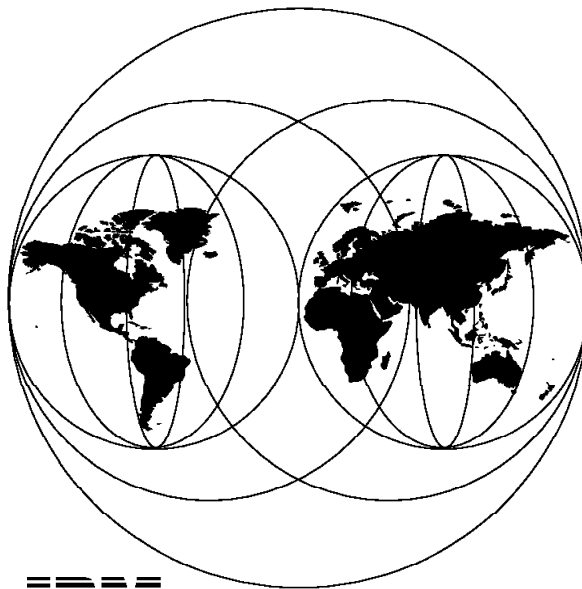# A Practical Guide to Network Storage Manager

December 1997

IBM

International Technical Support Organization
San Jose Center

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International Technical Support Organization

A Practical Guide to Network Storage Manager

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IBM

> **Take Note!**
>
> Before using this information and the product it supports, be sure to read the general information in Appendix C, "Special Notices" on page 123.

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Preface

The IBM 3466 Network Storage Manager provides integrated hardware and software for automated network backup. This redbook is a practical guide to integrating NSM into your environment. It provides step by step documentation on our experiences implementing NSM from the first time it is plugged in, through implementation of AIX, NT, and NetWare clients, to disaster recovery. Topics also include sizing and selecting the right model, the default ADSM configuration, how maintenance is applied, and using the Web administrative interface.

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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comments about this or other redbooks, please send us a note at the
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Chapter 1. Introduction to the IBM 3466 Network Storage Manager

The IBM 3466 Network Storage Manager (NSM) is an integrated data storage facility that provides backup, archive, space management, and disaster recovery of data stored in a network computing environment. The 3466 data storage facility integrates the IBM ADSTAR Distributed Storage Manager (ADSM) server functions and AIX with an RS/6000 RISC rack-mounted processor, Serial Storage Architecture (SSA) disk subsystems, tape library and drives, and network communications, into a single server system. Figure 1 illustrates NSM's components.

3466
Network Storage Manager
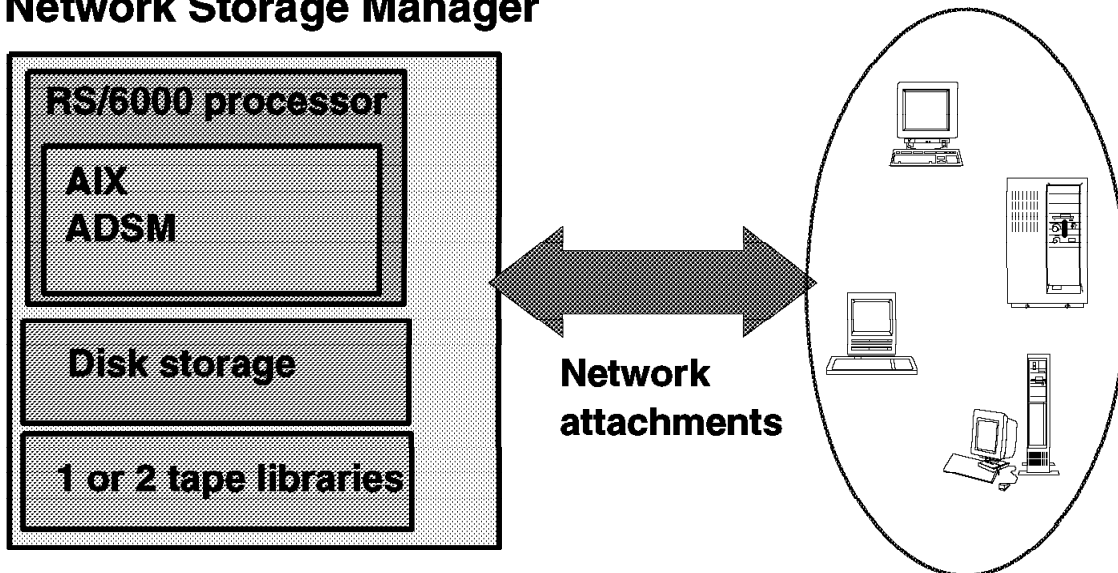
Figure 1. IBM 3466 Network Storage Manager Components

NSM manages client data. The clients can be desktop PCs, workstations, file servers, database servers, and so on. Client data files are transmitted by way of the network to the 3466 and written to storage. The data files can be stored on disk or on tape. ADSM moves the data files from disk to tape storage based on the occupancy thresholds of the disk storage. If a data file is recovered by means of restore or retrieve, or recalled by a client, then the file is transmitted on the network from disk storage or tape depending on the storage location of the data in the server.

The ADSM server provides centrally administered storage management services in the distributed environment. These services are based on a set of defined policies or rules, and you can automate and schedule many of the services to make the best use of your resources.

This chapter provides an overview of NSM, its features and functions and discusses a brief comparison of NSM versus a customer-built ADSM solution.

1.1 3466 Overview

Figure 2 illustrates the current models and configurations of the IBM 3466. In this project, we used a 3466 Model A01, with a single IBM 7337 DLT library.
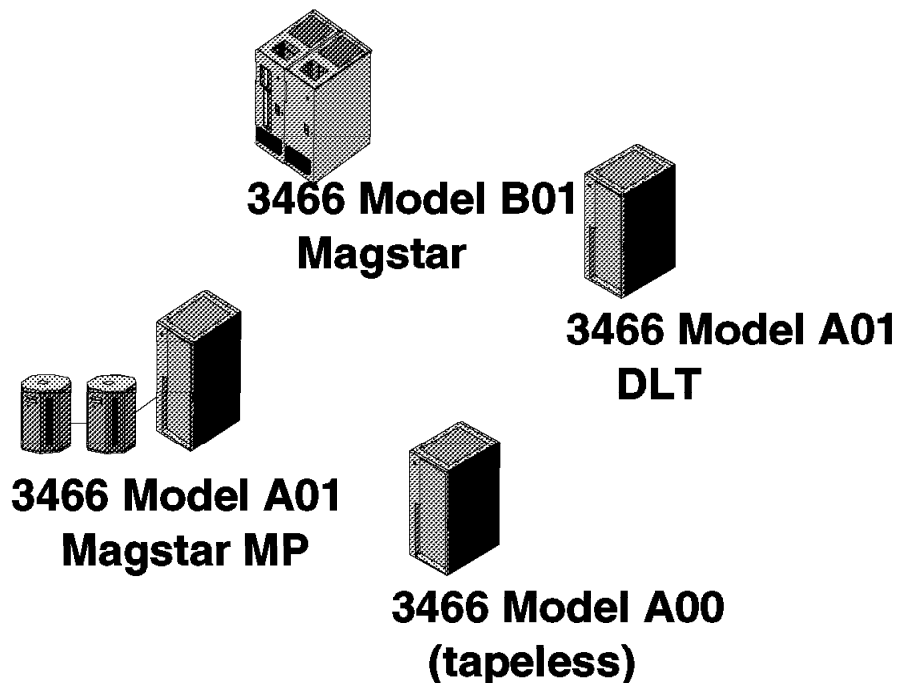
Figure 2. IBM 3466 Network Storage Manager Models

Models B01, B02, and B03 were introduced in 1996. They are intended for large backup and archive data storage environments, providing 72 to 288 GB

of intermediate disk storage and from 6.1 TB to 40.2 TB (with a 3:1 compaction ratio) of backup and archive cartridge tape storage capacity. The tape technology is IBM 3590 Magstar.

Models A00 and A01 are intended for small and medium size environments. Both models provide 36 to 144 GB of intermediate disk storage.

Model A00 has no tape library. Business partners and the customers must provide their own tape library. The libraries supported are defined by IBM. You may refer to the *3466 Model A00 Supported Storage Devices*, G225-6725 fact sheet for the current list. The list is available on the ADSM home page at http://www.storage.ibm.com/adsm.

Model A01 comes in two tape configurations. These provide from 500 GB to 9.6 TB (with a 3:1 compaction ratio) of backup and archive tape capacity. The DLT configuration can have one or two 7337 libraries with two DLT 7000 drives in each library. The IBM Magstar MultiPurpose (MP) configuration can have one or two types of Magstar MP Libraries, either a 3575-L12 or a 3575-L32, with from two to six drives in each library.

The 3466 provides storage management services to client platforms. The components of the server are:

- 3466 Server Processor
- Automated Tape Libraries and Drives
- Disk Storage
- Communications
- Network Storage Manager Software Package
- StorageSmart Home Page

The following sections describe the components of the 3466.

Note

Information about the processor and software levels is current as of August 1997 and is subject to change.

1.1.1 3466 Server Processor

The 3466 contains an RS/6000 rack-mounted system with a console display and keyboard. Models B01, B02, and B03 use a R20 system, while the Model A00 and A01 currently use an H10 system.

The R20 system has a 66 MHz, CMOS, multichip POWER2 processor with a 128 KB data cache, 32 KB instruction cache, and 1 MB L2 cache. The R20 system for the 3466 comes with four 64 MB memory cards for a total of 256 MB of memory, a 2.2 GB disk, an 8X CD-ROM drive, a 1.44 MB 3.5-inch diskette drive, integrated SCSI and eight Micro Channel Adapter (MCA) expansion slots.

The H10 system combines a 166 MHz PowerPC 604e microprocessor with the new, advanced peripheral component interconnect (PCI) bus, which is faster than the industry standard architecture (ISA) bus. It also offers ISA as a secondary bus architecture to accommodate attachment of ISA-based devices. The processor has its own 512 KB L2 cache, a 2.2 GB disk, an 8X CD-ROM drive, and 1.44 MB 3.5-inch diskette drive. The H10 system is configured with 256 MB of memory. A SCSI adapter card for the tape library, an SSA adapter card for disk storage, and network adapter cards for communications are preconfigured and cabled.

1.1.2 Tape Library and Devices

Model A00 has no tape library. The business partner and the customer must provide their own libraries and devices.

Model A01 comes in two configurations:

- DLT

  Maximum of two 7337 DLT libraries, each with:

  - 15 cartridge storage slots
  - Library controller
  - Single gripper accessor
  - Two DLT 7000 drives
  - 14 DLT cartridges (with external and internal labels), each having a capacity of 35 GB
  - One cleaning cartridge

- Magstar MP

  Maximum of two 3575 libraries, each with:

  - 120 or 320 cartridge storage slots (3575 Model L12 or L32)
  - Library controller
  - Dual gripper accessor
  - Two or three Magstar MP tape drives (Model L12 or L32)
  - Convenience input/output station

- 20 Magstar MP cartridge tapes (with external and internal labels), each having a capacity of 5 GB. Additional cartridges are ordered in quantities of 100.

- One cleaning cartridge

Model B01 has a 3494 tape library, a capacity of up to 6.1 TB uncompressed data, with the following:

- 610 cartridge storage slots

- Library controller

- Single gripper accessor

- Two Magstar tape drives

- 10-cartridge convenience input/output station

- 210 Magstar cartridge tapes (initialized and labeled), each with a capacity of 10 GB

- One cleaning cartridge

- Remote library manager console

Model B02 has a 3494 tape library, a capacity of up to 9.4 TB uncompressed data, with the following:

- 945 cartridge storage slots (Model B01 + 3494 D12)

- Library controller

- Single gripper accessor

- Three Magstar tape drives (optionally, four)

- 10-cartridge convenience input/output station

- 210 Magstar cartridge tapes (initialized and labeled), each with a capacity of 10 GB

- One cleaning cartridge

- Remote library manager console

Model B03 has a 3494 tape library, a capacity of up to 13.4 TB uncompressed data, with the following:

- 1345 cartridge storage slots (Model B01 + 3494 D12 + S10)

- Library controller

- Single gripper accessor

- Four Magstar tape drives

- 10-cartridge convenience input/output station

- 210 Magstar cartridge tapes (initialized and labeled), each with a capacity of 10 GB

- One cleaning cartridge

- Remote library manager console

Additional Magstar cartridges are ordered in quantities of 210.

1.1.3 Disk Storage

36 GB of SSA disk subsystem storage comes with the Model A00 and A01 3466, with up to 144 GB maximum. The 7133 Model 020 SSA disk subsystem can be installed with up to 16 SSA disk drive modules, in groups of four. Each disk drive module has a storage capacity of 9.1 GB.

Models B01, B02, and B03 may have two to four SSA disk subsystems with eight 9.1-GB disk drive modules per subsystem, providing from 72 GB up to 288 GB of backup and archive data storage.

The disk storage subsystem contains the ADSM database and recovery log, their mirrors, and the disk storage pool, DISKPOOL. The files that make up the database, recovery log, mirrors, and the disk storage pool are AIX journaled file system (JFS) file systems. The files are preallocated and formatted for you and are ready to use when the system is installed.

Currently, there is no feature of the 3466 that uses the RAID disk. For two reasons, this was not a strong requirement. First, the 3466 is basically a backup solution and most customers do not want to invest in RAID for copies of their data. They would rather invest in RAID for their primary file servers or database servers and then use 3466 for backups. Second, RAID still causes a performance loss on writes. RAID does have a performance benefit on reads, but only for normal data-access patterns, which backup data typically does not follow. So the read performance gains of RAID are not typically exploited in a backup solution like the 3466, while the write performance loss is realized with almost all backup activity.

1.1.4 Communications

The communications protocols supported by 3466 between server and clients are Transmission Control Protocol/Internet Protocol (TCP/IP), NetBIOS, IPX/SPX, and Systems Network Architecture (SNA). By default, TCP/IP is the communication method used. If you wish to use the other communication methods, you need to modify the server options file to add their parameters and configure the appropriate protocol on the system.

Connectivity on the network is available with asynchronous transfer mode (ATM), fiber distributed data interface (FDDI), Ethernet, and token ring. A maximum of four of the following adapters in any combination is permitted for all configurations of the Model A00 and A01:

- IBM Auto token-ring Lanstreamer PCI adapter

- Ethernet 10, 100 Mb/sec PCI adapter

- FDDI single-ring PCI adapter

- FDDI dual-ring PCI adapter

- ATM 155 Communications PCI adapter (requires *two* adapter slots.)

The Models B01, B02, and B03 may have:

- Maximum of two FDDI single-ring adapters with two FDDI dual-ring upgrades

- Maximum of two FDDI single-ring adapters, token-ring adapters, or Ethernet transceivers (in any combination) and one FDDI single-ring adapter with one FDDI dual-ring upgrade

- Maximum of two FDDI single-ring adapters, token-ring adapters, or Ethernet transceivers (in any combination) and one ATM Adapter

   The ATM 155 communications adapter requires *two* adapter slots

- Maximum of four FDDI single-ring adapters, token-ring adapters, Ethernet transceivers (in any combination)

1.1.5 Network Storage Manager Software Package

The software package, program product number 5765-C53, is required for the 3466. Feature 9101 for the B models or Feature 9102 for the A models must be ordered to ensure that the prerequisite software is preloaded with the system.

