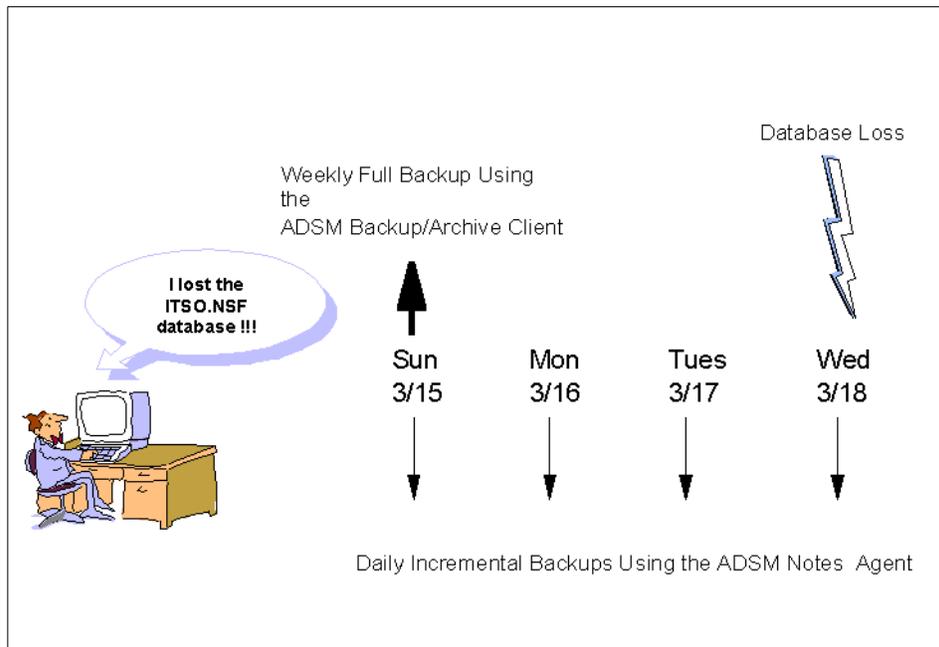
Figure 69. Disaster Recovery of a Database

The situation is that late in the evening on Wednesday, March 18, 1998, our sample Notes database, itso.nsf, is damaged or lost. What do we do to rebuild the database to its last consistent stage? We recover the database in two steps, as illustrated in Figure 69:

1. We use the ADSM backup/archive client to restore the last full backup taken on Sunday, March 15. This restores the database back to that point in time. The following is the command issued from the backup/archive command-line interface:

   `dsmc restore {C_DRIVE}\notes\data\itso.nsf`

2. We use the ADSM Notes agent to restore backup copies of documents taken after the full backup that we just restored using the backup/archive client. In this situation, you can use either the command-line interface or the GUI. Here is the command we issued from the command-line interface:

   ```
   dsmnotes restore itso.nsf -fromdate=03/15/98
   -fromtime=01:00 -todate=12/31/99
   ```

This command restores the latest available backup copies of documents taken after the last full backup on March 15, 1998 and merges them into the

full database previously restored. Specifying a TODATE later than the current date ensures that the latest possible backup copies are restored.

An alternative scenario would be that damage to a database is discovered later in the week, for example on Thursday. Restoring the most current backups would be possible but not necessarily desirable. A decision is made to roll back the database to the previous day, losing a day's updates, but possibly recovering a more consistent copy of the database:

```
dsmnotes restore itso.nsf -fromdate=03/15/98
-fromtime=01:00 -todate=03/17/98 -totime=01:00
```

This command specifies a tighter date range for the restore and merge operations. The most recent backup copies of documents from within this range are restored and merged into the database.

The above examples illustrate how you can recover databases by using a combination of the ADSM backup/archive client and ADSM Notes agent. The examples are representative of the common recovery situations that are likely to occur.