The software preloaded and configured on the system disk comprises:

- AIX 4.2.1 Operating System with AIX Connections Version 4.2

- Internet Connection Server Version 4.1 for AIX

- IBM Communications Server for AIX Version 4

- Device Driver Software for tapes, tape libraries, and disk storage subsystems

- IBM AIX REXX/6000

- ADSM for AIX Version 2.1 (2.1.5 level 13) with StorageSmart Web Server

- ADSM Client download packages

Available as an optional feature is the MediaStreamer Archive, Package 2.

The ADSM optional features that can be ordered for the 3466 are:

- Hierarchical Storage Management (HSM)

- Disaster Recovery Manager (DRM)

- Open Systems Environment

  Open Systems Environment enables support for an OpenEdition MVS or
  OS/390 Hierarchical File System (HFS) client and AFS and Distributed
  File Service (DFS) support.

Pricing and the optional feature numbers are contained in *3466 Price List*,
G225-6728.

1.1.5.1 ADSM code
The ADSM that ships with the IBM 3466 is the same code that ships when
you order ADSM separately. What is different is that the ADSM server code
has been installed, configured and tailored as follows:

- The server options file been changed from the default

- A Web server is running on the IBM 3466. This provides the
  StorageSmart home page, which allows you to download and customize
  client code, register clients, and perform administrative tasks. For more
  information, see 1.1.6, "StorageSmart Home Page" on page 9.

- The standard policy set is provided, as it is in the standard ADSM
  product. However, if you have a second tape library in your 3466, you
  also have a second policy domain called STANDARD2 and a second set
  of storage pools (see Figure 60 on page 117).

- Copy pools have been defined.

- One or two tape storage pools have been defined (depending on
  whether you have one or two tape libraries).

- The tape libraries have been defined to the tape storage pools and all
  tape volumes have been labeled and checked in with ADSM.

- Administrative schedules have been defined to perform daily care and
  feeding of the ADSM server (see 4.2.1, "Administrative Command
  Schedules" on page 59).

- Backup and archive client schedules have been defined to perform daily,
  weekly and monthly incremental backup.

1.1.6 StorageSmart Home Page

One of the features that differentiates the 3466 from a standard ADSM V2.1 solution is the StorageSmart Home Page. The StorageSmart Home Page is a Web-based interface that provides productivity and ease-of-use tools, which make the tasks of implementing and using ADSM much simpler.

The tools provide assistance in downloading and configuring ADSM clients, backing up remote clients centrally by means of the WebShell, and performing administrative tasks using a Web interface. We discuss downloading and configuring ADSM clients and backing up by means of the WebShell interface in Chapter 3, "Installation" on page 25. Performing ADSM server administrative tasks through the Web interface is discussed here.

To access the StorageSmart Home Page, point your Web browser to `http://3466machinename.mydomainname`, with the TCP/IP host name of the 3466. You are then presented with the screen shown in Figure 3 on page 10. Further on, using the StorageSmart Home Page is discussed in Chapter 3, "Installation" on page 25.

StorageSmart Home Page

The Network Storage Manager, a StorageSmart solution, is an integrated hardware and software solution that includes disk and tape storage, along with ADSM software that allows you to backup and archive files. An additional feature of the Network Storage Manager is WebShell, which provides Web interfaces that allow ADSM client code distribution, ADSM server administration and queries, and client backup and restore operations from your Web browser.

The WebShell Download and Configuration functions and the WebShell ADSM server administration functions reside on this Network Storage Manager system, and can be accessed directly through the links below. In contrast, the WebShell ADSM Backup/Restore client resides on an ADSM client machine and is accessed through that machine. When a WebShell Backup/Restore client is registered using the Download/Configure option below, the machine name is also added to a backup/restore list for convenience. Systems in this list that are running a WebShell Backup/Restore client can be accessed through the Backup or Restore entry below.

From the following list, you can choose to download clients for use with StorageSmart, run a backup or restore operation, or perform other administrative tasks.

Select a function:

- Download and/or Configure an ADSM client

- Backup or Restore files for an ADSM client

- Perform ADSM Server Administration Tasks

[Web Server Documentation | IBM Point of Access]

Figure 3. StorageSmart Home Page

1.2 A Brief Comparison of 3466 versus Custom-Built ADSM Solution

The 3466 is a complete storage management product (both hardware and software), that is configured and preloaded to make it a easily installed and ready-to-go system. Here are some of the points to consider when evaluating the 3466 versus planning, configuring, and building your own system with ADSM.

The key software component in the 3466 is the ADSM product. It provides a storage management solution for many types of platforms, from desktop PCs and workstations to large file servers and database servers. ADSM servers operate on a broad range of machine types, both of IBM and non-IBM manufacture, as well as operating systems from MVS to Windows NT. A very large effort may be required to determine the right hardware, the right software, and the appropriate connectivity to fit your environment. When you have the elements already available, then making ADSM complete the picture is not difficult since it fits so well in so many different configurations.

When you do not have the capacity nor the necessary elements to bring ADSM in without additional hardware resources and additional planning, then the IBM 3466 makes sense. It is a fully integrated storage management solution, which has the hardware, the software, and the network attachment capability.

1.2.1 Planning

The 3466 is offered now for environments from the small business up to very large enterprise data storage and backup environments. The hardware components are matched to the environments that need backup and recovery. The models are offered so that you can make better decisions about how to match up a network storage manager to your operating environment.

You can consider the 3466 as a complete system solution, easing the acquisition process within your organization. You are dealing with a single provider in most cases to provide the hardware, software, and network attachment. And you have to evaluate and justify only one machine instead of numerous components from more than one supplier.

ADSM is a complete software solution to meet your backup needs, but the 3466 network storage manager goes a couple of big steps further: 3466 is a complete hardware, storage, and software solution.

1.2.2 Installation

When it comes to setting up, installing, and configuring the 3466, you are not burdened with the responsibility of the tasks of:

- Installing the server processor and software — 3466 is preloaded and configured with the software, operating system and ADSM, at the factory and then installed by an IBM customer engineer (CE) in your location.

- All the hardware and software is integrated and tested before arriving at your location.

- Cabling and connectivity is completed by the IBM CE during the installation of the 3466 on your premises.

- Tape library and drives are predefined and the ADSM constructs are already set up.

- The ADSM disk storage files (the storage pool) are predefined, and the spaces are preallocated and formatted — ready to use.

- The ADSM database, its recovery log, and their mirrors are predefined, allocated, and formatted.

- Tape for the library is initialized and checked into the library during the install process. You receive enough tape to put your system into production.

- Connection to your network is completed during installation.

After the installation is complete, which in our laboratory was accomplished in 3 hours, you need to get the clients installed and then you are ready to start backing up. Network Storage Manager provides the client code, which can be downloaded from the installed server to the prospective clients. In fact, by using the new StorageSmart home page, you can accomplish the download, registration, and backup through simple and short procedures. Of course, the client must be network-browser-capable to use this — if not, the code can be downloaded using file transfer protocol (FTP).

With a custom-built ADSM solution, you are responsible for the above activities. IBM and its business partners offer services to accomplish this work, but with the 3466 it is provided for you, included in the price of the product.

1.2.3 Maintenance

3466 problem diagnosis procedures are included with the 3466 Start Up Guide, see *3466 Start Up Guide*, GA32-0386, which helps you respond to problems with the 3466. You can correct some problems with relatively simple actions. More complicated problems can be isolated by determining the problem source and then contacting IBM Software Support or IBM

Hardware Service if the problem cannot be resolved. If IBM Hardware Service is contacted, even for a software problem, it is up to them to contact Software Support—***not*** you. Likewise, if Software Support is contacted, even for a hardware problem, it is up to Software Support to contact Hardware Service.

With a custom-built ADSM solution, the steps for resolving software problems are the same; however, depending on the hardware you are using, you may have different phone numbers to call and different support groups to work with. You may also have the responsibility of convincing Software Support that this is a software problem or Hardware Support that this is a hardware problem.

Maintenance for the 3466 whether it is hardware, operating system software, or ADSM software is applied by an IBM CE as an equipment update, either as a hardware engineering change (EC) or a software EC. The EC level of the software is available through a query command that can be issued by the 3466 display terminal or remotely through telnet to the 3466 system.

With a custom-built ADSM solution, it is your responsibility to obtain and apply any software maintenance for ADSM and the operating system. The hardware is generally serviced under a separate maintenance agreement.

1.2.4 Functionality

All of the functionality that you get with ADSM is available to you when you have the 3466. The industry-standard award-winning features of backup, archive, hierarchical storage management, and disaster recovery manager are in both solutions without exception.

An additional bonus with the 3466 are the enhancements through the network you get with the StorageSmart Home page.

The StorageSmart Home page provides Web interfaces that allow ADSM client code distribution, ADSM server query support and administration command support, and client backup and restore operations from your Web browser in intranet environments. For more details, see 1.1.6, "StorageSmart Home Page" on page 9.

With a custom-built ADSM solution, you can obtain the WebShell client to support Web browser backup and restore capability in your current OS/2, AIX, and Windows NT, and Windows 95 client environments. However, ADSM V2.1 does not provide a Web interface to download client code, customize options files, or execute administrative commands.

1.2.5 Summary

Finally, ADSM was designed to have the "look and feel" of the platform it is installed on. The 3466 looks like (and is) a black box.

Table 1 summarizes the advantages of 3466 versus a custom-built ADSM installation:

Table 1. Brief comparison of 3466 versus Custom Built ADSM	
3466	**ADSM**
1. Is a fully integrated, network-connected, storage management solution.	1. Is a storage management solution.
2. Is a complete hardware, storage, and software solution.	2. Is a complete software solution.
3. Includes IBM on-site installation and maintenance.	3. Requires separate installation and maintenance assistance.
4. Provides backup, archive, HSM and DRM functions.	4. Provides backup, archive, HSM and DRM functions.
5. Includes a WebShell client **plus** the StorageSmart Home Page.	5. Includes a WebShell client.
6. Looks like a black box.	6. Looks like the platform it is installed on.

Chapter 2. Before You Start

In this chapter, we give you some things to consider in the sizing of your IBM 3466 Network Storage Manager. We describe the various tape types available to NSM and their different advantages. There are some tasks you need to perform before the 3466 arrives.

2.1 Sizing, How to Estimate Which NSM You Need

The 3466 models A and B, covers a wide range from small through medium up to large network environments.

- Small enterprises (A-Model)
    - 50 to 100 PCs, 50 to 100 workstations, or 10 to 20 file servers.
    - 1 TB to 3.6 TB compressed tape storage.
- Medium enterprises (A-Model)
    - Up to 500 PCs, 200 workstations, or 50 file servers
    - 4.5 TB to 9.0 TB compressed tape storage.
- Large enterprises (B-Model)
    - Up to 1000 PCs, 400 workstations, or 100 file servers.
    - 18 TB to 40 TB compressed tape storage.

2.1.1 Gathering Information

In the process of sizing your 3466, you need to know the following things:

- The number of file and database servers to back up

- The number of important workstations to back up

- How much data is on your client machines

- What to back up on the server. You might exclude the operating system.

- How many backup versions you would like to have

- What percent of data changes daily

    A rule of thumb if you cannot find out the change rate is to use a 5% daily change rate on workstation data and 40-60% on file server data.

This tells us the amount of data that will be stored in the 3466. Based on this information, you can determine what size of NSM you need.

2.1.2 Estimating Disk Space Requirements

The 3466 is designed and configured to hold one day of backed up data on disk. Use the following formula to estimate the amount of disk space you will need for the ADSM storage pool:

```
   number of clients X amount of backup data
```

Because you are not doing full dumps, you are storing only changed data on a daily basis.

Do not worry about peaks in workload. If you have one night with more backup data than the disk pool can handle, ADSM will automatically start migration from disk pool to tape pool.

Next, you need to calculate the size of your database:
```
 number of versions X number of files per client X number of clients X 500
byte.
```

Now that you know how much disk storage pool and database space you need, you can use Table 2 and Table 3 to choose the correct features.

If you order a 3466 with one tape library (either DLT or MP), you can see in Table 2 what different disk pool sizes ADSM is configured with, depending on the number of SSA disk modules.

Table 2. 3466 With One Library (either DLT or MP)				
SSA Disk Module	**4**	**8**	**12**	**16**
DISKPOOL Size	13.6 GB	33.4 GB	53.2 GB	73 GB
DATABASE Size	7.4 GB	14.2 GB	21 GB	27.8 GB
Note: LOG size is always 1.9 GB.				

If you order a 3466 with two tape libraries (either DLT or MP), you can see in Table 3 what different disk pool sizes ADSM is configured with, depending on the number of SSA disk modules.

Table 3. 3466 With Two Libraries (either DLT or MP)				
SSA Disk Module	**4**	**8**	**12**	**16**
DISKPOOL Size	n/a	16.7 GB	26.6 GB	36.5 GB
DISKPOOL2 Size	n/a	16.7 GB	26.6 GB	36.5 GB
DATABASE Size	n/a	14.2 GB	21 GB	27.8 GB
Note: LOG size is always 1.9 GB.				

Finally, you need to estimate how much tape pool you will need:
```
 one backup version + (number of daily incoming X (number of versions over
time - 1) X space for reclamation )).
```

You can get stuck between the choices of DLT or Magstar MP. As a NSM with two DLT libraries overlaps a Magstar MP/120 library in capacity, you should keep in mind the following:

- A DLT library tape pool, because it holds just 14 cartridges with a high storage capacity and is configured without collocation, could leave you with a very long restore time, depending on the number of files to restore.
- A Magstar MP/120 library tape pool is configured with collocation and, as it contains 119 cartridges with a lower capacity, gives you a better opportunity to reduce restore time even with a high number of files to restore.

You can then use Table 4 to determine which features to order to best suit your environment.

Table 4. 3466 Tape Libraries			
	DLT Feature 4202	**MP/120 Feature 4206**	**MP/320 Feature 4208**
TAPEPOOLSIZE	322	475	1350
COPYPOOLSIZE	107	75	150
Free Tapes	2	9	18
Note: All sizes are in GB, without compression and with just one library.			

Please note that you got some number of free tapes, not connected to any tape pool or copy pool, that are used for ADSM database backups. You can change the number of tapes belonging to a different tape pool or copy pool to better suit your environment. But do not forget to leave some tapes free so you do not miss your database backups.

2.2 Trade-offs on Tape Technologies Available

The 3466 uses three different tape technologies, depending on the model. All use different types of cartridge:

- Digital Linear Tape (DLT)

- Magstar MP Fast Access Linear Tape (FALT)

- IBM 3590 Cartridge System (Magstar)

See Table 5 on page 20 for an overview of tape comparisons.

2.2.1 Digital Linear Tape

The IBM Digital Linear Tape is designed for use in IBM's DLT series of tape drives and libraries. To ensure a long life, these tape cartridges require some care, in both handling and in storage; they must be kept in a clean environment.

The DLT contains 208 tracks, which are written four tracks at a time, overlapping at an 8-degree angle. There are no intertrack gaps nor is there a protective gap at the tape edge to protect data from tape curling. See Figure 4.
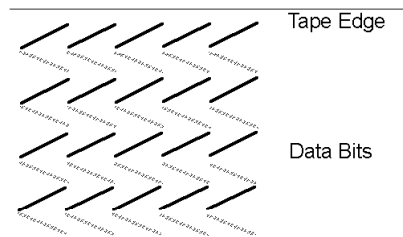
Figure 4. DLT Recording Pattern

The recording technique is called *symmetric phase recording*; it is a newly developed technology.

Error correction coding (ECC) is used to secure data on tape media.

As there is no servo mechanism to align the tape, the DLT drive threads the tape using six capstans. Vacuum keeps proper alignment of the tape against the head.

Each cartridge has an uncompressed capacity of 35 GB. Compression can increase the capacity to 70 GB.

The data transfer rate is up to 5.0 MB/second.

2.2.2 Magstar MP Fast Access Linear Tape

The Magstar MP FALT is especially designed to be used in tape libraries. Its rugged case is mounted on a metal plate. Tape is protected in that it never leaves the cartridge and maintains a self-enclosed path. This avoids exposing the tape to external guides, pickers, or rollers. The new path design eliminates thread time, reduces complexity, and increases reliability. This permits quick loading and, with the mid-point load, it reduces time needed to scan the tape. To prevent tape contamination, the cartridge door remains closed during handling and storage. This new tape technology

significantly reduces the tape load time, from cartridge retrieval to the start of reading the tape.

The tape contains 128 tracks, divided into two halves and with the start at mid-point. Tracks are written four at a time, starting from the middle and filling the right side first, with intertrack gaps and protective gap at the tape edge to protect data from tape curling. Tracks are written from the middle to the end of the tape where it electronically switches and writes back to the middle. Now the head moves down to write four more tracks to fill this half of the tape, then continues on the other half to repeat the process. See Figure 5.
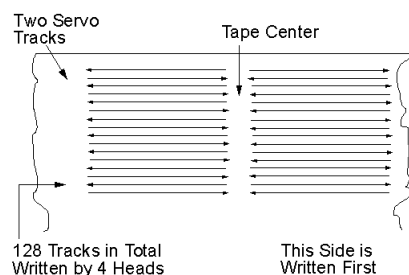
Figure 5. Magstar MP Recording Pattern

The recording technique is called *longitudinal serpentine recording*, a well proven technology from the 3480 and 3490E product family.

Error correction coding (ECC) and cross-track parity are used to secure data on the tape. Cross-track parity acts like RAID parity, with one parity bit written for every seven bits of data across tracks. This way, data can be rebuilt from parity if a track is damaged.

There are six servo heads that follow two prewritten servo tracks on the tape. If the tape shifts from the head, the servo immediately stops operation and realigns the tape to protect data on adjacent tracks from damage.

As the tape never leaves the cassette, there is no need for capstans, channels, and so on. The door of the cassette is opened automatically and the tape is placed against the heads, without friction against external objects.

Each cartridge has an uncompressed capacity of 5 GB; with compression, the capacity can increase up to 15 GB.

The data transfer rate is up to 2.2 MB/second.

2.2.3 IBM 3590 Tape System

The 3590 Magstar high performance cartridge is especially designed to be used in tape libraries like the IBM 3466. Its robust design is developed from the earlier 3480 tape cartridge. To protect the tape from contamination, when the cartridge is out of the drive, it is closed by the leader block attached to the end of the tape.

The tape contains 128 tracks; 16 tracks at a time are written time to the end of tape, where it electronically switches to the next 16 heads, reverses the tape, and starts writing new tracks back to the beginning of the tape. See Figure 6.
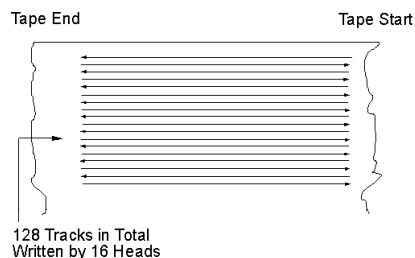
Figure 6. 3590 Magstar Recording Pattern

Like the Magstar MP, the 3590 Magstar uses longitudinal serpentine recording, a well proven technology from the 3480 and 3490E product family.

Error correction coding (ECC) together with volume control record with media error tracking allows recovery from multiple track loss.

A triply redundant servo tracking mechanism assures precise head and track alignment across the tape.

When a cartridge is inserted in a drive, the threading mechanism uses the leader block to pull the tape out of the cartridge and across the read/write head onto a nonremovable machine reel. A sophisticated air bearing protection is used to minimize tape friction and wear.

Each cartridge has a uncompressed capacity of 10 GB; with compression, the capacity can increase up to 30 GB.

Data transfer rate may increase up to 9.0 MB/second.

Table 5 (Page 1 of 2). Tape Drive Comparison			
Media	DLT	Magstar MP	3590 Magstar
Performance	5 MB/second	2.2 MB/second	9 MB/second

Table 5 (Page 2 of 2). Tape Drive Comparison			
Media	**DLT**	**Magstar MP**	**3590 Magstar**
Capacity per cartridge	35 GB / 70 GB compressed	5 GB / 15 GB compressed	10 GB / 30 GB compressed
Reliability	Satisfactory	High	Very High
Time to process 25 MB file - with load/unload	200 sec	40 sec	93 sec
Tracks	208 tracks/4 tracks written at a time	128 tracks/4 tracks written at a time	128 tracks/16 tracks written at a time

Tape Drive Summary:

- If you need high capacity tape cartridges, to save space in your tape storage, and if time to restore a large number of files is no object, then choose the 7337 DLT tape library (Feature 4202).
- If you have crucial applications that require fast restoration of large numbers of files, then choose the 3575 Magstar MP tape library (Feature 4206 or Feature 4208).

2.3 Performance Considerations

It is best to have a healthy and strong network for your 3466 ADSM Server to run on. If you have a heavily used network and adapters, it might be a good idea to build a small and separate network for your servers. Having all backups and restorations done on a separate network minimizes the load impact on your network and adapters if you have to perform a backup or restore data during daytime.

As modern file and database servers use compression in some way, consider turning off compression for all of your servers. You may then waste some valuable CPU power in your servers and you may even find that your compressed file slightly increases in size before it is sent to the ADSM server. However, consider that you have the reverse scenario for a restoration of the files. File and database servers are usually backed up during night-time hours and on weekends, and for that reason have access to the entire network when most user workstations are idle or shut down. Therefore, backup and restoration do not disturb or degrade the network for ordinary user workstations. For workstations, it is usually the other way round. Files are not compressed and the rest of your office is using the network heavily. As a result, one user might not be able to work for some time; if a server is down, however, your entire office may be out of server power.

2.4 Before the NSM Is Installed

There are a few steps that are important for you to carry out before your 3466 arrives.

2.4.1 Physical Planning

First, we suggest that you separately order the 3466 *Introduction and Planning Guide*, GA32-0385, in advance, so you can accomplish the required preparation steps before the 3466 arrives. This includes what your 3466 requires in terms of floor space, climate, and power considerations. Here are some site preparation topics:

- Dimensions of the total area for the 3466, including the footprint for one or two Magstar MP tape libraries if appropriate
- Aisle and door clearances
- Operator and service clearances
- Electrical wiring, power outlets, and ratings
- Cables to connect to your network
- Cooling and heating requirements
- Room requirements, such as footprint pressure (weight per square foot) and floor-to-ceiling clearance
- Telephone service
- Fire detection and suppression
- Tape cartridge storage
- Safety and security considerations

Note:

Please note that the 3466 is delivered with a single 220-volt power supply. If your voltage differs, you must prepare for 220 volts.

2.4.2 TCP/IP Configuration

The 3466 is delivered without anything set in the TCP/IP configuration. You must provide the IBM CE with the settings that your network administrator has supplied you with. There is a form in Appendix B of the *Introduction and Planning Guide*, GA32-0385, that either you or your network administrator need to fill out and hand to the IBM CE when the 3466 is to be installed.

2.4.3 Policy and Scheduling Requirements

The 3466 is delivered with a STANDARD policy and backup schedules that ought to cover the most basic needs for management of your backup and archive data. If you order a 3466 with two tape libraries, there will also be a STANDARD2 policy together with some additional schedules. However, you

need to review your own requirements and their dependence on the different types of operating systems and hardware you have, so you can decide how much to change the basic settings. In Appendix B, "3466 Initial Configuration" on page 111, you have a list of the basic settings of your 3466, as delivered.

If the basic policy settings have to be changed in some way, and if the changes are minor, such as just changing the number of versions to keep, we suggest you alter the standard policy, just to keep things simple.

If your changes are major — for example, you need to divide your organization into different policy domains, with different numbers of file versions to keep, or just to split servers and workstations into different policy domains — then we suggest that you create your own policy domains, as described in Section 4.3, "Policies" on page 62.

There are both administrative command schedules to maintain the ADSM server itself, and client backup schedules to handle your different types of files and database servers as well as your important workstations. All schedules, both administrative command and backup, that are predefined in the ADSM server are listed in Section 4.2, "Schedules" on page 58. The section also describes how you can modify the different types of administrative and backup or archive schedules to better suit your environment.

2.4.4 If You Order NSM with Two Libraries

With a 3466 containing two tape libraries, you must balance your backup load across two different disk- and tape pools. Just divide your servers and workstations so that they store data in two different storage pools. You can always move a backup client from one storage pool to another one to adjust the backup load.

Chapter 3. Installation

In this chapter we describe the environment that we used in our laboratory and cover the steps to install the IBM 3466 Network Storage Manager. We also describe the initial ADSM and AIX settings that come with the machine. We then detail the steps required to install ADSM clients using the tools available with the 3466. Finally, we discuss the topic of Web-based server administration.

3.1 Our Environment

Our laboratory environment consisted of an IBM 3466 Model A01 with a single DLT library. We used clients consisting of an RS/6000 running AIX, and PCs running Windows 95, Windows NT, OS/2, and NetWare, all connected through a token ring as shown in Figure 7. We provide additional details about our environment in Appendix A, "Our Environment" on page 103.
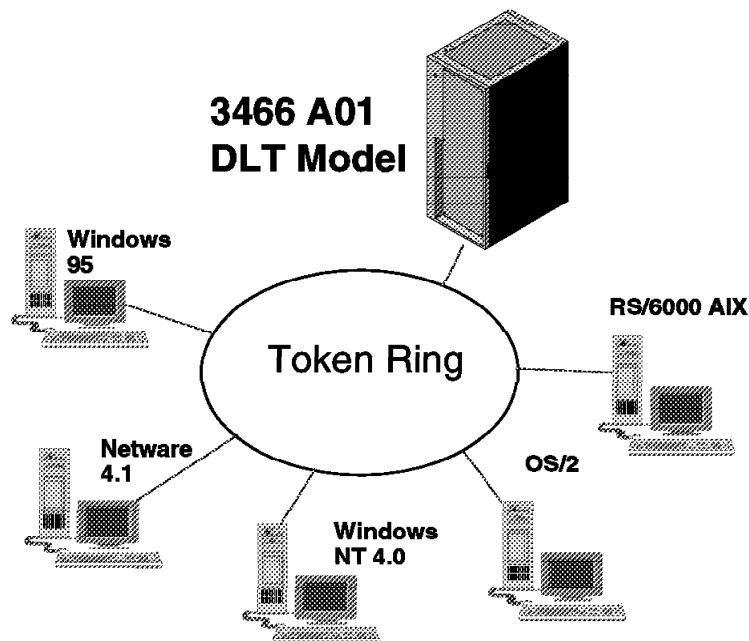
Figure 7. Our Installation Environment

25

3.2 3466 Installation Steps

In this section, we cover the steps that are required to install the IBM 3466. Once the installation is complete, the customer will have a fully configured and operational ADSM server.

3.2.1 Customer Engineer Tasks

The hardware installation and initial system tailoring is performed by the IBM CE. The IBM CE installs the 3466 and brings the product up to the point where it is ready to start receiving data for backup. The installation takes approximately 3 hours for the 3466 Model A01 with a single DLT library. During installation, the IBM CE performs the following tasks:

 1. Check and install cables for 3466 Model A01.

 2. Attach network cables to the RS/6000 Network Adapters.

 3. Install and verify cabling to the RS/6000 terminal.

 4. Verify 7133 SSA disk subsystem cabling.

 5. Attach and check out tape library (Magstar MP or DLT).

 6. Power up RS/6000.

 7. Customize TCP/IP on the RS/6000 (based on customer input gathered from the TCP/IP Configuration and Start-up Worksheet found in Appendix B of the *IBM Network Storage Manager Introduction and Planning Guide*, GA32-0385).

 8. Set time and time zone on RS/6000.

 9. Customize the Web server on the RS/6000 by setting the Host Name. This enables the NSM to be accessed as a Web server for several of its functions.

10. Verify attachment by testing TCP/IP communications, running SSA diagnostic link tests, and checking that AIX recognizes the tape library.

11. Create system backup tape (MKSYSB).

12. Initialize tape cartridges and update ADSM Tape Storage Pool.

13. Display and clear the AIX error log.

14. Enable ADSM to start automatically on RS/6000 power-up.

15. Perform post-installation activities, which include documenting software and hardware EC levels.

The activities that are the most time consuming during the CE installation are the initialization of the tape cartridges, and the creation of a system backup tape.

> **Note:**
>
> The initial password for the root user on AIX is **storsmart** and the initial password for the ADSM administrative client is **admin**. For security reasons, we strongly suggest that you change these two passwords following the completion of the IBM CE installation.

3.3 ADSM and AIX Initial Configuration

ADSM and AIX come preinstalled and preconfigured on the 3466. Once the IBM CE completes the installation, no further configuration activity is required on the part of the customer or business partner.

In the following sections, we explain the initial configuration for both ADSM and AIX. Full details of the initial configuration are covered in Appendix B, "3466 Initial Configuration" on page 111.

3.3.1 ADSM Configuration

In this section, we describe the initial ADSM configuration for the database and recovery logs, storage pools, storage management policies, and schedules.

3.3.1.1 Database and Recovery Logs

The disk has been configured to provide for the ADSM database and recovery log and their mirrors. For the A00 and A01 models, the default parameters are:

- 7.4 GB ADSM database and its mirror for a total of 14.8 GB

- 1.9 GB ADSM recovery log and its mirror for a total of 3.8 GB

3.3.1.2 Storage Pools

A storage pool is a named collection of storage volumes that share the same media type and are associated with one device class. ADSM requires that each tape library be defined in its own storage pool.

The number of storage pools defined depends on how many tape libraries are installed in your NSM. If you have an NSM with one tape library of any type, ADSM will have one disk storage pool (DISKPOOL) and two tape storage pools (TAPEPOOL and COPYPOOL).