One variation, however, is restoring a database that still exists without overwriting it. You can do such a restore with the ADSM Notes agent by specifying a new database name:

```
dsmnotes restore itso.nsf -to=newitso.nsf
```

The new database, newitso.nsf, must not have existed. This example creates a new database from scratch. You cannot use the TO option with the merge function. A database merge can be performed into the original database only. However, there are situations where you want both the preservation of the existing database and the merge of a database. The solution is to rename the database to be preserved to another location, then to perform the procedures described previously. The backup/archive client and Notes agent merge operation is performed by using the original database path and name without overwriting the old database.

The above recovery steps rebuild a database to its condition at the time of the last incremental backup. Unfortunately, it is not exactly restored to a point in time. Documents that were deleted since the last full backup, for example on Monday, will appear again in the rebuilt database following the recovery procedure we just explained. This is because they are restored in Step 1 using the backup/archive client, since they still existed on Sunday. The Notes agent backups from Monday on do not include copies of these documents since they were deleted during the Monday workday. During the restore

operation using the Notes agent in Step 2, there is no way that the Notes agent deletes these documents from the workstation.

The command-line interface has been used for the last few examples presented in this section. The GUI can also be used to rebuild a database. However, it is limited to recovering databases that already exist on your local Notes server. Moreover, a large merge operation ties up the Notes workspace for its duration, preventing the user or administrator from performing other Notes tasks. This is another reason for preferring the command-line interface for database merge operations.

The above examples suppose that the databases you want to recover are local databases. On Windows NT and AIX, you cannot recover remote databases using the ADSM Notes agent. On OS/2, however, you can restore documents of remote databases that are backed up by another Notes agent on OS/2 or Windows NT. This remote restore function is, however, limited to document restore. The remote GUI function cannot be used to perform full database restores. Remote recovery is explained in more detail in 5.3, "Remote Recovery" on page 67.

8.3 Notes Server Recovery

In this section we briefly discuss what to do in order to recover your Notes environment in a disaster scenario. There are mainly two steps to accomplish:

1. Recover your machine, operating system, and applications

2. Rebuild your Notes databases to a stable state

Step 1, the recovery of your Notes server machine with all its applications, we do not cover in this book. For this information, we refer to two ITSO redbooks, available as both hard cover books and on-line books in html format:

- ***ADSM Client Disaster Recovery: Bare Metal Restore (SG24-4880)***

    This redbook covers recovery scenarios for all three platforms, OS/2, Windows NT, and AIX. Since a Notes server is a client in terms of the ADSM hierarchy, this book delivers the appropriate information for system recovery.

- ***Windows NT Backup and Recovery with ADSM (SG24-2231)***

    This book explores the requirement for backup solutions to protect the Windows NT server and some of its common applications against failures.

Additionally, we refer to the Stand-alone Disk Image Dump and Restore program. This new feature of ADSM Disaster Recovery Manager allows you to back up and restore disk images from certain disk drives in personal computer systems that are compatible with the OS/2 operating system. You can back up and restore all content of the disk, including partitions, boot managers, file systems, and operating systems. The program stores the disk image as an object in the storage of an ADSM Version 3 server that has the licensed Disaster Recovery Manager feature.

Step 2, the rebuild of your Notes databases is discussed in 8.2, "Database Recovery" on page 129. You either use the backup/archive client for the database restore, or a combination of both the backup/archive client and the Notes agent.

Appendix A. Sample ADSM Server Queries

A.1 ADSM Query Content Command Output

The following is the output of an ADSM **query content** command. It displays the files currently residing in an ADSM storage pool volume.

```
ANS8000I Server command: 'query content d:\adsm\back01.dsm node=wnt_agent'

Node Name              Type Filespace  Client's Name for File
                            Name
---------------------- ---- ---------- --------------------------------------
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF1EDDACD9:4F6D758B-ON852561C6:00063-
                            SF          38C
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF89D68FBF:2DAA28CF-ON852561F7:00639-
                            SF          8E7
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OFD2C56189:CAF636AE-ON852561F7:0063A-
                            SF          37D
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OFF3BE56ED:72B73222-ON852561FE:00818-
                            SF          2FE
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF65B548C3:94DF28BA-ON852561FF:005F6-
                            SF          195
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF03379228:F04994C1-ON852561FF:00610-
                            SF          BB1
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF9B3F6F49:14D63533-ON852561FF:0061D-
                            SF          4A9
WNT_AGENT              Bkup $NOTESDIR- \DATA\
                            \NAMES.N-   OFD533EA00:6C78FE50-ON882565FA:0069B-
                            SF          846
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF453C3F29:937C7F06-ON85256236:00602-
                            SF          AE5
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF6CE34E59:E96C5AB8-ON85256236:00678-
                            SF          2A3
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OFB6EC5907:6D54E5F1-ON85256251:0064A-
                            SF          E39
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF16E5F2CE:FD5AB1AB-ON85256251:0064A-
                            SF          E3A
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF0F3B50C0:A92F3475-ON8525625C:0002D-
                            SF          DDB
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OFE4F397BB:48F3261D-ON85256292:006A5-
                            SF          2AC
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OFCACC38E0:56E139F9-ON85256297:006E8-
                            SF          524
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-   OF85255E2A:007AE746-ON85255E2A:000A7-
                            SF          09D
```

```
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF7AE7690F:F39E81A7-ON85256335:00036-
                            SF         592
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF302C2A7A:A5F44CF5-ON85256335:00050-
                            SF         2E1
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFFD478B64:9FA2302A-ON85256338:0063F-
                            SF         218
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFDD63FF40:FA0376AB-ON8525633A:00792-
                            SF         FCA
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFE39F2AF7:26BF66F5-ON8525633F:0056F-
                            SF         AA9
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFEDAE3880:39318AAA-ON85256356:00692-
                            SF         2F6
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFD97B0D30:CCA10842-ON85256359:006AC-
                            SF         BD3
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF66BACB27:FDD818DC-ON85256359:006B3-
                            SF         D0A
WNT_AGENT              Bkup $NOTESDIR- \DATA\
                            \NAMES.N-  OF2EE77180:FE93A249-ON802565B6:005F0-
                            SF         FA3
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF3FC085EE:C22826AE-ON852561C2:00601-
                            SF         41E
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF85255E01:001356A8-ON85255AFB:00640-
                            SF         32C
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OFB8900107:5F8514A1-ON852561C2:00601-
                            SF         41C
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF85255E2A:007AE747-ON85255E29:00811-
                            SF         22C
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF85255E3D:0072854A-ON85255D89:004B9-
                            SF         6AC
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF85255EB8:0000F3C5-ON85255DF5:001BD-
                            SF         78C
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF36F9D5A2:F3D90AD1-ON852561C2:00602-
                            SF         267
WNT_AGENT              Bkup $NOTESDIR- \DATA\
                            \NAMES.N-  OFC3CD536C:B7FDD9DF-ON8825661E:007C0-
                            SF         0FE
WNT_AGENT              Bkup $NOTESDIR- \DATA\
                            \NAMES.N-  OF3AAB8BEB:A9F445FB-ON882565E9:00348-
                            SF         F84
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF85255E01:001356A8-ON8525565F:00667-
                            SF         EE5
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF852560B3:0065DAE7-ON85255D68:0057B-
                            SF         881
WNT_AGENT              Bkup $NOTESDIR- \NONDATA\
                            \NAMES.N-  OF852560CF:006D80E1-ON85255E29:0080E-
                            SF         0A9
```

```
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF114201ED:3C708FB3-ON8525613B:004FB-
                             SF         2E0
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OFED68E969:2ADDAB4F-ON852561C6:006A7-
                             SF         9F1
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OFF6284921:AE26E797-ON852561BD:007B5-
                             SF         DD6
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF7B8A2765:1340B2DB-ON8525613B:004FB-
                             SF         A5C
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF711AA542:FA56F5C9-ON852561C2:00602-
                             SF         268
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OFECE50566:9ACEF697-ON852561C2:006A0-
                             SF         3EC
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF852560A2:00634BFE-ON852560A0:00562-
                             SF         406
WNT_AGENT               Bkup $NOTESDIR- \DATA\
                             \NAMES.N-  OFE566BCAB:C9B45AE6-ON082565D2:007DF-
                             SF         05F
WNT_AGENT               Bkup $NOTESDIR- \DATA\
                             \NAMES.N-  OF97E6F573:450A23EC-ON802565B6:005EF-
                             SF         982
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF852560B3:0063C2E1-ON8525607B:006D5-
                             SF         CBC
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF85255E01:001356A8-ON85255A31:007E2-
                             SF         B31
WNT_AGENT               Bkup $NOTESDIR- \DATA\
                             \NAMES.N-  OF1C80B744:5C7BAAD9-ON802565B6:005F0-
                             SF         001
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\
                             \NAMES.N-  OF85255E01:001356A8-ON85255AFB:006EA-
                             SF         91A
WNT_AGENT               Bkup $NOTESDIR- \DATA\
                             \NAMES.N-  OF54D3F1D5:99481576-ON082565B6:0064E-
                             SF         860
WNT_AGENT               Bkup $NOTESDIR- \DATA\
                             \NAMES.N-  OFB98F4747:4CD2A845-ON882565B6:0061B-
                             SF         7C1
WNT_AGENT               Bkup $NOTESDIR- \NONDATA\ DBHDR
                             \NAMES.N-
                             SF

ANS8002I Highest return code was 0.
```