Client data is backed up or archived to DISKPOOL. It is then migrated from DISKPOOL to TAPEPOOL. If a file larger than 100 MB is sent to the ADSM server, it will go straight to TAPEPOOL.

COPYPOOL is a copy storage pool. The contents of DISKPOOL and TAPEPOOL are backed up to COPYPOOL to protect against media loss or failure.

If you have an NSM with two tape libraries, ADSM will have two disk storage pools (DISKPOOL and DISKPOOL2) and four tape storage pools (TAPEPOOL, TAPEPOOL2, COPYPOOL and COPYPOOL2). The relationship between DISKPOOL2, TAPEPOOL2, and COPYPOOL2 is the same as it is for the other three storage pools.

For TAPEPOOL and TAPEPOOL2, the collocation setting depends on the type of A01 model used. In our scenario, we had a DLT library and collocation was disabled for all tape storage pools. With collocation enabled, ADSM keeps each client's files on a minimal number of volumes within a storage pool. Restoring collocated files requires fewer media mounts. Generally, collocation will reserve at least one tape for each client. Since a single DLT library holds a maximum of 15 catridges, collocation does not make sense. With the Magstar MP library, collocation is enabled for the TAPEPOOL (and TAPEPOOL2) and disabled for the COPYPOOL (and COPYPOOL2).

The 3466 Model A01 single DLT library configuration, which we used in our lab, had a DISKPOOL defined with 13.6 GB of storage, and with caching disabled.

The uncompressed capacity of the TAPEPOOL on our machine was 322.6 GB and that of the COPYPOOL was 107.5 GB.

3.3.1.3 Policies of the NSM Initial ADSM Configuration
The NSM initial ADSM configuration comes with one or two policy domains. The policies are what direct client data to a storage pool. Since a two-library NSM has a second set of storage pools, there must be a corresponding policy to point to it. Figure 8 on page 29 shows the initial settings for the policy domain STANDARD.

```
┌─────────────────────────────────────────────────────────────┐
│ Policy Domain STANDARD                                        │
│     backup retention grace period = 30 days                   │
│     archive retention grace period = 365 days                 │
│  ┌──────────────────────────────────────────────────────────┐│
│  │ Policy Set STANDARD                                        ││
│  │  ┌────────────────────────────────────────────────────────┐│
│  │  │ Management Class STANDARD                               ││
│  │  │     Space management technique = automatic              ││
│  │  │     Backup version must exist before migrating a file   ││
│  │  │     Storage pool destination for migrated files = DISKPOOL││
│  │  │  ┌──────────────────────────────────────────────────────┐│
│  │  │  │ Backup Copy Group                                     ││
│  │  │  │     Serialization = Shared static                     ││
│  │  │  │     Copy mode = Modified                              ││
│  │  │  │     Copy frequency = 0                                ││
│  │  │  │     Versions to keep:                                 ││
│  │  │  │        If data exists = 2                             ││
│  │  │  │        If data deleted = 1                            ││
│  │  │  │     Retain all backup versions = 30 days              ││
│  │  │  │     Retain last version of a deleted file = 60 days   ││
│  │  │  │     Storage pool destination = DISKPOOL               ││
│  │  │  └──────────────────────────────────────────────────────┘│
│  │  │  ┌──────────────────────────────────────────────────────┐│
│  │  │  │ Archive Copy Group                                    ││
│  │  │  │     Serialization = Shared static                     ││
│  │  │  │     Retain archived file = 365 days                   ││
│  │  │  │     Storage pool destination = DISKPOOL               ││
│  │  │  └──────────────────────────────────────────────────────┘│
│  │  └────────────────────────────────────────────────────────┘│
│  └──────────────────────────────────────────────────────────┘│
└─────────────────────────────────────────────────────────────┘
```

Figure 8. Policy Domain STANDARD

When you have an NSM with two tape libraries, you will also have a policy domain called STANDARD2, as shown in Figure 9 on page 30.

```
┌──────────────────────────────────────────────────────────────┐
│ ┌────────────────────────────────────────────────────────┐   │
│ │ Policy Domain STANDARD2                                  │   │
│ │     backup retention grace period = 30 days              │   │
│ │     archive retention grace period = 365 days            │   │
│ │ ┌────────────────────────────────────────────────────┐  │   │
│ │ │ Policy Set STANDARD2                                │  │   │
│ │ │ ┌────────────────────────────────────────────────┐ │  │   │
│ │ │ │ Management Class STANDARD2                      │ │  │   │
│ │ │ │     Space management technique = automatic      │ │  │   │
│ │ │ │     Backup version must exist before migrating a file │ │   │
│ │ │ │     Storage pool destination for migrated files = DISKPOOL2 │ │  │
│ │ │ │ ┌────────────────────────────────────────────┐ │ │  │   │
│ │ │ │ │ Backup Copy Group                           │ │ │  │   │
│ │ │ │ │     Serialization = Shared static           │ │ │  │   │
│ │ │ │ │     Copy mode = Modified                    │ │ │  │   │
│ │ │ │ │     Copy frequency = 0                      │ │ │  │   │
│ │ │ │ │     Versions to keep:                       │ │ │  │   │
│ │ │ │ │         If data exists = 2                  │ │ │  │   │
│ │ │ │ │         If data deleted = 1                 │ │ │  │   │
│ │ │ │ │     Retain all backup versions = 30 days    │ │ │  │   │
│ │ │ │ │     Retain last version of a deleted file = 60 days │ │ │ │
│ │ │ │ │     Storage pool destination = DISKPOOL2    │ │ │  │   │
│ │ │ │ └────────────────────────────────────────────┘ │ │  │   │
│ │ │ │ ┌────────────────────────────────────────────┐ │ │  │   │
│ │ │ │ │ Archive Copy Group                          │ │ │  │   │
│ │ │ │ │     Serialization = Shared static           │ │ │  │   │
│ │ │ │ │     Retain archived file = 365 days         │ │ │  │   │
│ │ │ │ │     Storage pool destination = DISKPOOL2    │ │ │  │   │
│ │ │ │ └────────────────────────────────────────────┘ │ │  │   │
│ │ │ └────────────────────────────────────────────────┘ │  │   │
│ │ └────────────────────────────────────────────────────┘  │   │
│ └────────────────────────────────────────────────────────┘   │
└──────────────────────────────────────────────────────────────┘
```

Figure 9. Policy Domain STANDARD2

Further descriptions of these policies are provided in Appendix B.5, "ADSM Policies" on page 115.

3.3.1.4 ADSM Schedules

The IBM 3466 comes preconfigured with numerous administrative command and client backup schedules. The administrative schedules execute automatically at their predefined times. For the client backup schedules, the ADSM administrator must take some steps as we describe in 3.4.4, "Activating Client Schedules" on page 45, to associate a client with a schedule. There are client backup schedules that run daily, weekly, and monthly. These are described in detail in Appendix B.4, "Client Backup Schedules" on page 114.

The administrative command schedules that are available on NSM are defined as daily or weekly events, and include the following tasks:

- Backup up DISKPOOL and TAPEPOOL to COPYPOOL

- Backup up DISKPOOL2 and TAPEPOOL2 to COPYPOOL2 (for an NSM with two tape libraries)

- Backup the ADSM database

- Delete old database volumes

- Delete old tape volumes

- Expire backup and archive files

- Migrate data from DISKPOOL to TAPEPOOL

- Migrate data from DISKPOOL2 to TAPEPOOL2 (for an NSM with two tape libraries)

- Reclaim TAPEPOOL and COPYPOOL volumes

- Reclaim TAPEPOOL2 and COPYPOOL2 volumes (for an NSM with two tape libraries)

You can access the administrative command schedules from the administrative GUI client by clicking once on the **plus sign** to the left of **Central Scheduler**, and then double clicking on **Administrative Command Schedules**. You will then be presented with the list of administrative command schedules available as shown in Figure 10.

Figure 10. Example of Administrative Command Schedules

Detailed information about the administrative command schedules is
provided in Appendix B.3, "ADSM Administrative Command Schedules" on
page 113.

3.3.2 Initial AIX Settings

The 3466 Model A01 contains an RS/6000 with AIX 4.2.1. The machine
comes to the customer with AIX and ADSM preinstalled. AIX comes
installed in the volume group named *rootvg* and has been mirrored across
the two internal 2.2 GB SCSI disks. The mirroring has been done to ensure
maximum system availability. Within group rootvg, there is 472 MB free
space on each of the two disks.

The ADSM logs, databases, and disk storage pool all reside in a separate
volume group called *adsmvg*. This volume group resides on four 9.1 GB
SSA disks that are housed in a separate drawer from the RS/6000. In order
to maximize performance, each database recovery log file, with its mirror,
has been placed on separate SSA disks. DISKPOOL files have also been
placed on separate SSA disks within the 7133 disk drawer. None of the
logical volumes within group adsmvg have been mirrored, and there is 592
MB of free space left within the volume group. Figure 11 on page 33 shows
a schematic of the logical layout of the disk drives.
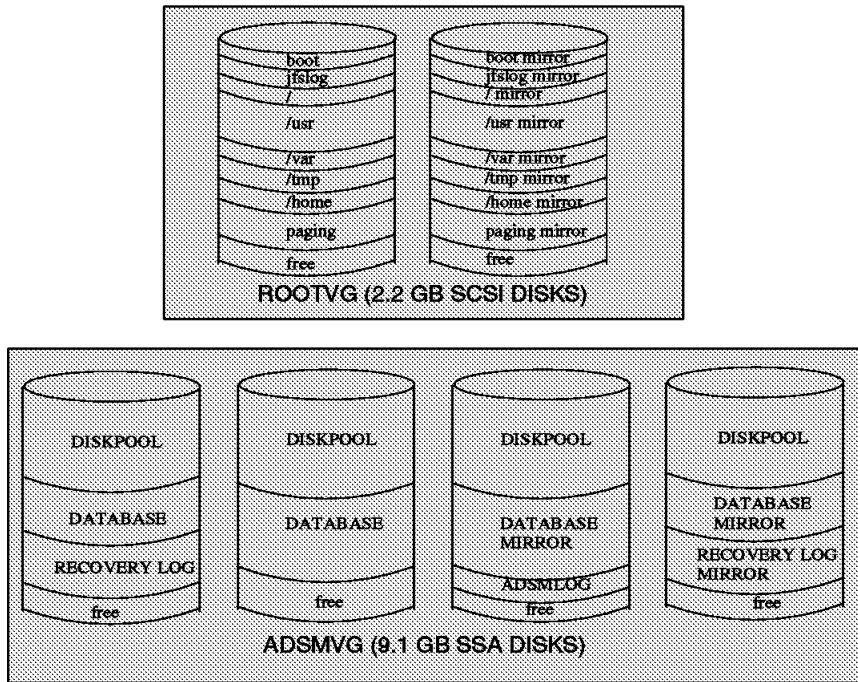
Figure 11. Logical Layout of Disk Drives

The AIX logical volumes and mount points for group adsmvg are shown below:

```
adsmvg:
LV NAME      TYPE     LPs   PPs   PVs   LV STATE      MOUNT POINT
dbaa1dk5     jfs      192   192   1     open/syncd    /dbaa1dk5
loglv00      jfslog   1     3     3     open/syncd    N/A
dbaa1dk4     jfs      288   288   1     open/syncd    /dbaa1dk4
dbaa1dk2     jfs      192   192   1     open/syncd    /dbaa1dk2
dbaa1dk3     jfs      288   288   1     open/syncd    /dbaa1dk3
lgaa1dk5     jfs      128   128   1     open/syncd    /lgaa1dk5
lgaa1dk2     jfs      128   128   1     open/syncd    /lgaa1dk2
bfaa1dk5     jfs      220   220   1     open/syncd    /bfaa1dk5
bfaa1dk4     jfs      220   220   1     open/syncd    /bfaa1dk4
bfaa1dk2     jfs      220   220   1     open/syncd    /bfaa1dk2
bfaa1dk3     jfs      220   220   1     open/syncd    /bfaa1dk3
adsmlog      jfs      32    32    1     open/syncd    /adsmlog
```

The naming convention used is **xxaanknn** where:

- xx is resource type

  - db for database

- lg for recovery log

  - bf for diskpool

- aa is the number of times a resource was created

- n is always 1

- dknn is the AIX hard disk number (for example, dk3 for hard disk3)

3.4 ADSM Client Installation

Installing ADSM clients is the only significant task that awaits a customer or business partner who acquires an IBM 3466, since the ADSM Server installation is completed by IBM. However, NSM comes with a Web-based delivery mechanism that greatly simplifies the installation of ADSM clients.

In the following subsections, we describe the steps to install ADSM clients, both PC and AIX based, and how to activate client schedules. We also cover the installation of the new WebShell client.

3.4.1 Downloading the ADSM Client

the ADSM client The first step in the installation of an ADSM client is to download the client code to the workstation. You can use one of two methods to accomplish this task: the StorageSmart Web interface or a manual FTP download.

3.4.1.1 Web Interface Download

To access the code through the Web interface, point your Web browser to the address `http://3466machinename.mydomainname`. The 3466 machine name and domain are based on the TCP/IP host name that was set by the IBM CE. This action will open up the IBM 3466 StorageSmart home page, shown in Figure 3 on page 10. and repeated as Figure 12 on page 35.

StorageSmart Home Page

The Network Storage Manager, a StorageSmart solution, is an integrated hardware and software solution that includes disk and tape storage, along with ADSM software that allows you to backup and archive files. An additional feature of the Network Storage Manager is WebShell, which provides Web interfaces that allow ADSM client code distribution, ADSM server administration and queries, and client backup and restore operations from your Web browser.

The WebShell Download and Configuration functions and the WebShell ADSM server administration functions reside on this Network Storage Manager system, and can be accessed directly through the links below. In contrast, the WebShell ADSM Backup/Restore client resides on an ADSM client machine and is accessed through that machine. When a WebShell Backup/Restore client is registered using the Download/Configure option below, the machine name is also added to a backup/restore list for convenience. Systems in this list that are running a WebShell Backup/Restore client can be accessed through the Backup or Restore entry below.

From the following list, you can choose to download clients for use with StorageSmart, run a backup or restore operation, or perform other administrative tasks.

Select a function:

- Download and/or Configure an ADSM client

- Backup or Restore files for an ADSM client

- Perform ADSM Server Administration Tasks

[Web Server Documentation | IBM Point of Access]

Figure 12. StorageSmart Home Page

On the StorageSmart home page, you choose the option to **Download and/or Configure an ADSM client**. In the next screen that appears, there are three options as shown in Figure 13 on page 36.

- Option 1 enables you to download the client code.

- Option 2 downloads a customized options file.

- Option 3 causes an e-mail to be sent to the AIX root user ID with information that can be used to register the new ADSM client. Additionally, it causes a link to be added to the StorageSmart Backup/Restore Web page (accessible from the StorageSmart Home Page by selecting **Backup or Restore files for an ADSM Client**) which points to your newly added client.

> **Note:**
>
> At the time of the writing of this book, choosing the second option was not yet operational. Therefore, we do not cover Option 2 in detail.
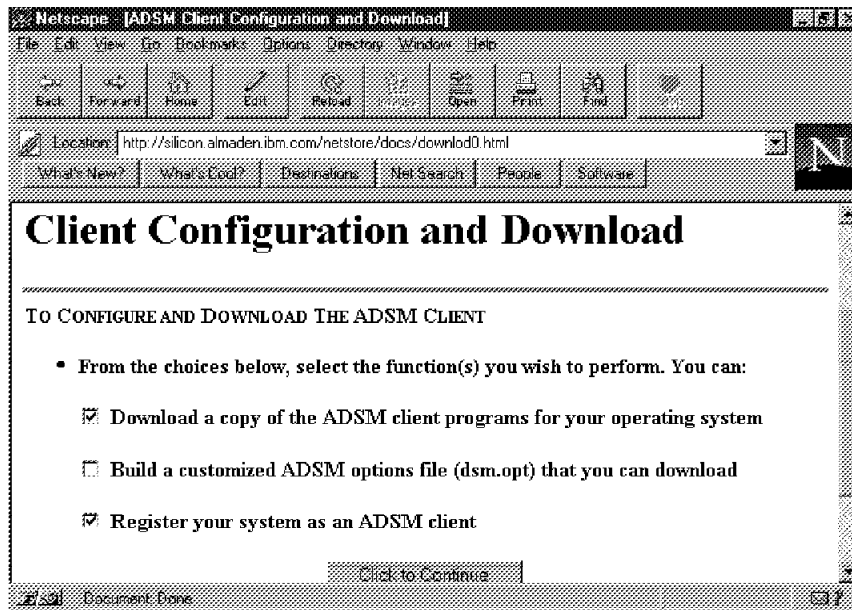
Figure 13. Client Configuration and Download (Option 1)

The next screen that appears is shown in Figure 14 on page 37. You need to choose the operating system type, and enter your node name, password, and contact name.
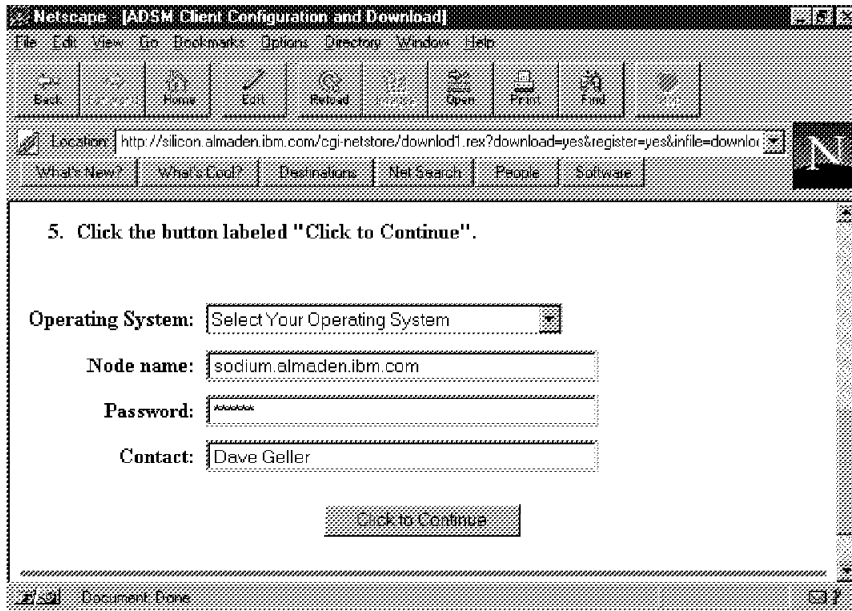
Figure 14. Client Configuration and Download (Option 2)

You are then presented with a screen where you can choose to download the ADSM client and ADSM Web client. See Figure 15 on page 38. If this is a new ADSM client install, click on 1.(**Click here to download the ADSM client**). If you are updating an existing ADSM client to have WebShell support, click on 2.(**Click here to download the ADSM client**).
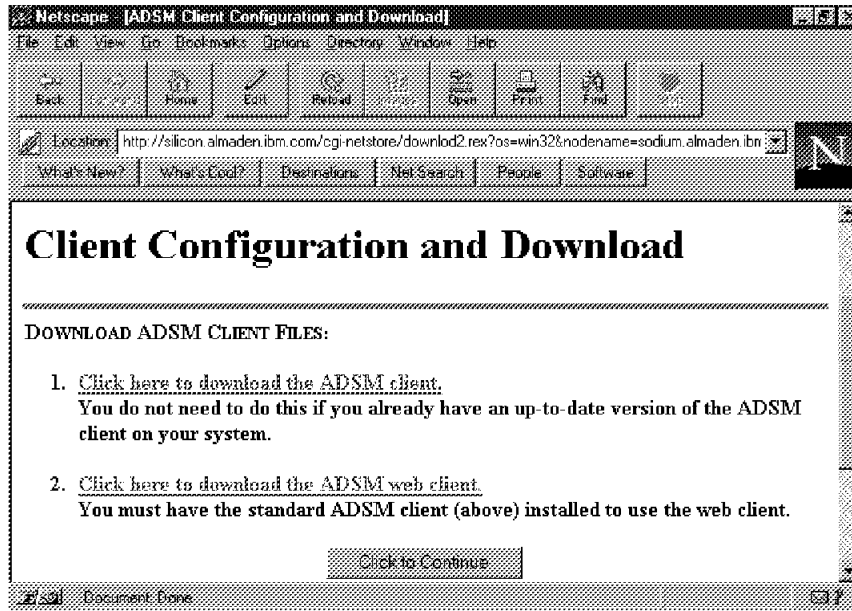
Figure 15. Client Configuration and Download (Option 3)

When you choose **1**, you are presented with a screen that asks you to specify the directory where you want to download the packed file. It is best to download the file into a temporary directory, which can be used for unpacking. The following are the names of the files that we downloaded:

- win32.exe (Windows 95 and Windows NT)
- os2.exe (OS/2)
- nov.exe (Novell NetWare)
- aix.tar.Z (AIX 4.1/4.2)

Note:

The Novell NetWare file nov.exe cannot be unpacked by the NetWare operating system. It must be unpacked using DOS, Windows or OS/2. Therefore, you should download the nov.exe file onto a NetWare requester in a temporary subdirectory on the NetWare server. After you unpack the file from the NetWare requester, you can install the client code using the Netware server. This method also applies to an FTP download as we describe in the subsection below.

3.4.1.2 FTP Download

The second method available to download the above listed files is to use
FTP from a command line. To accomplish this, execute the following:

1. **cd** to a temporary directory

2. **ftp 3466machinename.domainname**

3. log in as **anonymous** with any password

4. **cd /pub/adsm/clients/<osname>**(osname is the name of the operating
   system running on your client and can be any of the following)

   ```
   aix_3.2   bull   hpux10    os2       sinix_intel   sunos
   aix_4.1   dec    mac       sco       sinix_risc    ultrix
   aix_4.2   dos    nec       sequent   sol25         win_3.x
   att       hpux   NetWare   sgi       solaris       win_95_NT
   ```

5. **bin** (to change to binary mode)

6. **get <filename>** (filename is the name of the file you are downloading)
   To see the file names available in the current directory type **ls** before
   using the **get** command.

7. **quit**

3.4.2 Installing the ADSM Client

Once the download is complete, you need to install ADSM on the client. To
install ADSM, you need to unpack the downloaded file, and configure the
appropriate options files. In this section we provide details on the steps
required to accomplish these tasks for the PC operating systems (Windows
95 and NT, OS/2, and NetWare), and for AIX. The documented procedures
for installing all ADSM clients can be found in *ADSTAR Distributed Storage
Manager, Installing the Clients*, SH26-4049.

3.4.2.1 Installing the OS/2 and Windows ADSM Client

The client file that you downloaded is an executable. To unpack it, type the
file name from a command line or double click on the icon of the file from a
GUI.

After the files are unpacked, go to one of the subdirectories that were
created and look for **setup.exe** (for Windows 95 and NT), or the **install.exe**
(for OS/2). Execute this file and it will put you into the ADSM Client
Installation program. See Figure 16 on page 40.

> **Note:**
>
> Unpacking the os2.exe file will create os2base.exe and os2ln.exe. You then need to unpack os2base.exe for the ADSM client installation files. The file os2ln.exe contains the ADSM Lotus Notes Backup Agent.

Figure 16. ADSM Windows Client Installation Program

The installation program will present you with the opportunity to install the following ADSM components:

- Backup or archive client (command line interface and GUI)

- Administrative client (command line interface and GUI)

- Application programming interface

- WebShell

> **Note:**
>
> The WebShell installation as part of the base ADSM installation is only available for Windows 95 and NT. For OS/2 and AIX, a separate WebShell file download and installation procedure is required, which we describe in Section 1.2.5.

If you are configuring a computer to be a backup-archive client, you need to install the backup-archive client files at a minimum. For Web interface support, also install the WebShell files.

Creating the Options File Once the installation is complete, you need to create an options file (dsm.opt). The dsm.opt file must include your nodename, the communication method, and the 3466 host address at a minimum. The best way to create the dsm.opt file is to use the example file (dsm.smp) that is provided as a base. The following is an example of a dsm.opt file for a Windows 95 machine:

```
****************************************************************
* IBM Adstar Distributed Storage Manager
*
* Sample dsm.opt for 32-Bit Windows Client
*
* See options.wri for complete options file documentation
****************************************************************
NodeName  Sodium
COMMMETHOD TCPIP
TCPServeraddress silicon.almaden.ibm.com

Exclude *:\...\*.SWP
Exclude *:\...\*.PAR
Exclude *:\IBMBIO.COM
Exclude *:\IBMDOS.COM
Exclude *:\MSDOS.SYS
Exclude *:\IO.SYS
```

3.4.2.2 Installing the Novell NetWare ADSM Client

The process of installing the ADSM client is different for a NetWare than for Windows and OS/2 because of the nature of the NetWare operating system. The process involves procedures from a NetWare requester, and others from a NetWare server. The NetWare server procedures can be done from the NetWare local console or from a remote console.

The ADSM client file that you downloaded (nov.exe) is an executable. It will not run on the NetWare operating system and must be executed from a NetWare requester. To unpack the file, type the file name from a command line or double click on the icon of the file from a GUI at the Netware requester. After the files are unpacked, go to one of the subdirectories that were created and look for instdsm.nlm. This file is the ADSM installation utility and is a NetWare Loadable Module that must be run on the NetWare operating system from a NetWare console. To start this utility, type `load volume:\directoryname\instdsm` from the NetWare console. This will bring up the following installation menu:

```
ADSM Install Options
====================
Install ADSM
Install SMS Modules
Install API
Exit ADSM Install
```

Click on **Install ADSM** and **Install SMS Modules** to complete the installation.

Creating the Options File: Once the installation is complete, you need to create an options file (dsm.opt). The dsm.opt file must include your nodename, the communication method, and the 3466 host address at a minimum. The best way to create the dsm.opt file is to use the example file (dsm.smp) that is provided as a base. You can create this file from the NetWare console with the native NetWare editor (LOAD EDIT), or from a NetWare client with the standard PC editors. The following is an example of a dsm.opt file for a Novell NetWare machine:

```
 **************************************************************
 * IBM Adstar Distributed Storage Manager
 *
 * Sample dsm.opt for Novell NetWare
 **************************************************************

NODENAME          EASTER
COMM              TCPIP
TCPSERVERADDRESS  9.1.150.186
TCPPORT           1500
TCPWINDOWSIZE     32
TXNBYTELIMIT      5000
COMPRESSION       YES
ERRORLOGNAME      ITCS410A/SYS:\ADSM\DSMERROR.LOG
ERRORLOGRETENTION 10,D
SCHEDLOGNAME      ITCS410A/SYS:\ADSM\DSMSCHED.LOG
SCHEDLOGRETENTION 10,D
SUBDIR            YES
DOMAIN            SYS: VOL1: DIRECTORY
INCLUDE           *:\...\*
NWUSER            .ADMIN.ibm:itsosj
NWWAIT            NO
```

3.4.2.3 Installing the AIX ADSM Client

The process of installing the ADSM AIX client is similar to the steps we described for PC operating systems, with a few differences which we cover in this section. For all steps in the AIX installation, you are required to log in as the system administrator (root) in order to have the correct permissions.

The client file that you downloaded for AIX is in packed tar format. You
need to unpack and then untar the file in order to begin the install
procedure. You execute the following commands as the root user while
inside the directory where you downloaded the file:

```
uncompress aix.tar.Z
tar -xvf aix.tar
```

Now you need to invoke **smit** and follow the software installation menus until
you get to the **Install/Update Selectable Software (Custom Install)** menu.
From here, select **Install/Update From All Available Software**. In the first
field that is presented, input the directory name where you downloaded and
upacked the aix.tar.Z file, and press Enter. Now move to the field that says
SOFTWARE to install, and select the **LIST** button (for the GUI interface), or
the F4 key (for the ASCII interface). You are then presented with a list of
ADSM client components, which can be installed as shown in Figure 17.
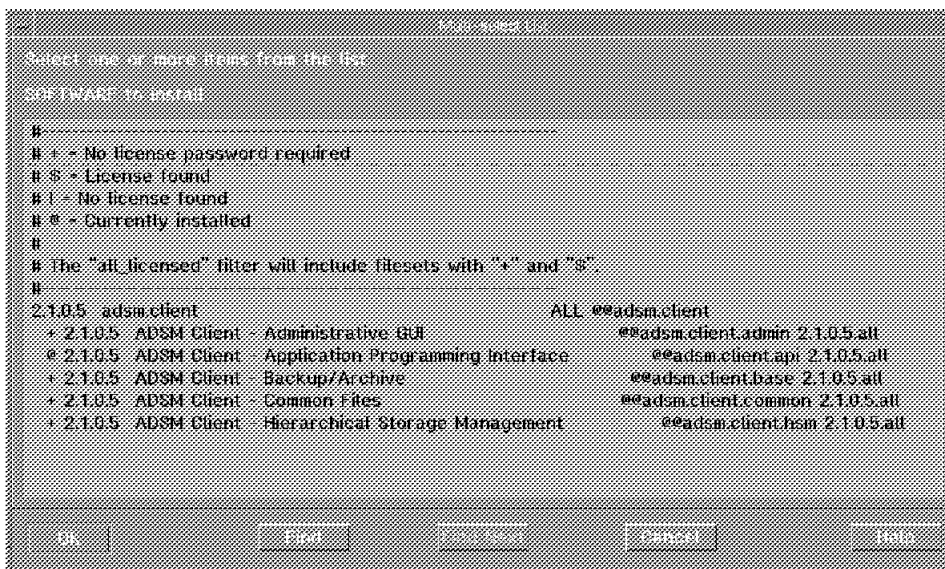
Figure 17. ADSM Software Installation Options for AIX

Select the components that you want to install by clicking and highlighting
with your mouse (or using the F7 key in the ASCII interface). At a minimum
for the typical backup or archive client, you need to install the **ADSM Client -
Common Files** and the **ADSM Client - Backup/Archive** components.