A.2 ADSM Notes Agent Query Output

The following is the output of a database query using the **dsmnotes query**
command. The output displays the Notes internal document name, the time
stamp of the backup copy, and, if the copy is inactive, the time and date when
it will expire on the ADSM server.

```
C:\WIN32APP\IBM\ADSM\Agentln>dsmnotes query names.nsf

ADSTAR Distributed Storage Manager
ADSMConnect Agent for Lotus Notes - Version 2.1.7
(C)  Copyright IBM Corporation, 1990, 1997, All Rights Reserved.
\DATA\OF1BA99D85:CEB8CFE9-ON8525615C:00816A45          6/17/1998 13:22:21
0/0/0 0:0:0
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Appendix B. Special Notices

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Appendix C. Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

C.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see "How to Get ITSO Redbooks" on page 151.

ADSM Redbooks

Book Title	Publication Number
General Topics	
ADSM Version 3 Technical Guide	SG24-2236
ADSM Concepts	SG24-4877
ADSM Advanced Implementation Experiences	GG24-4221
Using ADSM Hierarchical Storage Management	SG24-4631
Client Disaster Recovery: Bare Metal Restore	SG24-4880
Specific Server Books	
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ADSM Server-to-Server Implementation and Operation	SG24-5244
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AIX Tape Management	SG24-4705
ADSM/6000 on 9076 SP2	GG24-4499
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ADSM/VSE Implementation Guide	SG24-4266
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Getting Started with ADSM NetWare Clients	GG24-4242
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ADSM API Examples for OS/2 and Windows	SG24-2588
ADSM with Other Products	
A Practical Guide to Network Storage Manager	SG24-2242

Book Title	Publication Number
Using ADSM to Back Up Databases	SG24-4335
Using ADSM to Back Up Lotus Notes	SG24-4534
Hierarchical Storage Management for NetWare: ADSM and AvailHSM Implementation	SG24-4713
Using ADSM to Back Up OS/2 LAN Server and Warp Server	SG24-4682
Backup, Recovery, and Availability with DB2 Parallel Edition on RISC/6000	SG24-4695
ADSM Operation and Management with TME10	SG24-2214

C.2 Redbooks on CD-ROMs

Redbooks are also available on CD-ROMs. **Order a subscription** and receive updates 2-4 times a year at significant savings.

CD-ROM Title	Subscription Number	Collection Kit Number
System/390 Redbooks Collection	SBOF-7201	SK2T-2177
Networking and Systems Management Redbooks Collection	SBOF-7370	SK2T-6022
Transaction Processing and Data Management Redbook	SBOF-7240	SK2T-8038
Lotus Redbooks Collection	SBOF-6899	SK2T-8039
Tivoli Redbooks Collection	SBOF-6898	SK2T-8044
AS/400 Redbooks Collection	SBOF-7270	SK2T-2849
RS/6000 Redbooks Collection (HTML, BkMgr)	SBOF-7230	SK2T-8040
RS/6000 Redbooks Collection (PostScript)	SBOF-7205	SK2T-8041
RS/6000 Redbooks Collection (PDF Format)	SBOF-8700	SK2T-8043
Application Development Redbooks Collection	SBOF-7290	SK2T-8037