Creating the Options File: Once the installation is complete, you need to create two options files (dsm.sys and dsm.opt). The dsm.sys is the client system options file, and dsm.opt is the client user options file. Both files should be placed in the /usr/lpp/adsm/bin directory. The best way to create the required options files is to use the example files (dsm.sys.smp and dsm.opt.smp) as a base. The following are examples of both dsm.sys and dsm.opt files.

```
****************************************************************
* IBM Adstar Distributed Storage Manager
*
* Sample Client System Options file for AIX (dsm.sys)
****************************************************************
SErvername silicon
   COMMmethod       TCPip
   TCPPort          1500
   TCPServeraddress silicon.almaden.ibm.com
```

```
****************************************************************
* IBM Adstar Distributed Storage Manager
*
* Sample Client User Options file for AIX (dsm.opt)
****************************************************************
SErvername silicon
```

3.4.3 Registering the ADSM Client

Once the ADSM client is installed, you need to register it to the IBM 3466. Use either the ADSM administrative GUI client or the **register node** command in the administrative command line client to accomplish this. This can be done from the NSM console, or from an already registered ADSM client that has the administrative client installed. Further details on registering clients can be found in the *ADSTAR Distributed Storage Manager for AIX, Administrator's Guide*, SH35-0134.

If you have an NSM with two tape libraries, there is one policy domain for each library. A client can be registered to only one policy domain, so you must choose a policy domain for each client. Try to distribute the clients evenly between policy domains so that you are effectively using the capacity in both tape libraries.

If you downloaded the ADSM client code via the StorageSmart Web interface option **Register your system as an ADSM client**, as shown in Figure 13 on page 36, an e-mail message will have been sent to the IBM 3466 with the information required to register the ADSM client. To access this e-mail under AIX, do the following:

1. Log in as root

2. Type mail. This will bring up a list of your e-mail messages as shown below:

```
Mail (5.2 UCB) (AIX 4.1)  Type ? for help.
"/var/spool/mail/root": 4 messages 4 unread
>U  1 nobody            Wed Aug 13 11:19  10/415
 U  2 nobody            Wed Aug 13 11:19  10/418
 U  3 nobody            Wed Aug 13 11:19  10/421
 U  4 nobody            Wed Aug 13 11:19  10/423
```

3. Type 1 to read the first mail message. If the message came from the Web interface, it will look like this:

```
Message 1:
From nobody Wed Aug 13 11:19:07 1997
Date: Web, 13 Aug 1997 11:19:07 -0700 (PDT)
From: nobody
To: root

Please register ADSM client node sodium.almaden.ibm.com with
password client, contact is Dave Geller
```

4. Type d to delete the message, n to see next message, or q to quit reading your mail. If you do not delete the message, it will automatically be saved in /mbox after you've read it and exited the mail application. Unread mail is saved in /var/spool/mail/root.

For more information about using mailbox commands, you can type **?** next to the ? mail prompt, and you will be presented with a list of options available.

3.4.4 Activating Client Schedules

Predefined backup/archive client schedules are available on NSM. They have been defined as daily, weekly, and monthly incremental backup events. You can access the backup/archive schedules from the administrative GUI client on the 3466 console by clicking once on the **plus sign** to the left of **Central Scheduler**, and then double clicking on **Backup/Archive Schedules**. You will then be presented with the list of backup/archive schedules available as shown in Figure 18 on page 46.
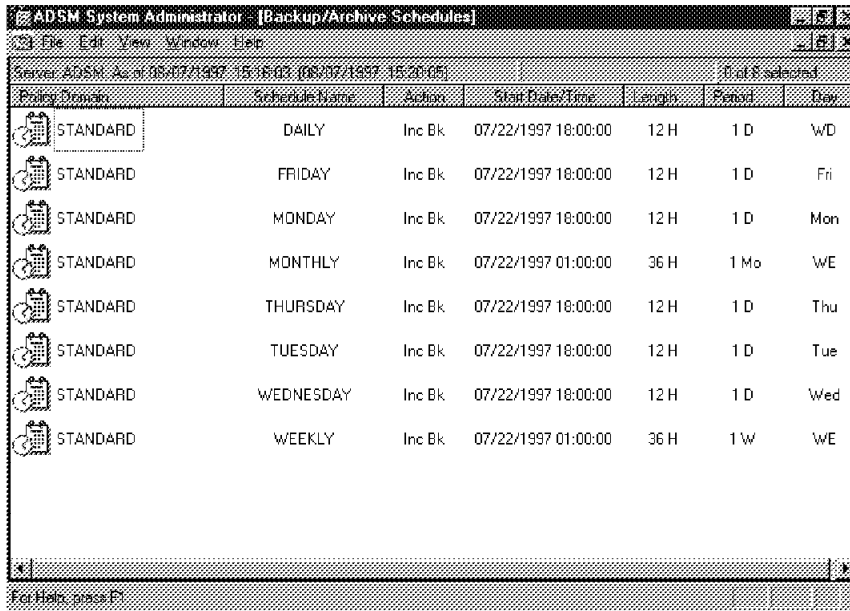
Figure 18. Backup/Archive Schedules

To activate a client schedule for a particular node, **double click** on the schedule that you would like to use from the list shown in Figure 18. You are then presented with Figure 19 on page 47. From this screen, do the following:

1. Click on **Add nodes**.

2. Click on **Include**.

3. Click on the node names that you want to add to the schedule.

4. Click on **Add**.

5. Click on **Apply**.
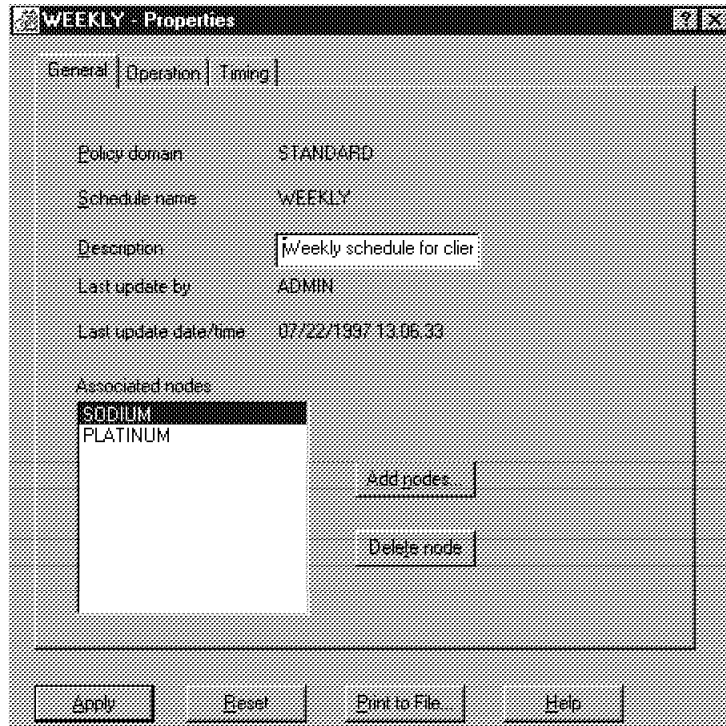
Figure 19. Weekly Incremental Backup Schedule

Finally, you must start the ADSM client scheduler. **This step must be done on the ADSM client machine**. To do this, enter the following command at the ADSM client:

```
dsmc schedule
```

The **dsmc** command is located in the directory where you installed the ADSM backup/archive client code. We suggest that you include this command in one of your system start-up files, so that ADSM client scheduling can be automatically activated.

Note:

To prevent having to enter a password each time this command is
invoked, edit the dsm.opt file and enter the following line in the file:

```
passwordaccess generate
```

This option automatically stores an encrypted password on your disk
after your first access with the **dsmc** command. Subsequent accesses to
dsmc commands do not require the user to enter a password.

3.4.5 Installation of the WebShell Client

In addition to the standard ADSM client, users now have the option of
installing an ADSM WebShell client. The ADSM WebShell client enables
users to interact with ADSM via their familiar Web browser interface. The
WebShell client is available only for clients running AIX, OS/2, Windows 95,
and Windows NT. The installation documentation for the WebShell client is
contained in an html file on the NSM, and can be accessed by pointing your
Web browser to `http://3466machinename.mydomainname/netstore/docs/`
`wsreadme.html`.

3.4.5.1 Downloading the WebShell Client

If you downloaded and installed the ADSM Windows 95 and NT client code
from the IBM 3466, then you may already have installed the WebShell client.
Otherwise, for OS/2, AIX and upgrades to existing Windows 95 and NT
machines, you will need to download the WebShell code. To do this, choose
Option 2 from the menu shown in Figure 15 on page 38. The name of the
file containing the WebShell code is winweb.exe (for Windows 95 and NT),
os2web.exe (for OS/2), and aixweb.tar (for AIX).

3.4.5.2 Installing the WebShell Client

For multiuser systems, the WebShell installation procedure should be
carried out by the system administrator (for example, root for AIX), since
he/she will have the correct permissions to update or read secure
directories, such as the directory that contains passwords.

The following are the steps to install the WebShell client:

 1. Copy the WebShell package (winweb.exe, os2web.exe, or aixweb.tar) to
    the directory containing (or to contain) the ADSM Command Line client
    (dsmc.exe or dsmc).

 2. Change to that directory.

3. Extract the WebShell files. For Windows, execute **winweb**. For OS/2 execute **os2web**. For AIX, execute **tar -xvf aixweb.tar**.

4. Inform WebShell of your ADSM backup/restore client password, by executing:

```
adsmpswd p <password> wsstuff  (OS/2 and WINDOWS)

adsmpswd p <password> /etc/security/adsm (AIX)
```

> **Note:**
>
> The <password> parameter should be the same password that is used by the registered ADSM backup/archive client.

This command will create a password file called adsmpswd.ws in the wsstuff directory on OS/2 and Windows, and in the /etc/security/adsm directory on AIX. This password file is used by the WebShell interface to gain access to ADSM.

5. Inform WebShell of the Web users on the system, and the passwords to be used for Web authentication, by executing:

```
mkwspswd p <userid> <password> u wsstuff  (OS/2 and WINDOWS)

mkwspswd p <userid> <password> u /etc/security/adsm (AIX)
```

> **Note:**
>
> The <userid> parameter can be any user name that you choose and is not in any way related to your ADSM backup-archive client name.
>
> The <password> parameter can be any password that you choose to be associated with this user ID, and is not in any way related to your ADSM backup/archive client password.

This **mkwspswd** command will create a password file called adsmpswd.ws in the wsstuff directory on OS/2 and Windows, and in the /etc/security/adsm directory on AIX. This file is used for authentication of Web browser users who want to access the WebShell interface on your client, whether it be local or remote.

6. Enable the WebShell interface on your client by executing:

```
webshell
```

The output of the **webshell** command will be:

```
Listening on port: 2121
URL is: http://YourMachineName:2121/webshell
```

YourMachineName will be the TCP/IP name of your client machine.

To have the WebShell automatically enabled after each system boot, we suggest that you place the **webshell** command in one of your system or user start up files.

3.4.5.3 Accessing the WebShell

Once the installation steps are complete, you can now access the WebShell on your client by pointing your Web browser to `http://YourMachineName:2121/webshell`. You will be asked to enter your WebShell user ID and password (from Step 5 above) and will then be presented with the WebShell interface as shown in Figure 20.
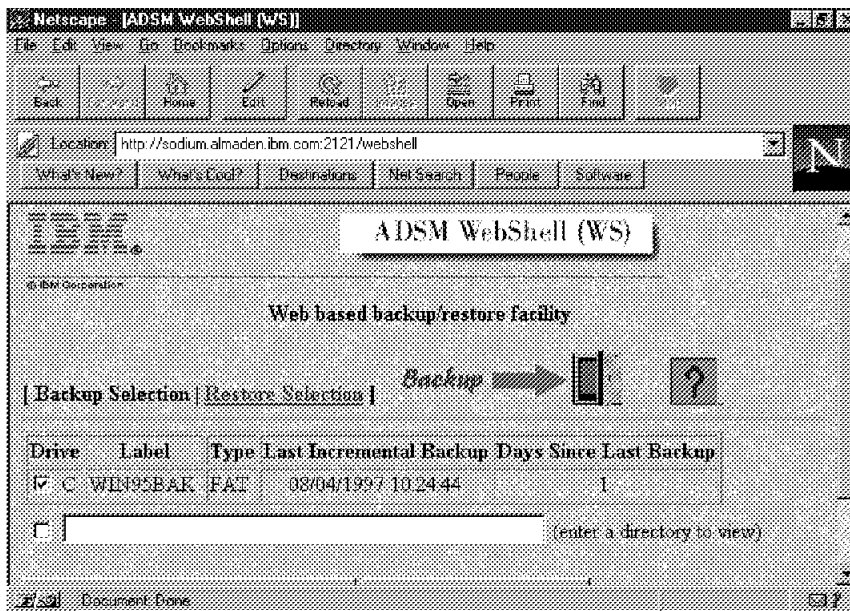
Figure 20. ADSM WebShell Interface

An alternative way to access the WebShell on your client is to go to the StorageSmart Home Page, as shown earlier in Figure 12 on page 35, and click on **Backup or Restore files for an ADSM client**. You are then presented with the StorageSmart Backup/Restore Web page which contains the list of clients you registered earlier from the StorageSmart Web interface. See Figure 21 on page 51 for an example. From here, you click on the client

you want to access, and your Web browser will be pointed to the correct address.

> **Note:**
>
> If you did not register the client via the StorageSmart Web interface, and you would like it to be included in the client list as shown in Figure 21, you can edit the /usr/lpp/StorageSmart/netstore/config/backup.client.list file on the RS/6000 and enter the address of the client manually.
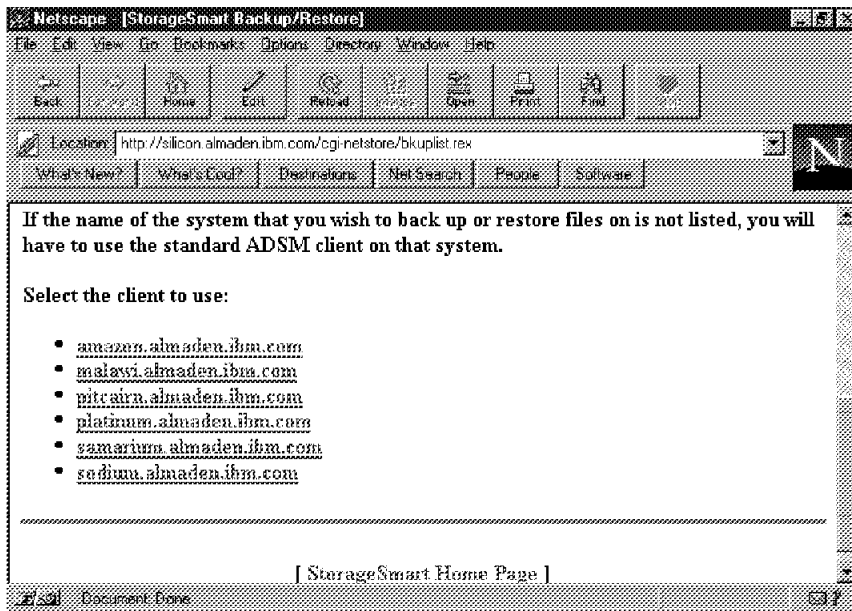
Figure 21. StorageSmart Backup/Restore Web Page

3.5 Web-Based Server Administration

In addition to downloading and configuring ADSM, and initiating ADSM backup/restore functions remotely, the StorageSmart Web interface also facilitates Web-based server administration. In this section, we provide details on the functions that are available via the Web administrative interface.