C.3 ADSM Product Publications

Book Title	Publication Number
ADSM V3R1 Messages	GC35-0271
ADSM V3R1 AIX Quick Start	GC35-0273
ADSM V3R1 AIX Administrator's Guide	GC35-0274
ADSM V3R1 AIX Administrator's Reference	GC35-0275
ADSM V3R1 MVS Quick Start	GC35-0276
ADSM V3R1 MVS Administrator's Guide	GC35-0277
ADSM V3R1 MVS Administrator's Reference	GC35-0278

Book Title	Publication Number
ADSM V3R1 AIX License	SC35-0283
ADSM V3R1 MVS License	GC35-0284
ADSM V3R1 Windows NT Administrator's Guide	GC35-0292
ADSM V3R1 Windows NT Administrator's Reference	GC35-0293
ADSM V3R1 Windows NT License	SC35-0294
ADSM V3R1 Windows NT Quick Start	GC35-0295
ADSM V3R1 Using the UNIX Backup-Archive Client	SH26-4075
ADSM V3R1 Using the OS/2 Backup-Archive Client	SH26-4076
ADSM V3R1 Using the Novell NetWare Backup-Archive Client	SH26-4077
ADSM V3R1 Using the Microsoft Windows Backup-Archive Client	SH26-4078
ADSM V3R1 Installing the Clients	SH26-4080
ADSM V3R1 Using the Application Programming Interface	SH26-4081
ADSM V3R1 Trace Facility Guide	SH26-4082
ADSM V3R1 Client Reference Cards	SX26-6019
ADSM V3R1 Using the OS/2 Lotus Notes Backup Agent	SH26-4084
ADSMConnect Agent for Oracle7 Backup on AIX Installation and User's Guide	SH26-4061
ADSMConnect Agent for Oracle Backup on Sun Solaris Installation and User's Guide	SH26-4063
ADSMConnect Agent for Lotus Notes on Windows NT Installation and User's Guide	SH26-4065
ADSMConnect Agent for Lotus Notes on AIX Installation and User's Guide	SH26-4067
ADSMConnect Agent for Microsoft SQL Server Installation and User's Guide	SH26-4069

C.4 ADSM Online Product Library

All of the ADSM publications are available in online readable format on the CD-ROM listed below:

CD-ROM Title	Publication Number
ADSM V3R1.0 MVS Online Product Library	SK3T-1396

How to Get ITSO Redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, CD-ROMs, workshops, and residencies. A form for ordering books and CD-ROMs is also provided.

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  Index # 4421 Abstracts of new redbooks
  Index # 4422 IBM redbooks
  Index # 4420 Redbooks for last six months

- **On the World Wide Web**

Redbooks Web Site	http://www.redbooks.ibm.com
IBM Direct Publications Catalog	http://www.elink.ibmlink.ibm.com/pbl/pbl

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Redpieces

For information so current it is still in the process of being written, look at "Redpieces" on the Redbooks Web Site (`http://www.redbooks.ibm.com/redpieces.html`). Redpieces are redbooks in progress; not all redbooks become redpieces, and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

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We accept American Express, Diners, Eurocard, Master Card, and Visa. Payment by credit card not available in all countries. Signature mandatory for credit card payment.

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ITSO Redbook Evaluation

Using ADSM to Back Up Lotus Notes
SG24-4534-01

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