3.5.1 Web Administrative Interface

ADSM V2.1 provides two interfaces for administrative tasks: the administrative command line client and the administrative GUI client. However, with the IBM 3466, you are also provided with a Web administrative interface. This Web administrative interface is a precursor to the full-function Web administrative interface provided with ADSM V3.

To access the Web administrative interface, go to the StorageSmart Home Page and click on **Perform ADSM Server Administration Tasks**. You are then presented with Figure 22.

StorageSmart ADSM Server Administration

Clients

Database/Recovery Log

Storage

Policy

Schedules

Server Activities/Configuration

[Enter a Server Command | Help Overview]

[Change Administrative Query Password]

Figure 22. StorageSmart ADSM Server Administration

The menu items in the Web administrative interface issue query commands against the ADSM server, and display the results as Web pages. Each menu icon or entry form maps directly to an ADSM server query command.

Simple queries are executed when the associated icon is selected; more complex queries provide forms that can be filled out which tailor the query command being issued. The help link at the bottom of an entry form displays command syntax and describes the output returned.

For example, in order to get a list of registered client nodes, click on **Clients** on the StorageSmart ADSM Server Administration Web page as shown on Figure 22 on page 52. This brings up the StorageSmart ADSM Client page as shown in Figure 23.
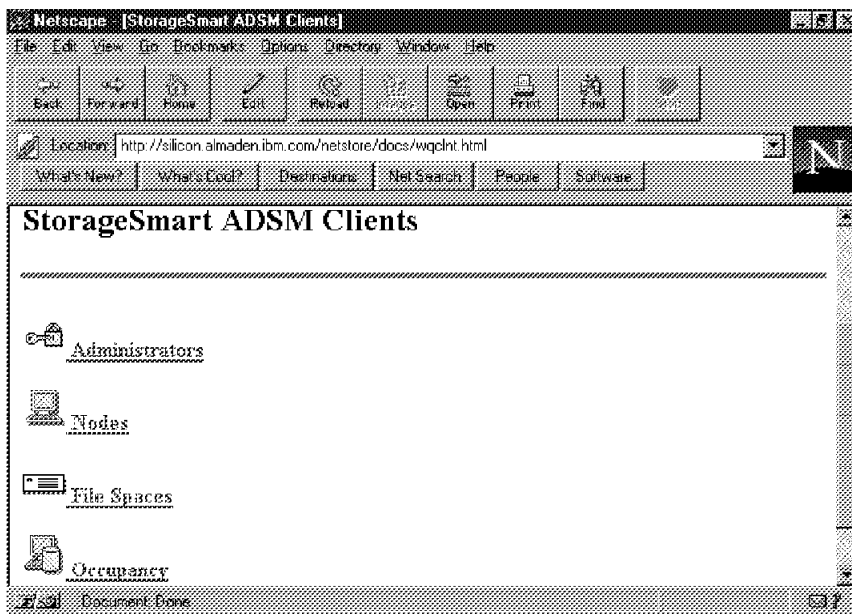
Figure 23. StorageSmart ADSM Clients

Then you click on the **Nodes** icon and are presented with the form shown in Figure 24 on page 54.
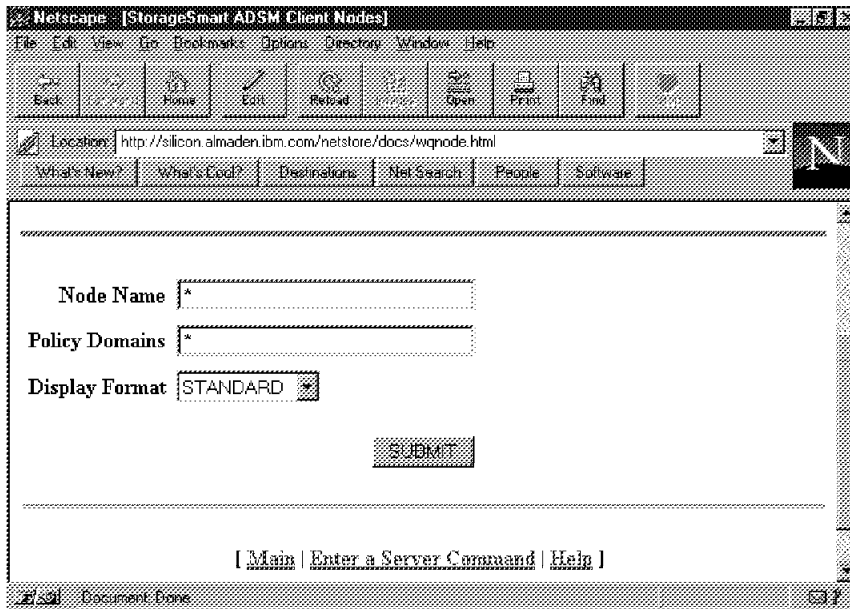
Figure 24. StorageSmart ADSM Client Nodes

If you do not want to change any fields, you can click on **SUBMIT**, and you will be presented with output similar to that shown in Figure 25.
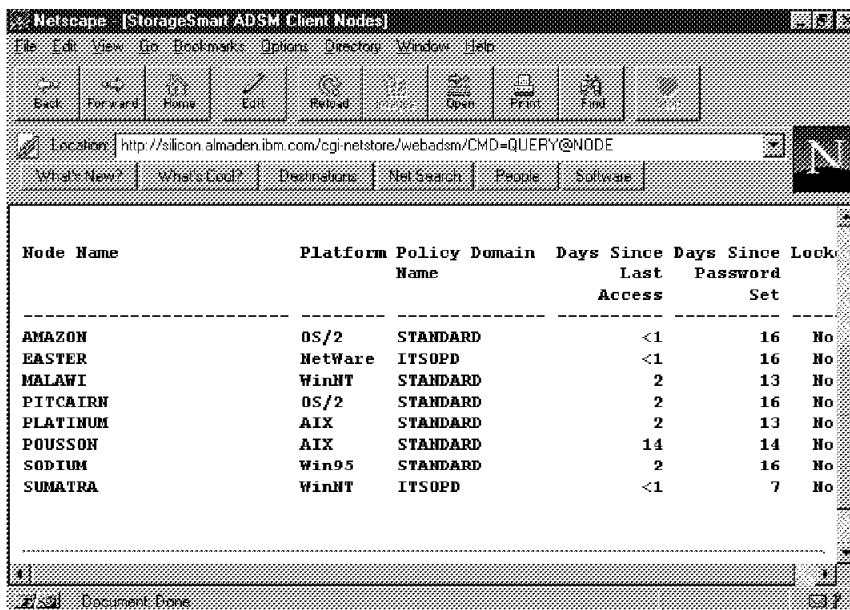
Figure 25. ADSM Client Nodes Query Output

In addition to executing ADSM query commands using the Web administrative interface, you can also issue any server command for which you are authorized. You must provide your own ADSM server administrator ID and password with the command since the default ID for the Web administrative interface has query access only.

For example, if you want to issue the command to change the password for one of your client nodes, first click on **Enter a Server Command** at the bottom of any Web administrative interface page. You are then presented with the panel shown in Figure 26.
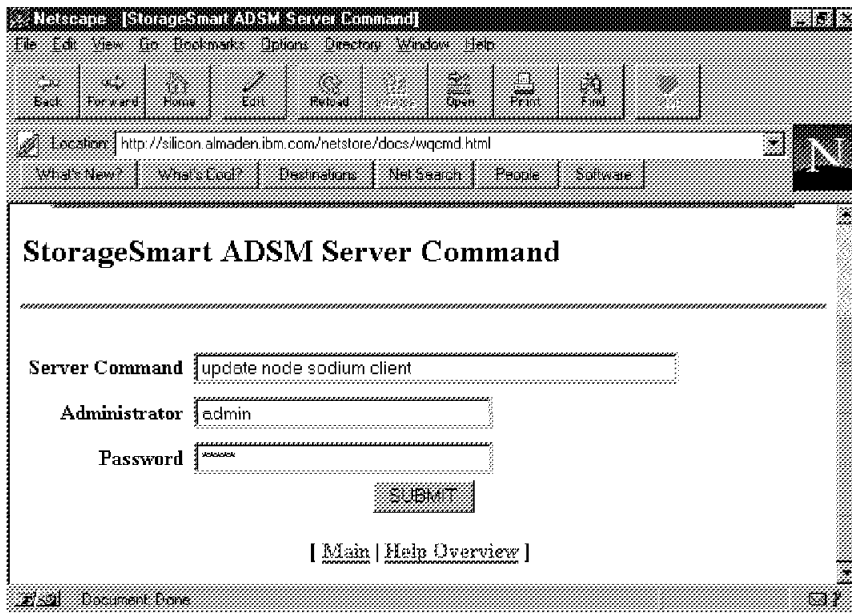
Figure 26. Sample StorageSmart ADSM Server Command

From the panel, type your ADSM server command with your administrator ID and password, and then press **submit**. You are then presented with the ADSM command output in a Web page as shown in Figure 27 on page 56.
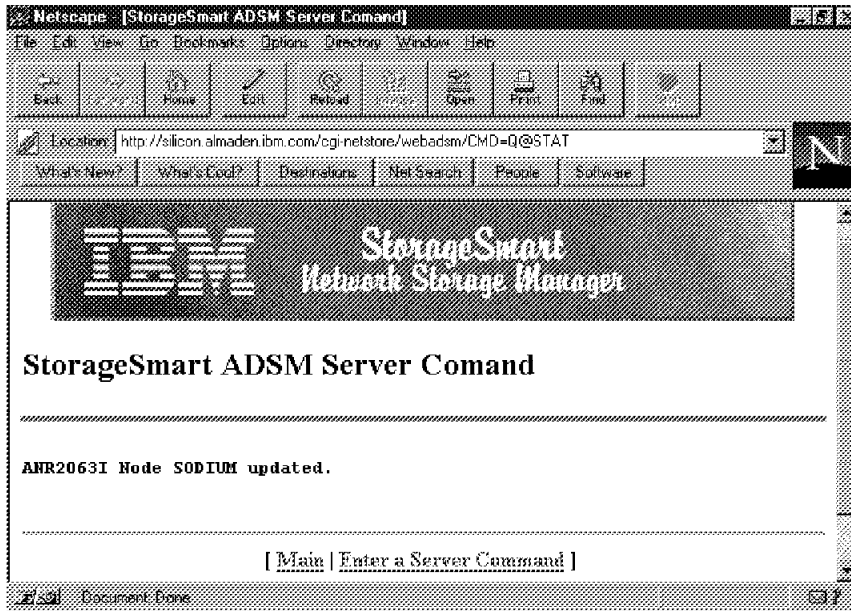
Figure 27. Output from Sample ADSM Server Command

Chapter 4. Tailoring the ADSM Server

In this chapter, we explain how to tailor the ADSM Server of the IBM Network Storage Manager. We cover both policies and schedules.

All steps described and figures shown are from a Windows NT 32-bit ADSM Administrative Client at level 2.1.06. Some steps can differ for different administrative clients, but generally the steps are the same.

4.1 Register Nodes

The first thing you have to do is register your clients. The simplest way to do this is by using the administrative GUI client but you can use the administrative command line client if you prefer. If you have a 3466 with two tape libraries, you need to distribute your clients between the two policy domains.

Using the administrative GUI client, do the following: From the **Component Tree** window, double click on **Nodes**. On the **ADSM System Administration** window, select **Edit** from the menu bar. From the **Edit** pull-down menu select **Add...**. In the popup window **Node - Add**, on the **General page**, fill in the name of your node, the contact information (the owner of the node), and what policy domain the node should belong to. You can select (now or later) whether your node should use compression or not. We recommend that you select **Always** or **Never**, rather than the default **Client determined**. For a file or a database server we recommend that you choose **Never** for no compression. For a workstation that might run backups during office hours we recommend that you choose **Always** for compression to spare the network. On the second page, type in the password your node is going to use (you have to do it twice). On the third (**Filespace**) page, enter your client's Filespace authorization. We recommend that you not give clients a second chance to delete any file that ADSM holds a backup copy of. Make sure that you have only a check in the **Can delete archive data** check box and let the **Can delete backup data** box be clear (no check). See Figure 28 on page 58.
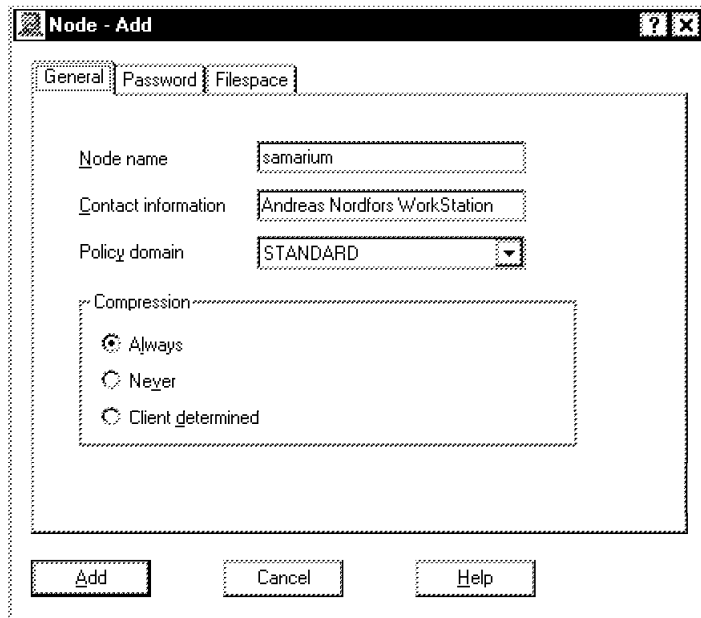
Figure 28. Registering Your Node on the General Node - Add Page

Using the administrative command line as the client, type in the following:

```
adsm> register node samarium itsosj contact='Andreas Nordfors WorkStation' -
cont> domain=standard compression=yes archdelete=yes backdelete=no
ANR2060I Node SAMARIUM registered in policy domain STANDARD.
```

After the minus sign (top line), press ENTER and you will have the cont> prompt..

4.2 Schedules

Schedules are set up to maintain server administrative operations as well as client operations. They are easy to set up and maintain. As an administrator, you can keep track of all events that are set up in your ADSM server through the logs that are stored in the database.

We assume that you run your scheduled daily backup for your servers during the night and that you run backups manually as needed for some of your important workstations.

Automatic backups can be scheduled daily or weekly, according to the workload. If critical data accumulates faster than planned, manual backups can be run in addition and the automatic schedules modified.

4.2.1 Administrative Command Schedules

ADSM server administrative command schedules are used mainly for preventive maintenance of your ADSM server, for disaster recovery, and for backup of your files. Housekeeping tasks are also scheduled, such as updating and freeing space in the database, recycling tapes, and moving files to the next storage pool.

There are 12 administrative command schedules set up in the ADSM server. If you have an IBM 3466 with two tape libraries, you have eight additional administrative command schedules to maintain your additional storage pools. Table 7 on page 113 shows how the administrative command schedules are initially set up. You also have a screen capture available in Figure 10 on page 31. Actually, you do not need to activate or change any of these since they are automatically activated and started when the ADSM server is started. The only thing you may want to do is adjust the timing of the schedules so they will fit into your own environment. See Table 6 for the weekly timing of all administrative command schedules during a week. It is followed by a brief description of your administrative command schedules.

Table 6 (Page 1 of 2). ADSM Administrative Command Schedules Timing in a Week							
Schedule Name	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
BACKUPSTG_DISK	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00
BACKUPSTG_DISK2 **	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00	05:00-07:00
BACKUPSTG_TAPE	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15
BACKUPSTG_TAPE2 **	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15	05:15-07:15
START_RECL_COPY		08:00-09:00					
START_RECL_COPY2 **		08:00-09:00					
MIGRATION_START	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00
MIGRATION_START2 **	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00	09:00-11:00
DBBACKUP_FULL	13:00-15:00	13:00-15:00	13:00-15:00	13:00-15:00	13:00-15:00	13:00-15:00	13:00-15:00
EXPIRE_INVENTORY *	14:00-16:00		14:00-16:00		14:00-16:00		14:00-16:00
START_RECLAIM *		14:00-16:00		14:00-16:00		14:00-16:00	
START_RECLAIM2 * **		14:00-16:00		14:00-16:00		14:00-16:00	
DELETE_DBVOLHIST	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00
DELETE_VOL_HIST	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00	17:00-19:00
MIGRATION_STOP	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00
MIGRATION_STOP2 **	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00	18:00-20:00
STOP_RECLAIM *		18:00-20:00		18:00-20:00		18:00-20:00	
STOP_RECLAIM2 * **		18:00-20:00		18:00-20:00		18:00-20:00	
STOP_RECL_COPY		18:00-19:00					

Table 6 (Page 2 of 2). ADSM Administrative Command Schedules Timing in a Week							
Schedule Name	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
STOP_RECL_COPY2 **		18:00-19:00					
Note: * Schedules EXPIRE_INVENTORY, START_RECLAIM and STOP_RECLAIM are to run every other day							
** Only defined for a second tape library.							

The scheduled operations are as follows:

Name	Operation
BACKUPSTG_DISK	DISKPOOL is backed up every day between 05:00 and 07:00.
BACKUPSTG_DISK2	DISKPOOL2 is backed up every day between 05:00 and 07:00.
BACKUPSTG_TAPE	TAPEPOOL is backed up every day between 05:15 and 07:15.
BACKUPSTG_TAPE2	TAPEPOOL2 is backed up every day between 05:15 and 07:15.
START_RECL_COPY	Reclamation processing for COPYPOOL starts every Tuesday between 08:00 and 09:00.
START_RECL_COPY2	Reclamation processing for COPYPOOL2 starts every Tuesday between 08:00 and 09:00.
MIGRATION_START	Migration of data from DISKPOOL to TAPEPOOL starts every day between 09:00 and 11:00.
MIGRATION_START2	Migration of data from DISKPOOL2 to TAPEPOOL starts every day between 09:00 and 11:00.
DBBACKUP_FULL	A full database backup starts every day between 13:00 and 15:00.
EXPIRE_INVENTORY	Processing expiration of client data begins on a Monday between 14:00 and 16:00 and is run at the same time every other day.
START_RECLAIM	Reclamation processing for TAPEPOOL starts on a Tuesday between 14:00 and 16:00 and is run at the same time every other day.
START_RECLAIM2	Reclamation processing for TAPEPOOL2 starts on a Tuesday between 14:00 and 16:00 and is run at the same time every other day.
DELETE_DBVOLHIST	Database volume history file is deleted every day between 17:00 and 19:00
DELETE_VOL_HIST	Volume history file is deleted every day between 17:00 and 19:00
MIGRATION_STOP	Migration of data from DISKPOOL to TAPEPOOL stops every day between 18:00 and 20:00.
MIGRATION_STOP2	Migration of data from DISKPOOL2 to TAPEPOOL2

	stops every day between 18:00 and 20:00.
STOP_RECLAIM	Reclamation processing for TAPEPOOL stops on a Tuesday between 18:00 and 20:00 and is run at the same time every other day.
STOP_RECLAIM2	Reclamation processing for TAPEPOOL2 stops on a Tuesday between 18:00 and 20:00 and is run at the same time every other day.
STOP_RECL_COPY	Reclamation processing for COPYPOOL stops every Tuesday between 18:00 and 20:00.
STOP_RECL_COPY2	Reclamation processing for COPYPOOL2 stops every Tuesday between 18:00 and 20:00.

Note:

There is an exception to this if you have an IBM 3466 model A00, without a tape library. All administrative command schedules that involve the tape library are defined but *not* activated. It is up to you to activate those administrative command schedules.

4.2.2 Backup/Archive Schedules

The ADSM server has eight backup schedules defined, as shown in Table 8 on page 114. You have to first register a node and then connect it to the proper schedule. This is described in Section 3.4.4, "Activating Client Schedules" on page 45. All predefined schedules are backup schedules and are connected to the STANDARD policy domain. With a second tape library, you also have another eight backup schedules, connected to the STANDARD2 policy domain:

DAILY	Monday through Friday between 18:00-06:00
WEEKLY	Weekly between 01:00 on Saturday and 13:00 on Sunday
MONTHLY	Monthly between 01:00 on Saturday and 13:00 on Sunday
MONDAY	Monday between 18:00 and 06:00
TUESDAY	Tuesday between 18:00 and 06:00
WEDNESDAY	Wednesday between 18:00 and 06:00
THURSDAY	Thursday between 18:00 and 06:00
FRIDAY	Friday between 18:00 and 06:00

4.3 Policies

The preconfigured system will get you going. You can use it to put in place typical, standard policies that will protect your environment. This section covers how to enhance and tailor the 3466 ADSM server to specific needs once you are comfortable with the basics.

Before you start adding nodes to your IBM 3466 ADSM server, we recommend that you make the necessary changes to either the STANDARD policy, already configured in ADSM, or create a new policy that better reflects your environment's needs. We also recommend, depending on your environment, naming conventions for your new policy domains, policy sets, and management classes. It is a good idea to include an abbreviation of the policy domain, policy set and management classes in your naming convention, so that you can keep track of what is used where. Here are some examples of naming conventions:

- For policy domain, you could use *xxxx*pd or pd*xxxx*

- For policy set, you could use *xxxx*ps or ps*xxxx*

- For management class, you could use *xxxx*mc or mc*xxxx*

Then, just replace the *xxxx* with the naming convention of your choice. It could reflect a department, or cover your file servers and workstations.

Figure 29 on page 63 gives an overview of the standard policies.

Note:

When you start tailoring your ADSM server, be sure to keep the STANDARD policy domain, policy set, and management class. You can change it, if you just have minor changes, or keep it, if you have major changes to make. However, do not delete it.
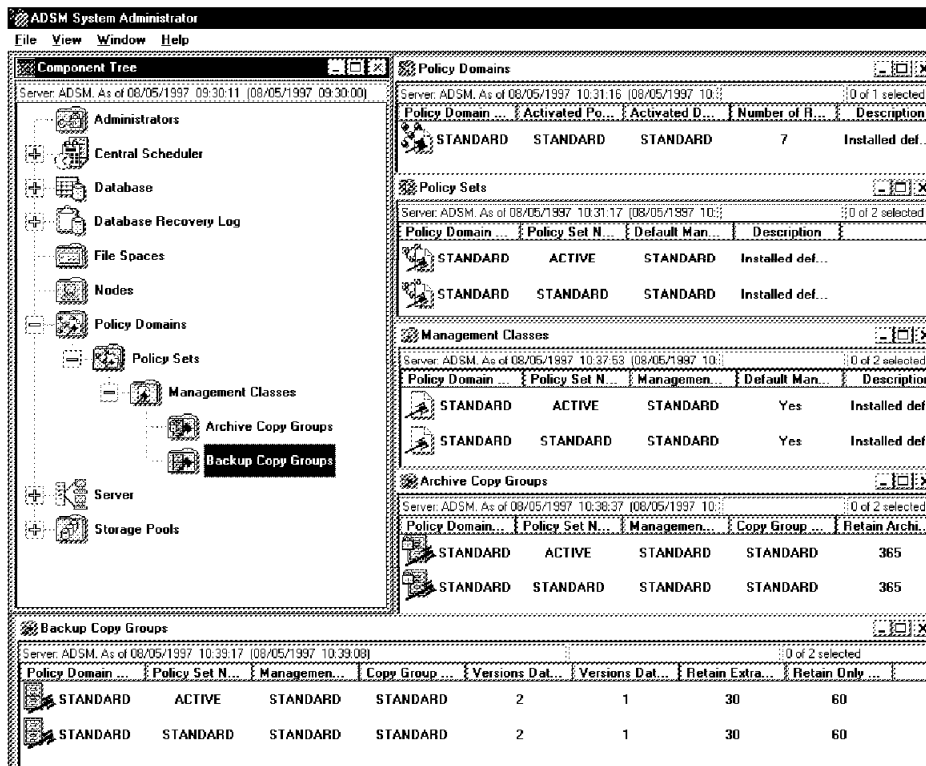
Figure 29. An Overview of STANDARD Policies

4.3.1 Create Your New Policy Domain

The easiest way to create the new policy domain is to use the administrative GUI client. See Figure 30 on page 64. From the **Component Tree** window, select **Policy Domain**. On the **ADSM System Administration** window, select **Edit** from the menu bar. From the **Edit** pull-down menu select **Add...** In the popup window **Policy Domain - Add**, fill in the new name of your policy domain and a description of what your new policy domain should cover. The backup and archive retention you can leave as they are. They tell ADSM what to do and how long to keep files that are no longer associated with any management class. If you have created a management class in your policy and backed up files associated with that class, and decide to delete the management class, archive retention tells ADSM what to do with the files. When everything is filled in properly, click on the **Add** button. Our policy domain name is ITSOSRVPD.
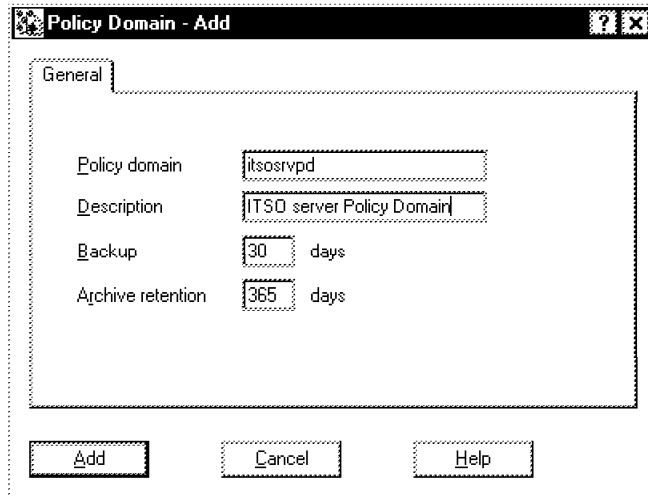
Figure 30. Creating Your Policy Domain

4.3.2 Create a New Policy Set

You can create the policy set in the same way you created the policy domain. See Figure 31 on page 65. From the **Component Tree** window, select **Policy Set**. On the **ADSM System Administration** window, select **Edit** from the menu bar. From the **Edit** pull-down menu, select **Add...** In the popup window **Policy Set - Add**, you have one pull-down menu, where you choose **ITSOSRVPD** and then fill in the new name of your policy set, together with a description what your new policy set covers. When everything is filled in properly, click on the **Add** button. Our policy set name is NSMSRVPS.
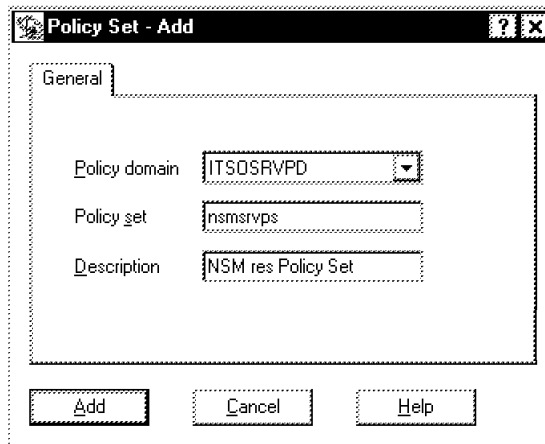
Figure 31. Creating Your Policy Set

4.3.3 Create a New Management Class

You can now create a new management class in the same way you created the policy domain and policy set. From the **Component Tree** window, select **Management Class**. On the **ADSM System Administration** window, select **Edit** from the menu bar. From the **Edit** pull-down menu select **Add...**. In the popup window **Management Class - Add**, you have two tabs to fill in. On the page of the first tab *(General)*, you have two pull-down menus, where you choose policy domain **ITSOSRVPD** and policy set **NSMSRVPS**. You then fill in the new name of your management class together with a description of what your new management class covers. Our management class name, SRV2MC, is intended to reflect that this management class should contain just two backup versions. See Figure 32 on page 66.
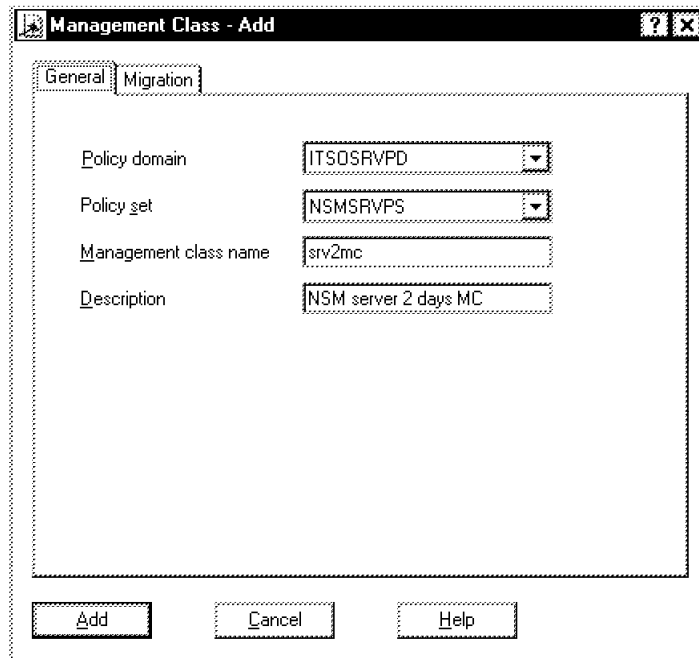
Figure 32. Creating a New Management Class

On the page of the second tab **(Migration)**, you have one pull-down menu for the storage pool destination for migrated files, where you choose **DISKPOOL**, just to assign a storage pool for space management. In this case, we have no space management allowed but we still have to fill in this field or the validation/activation will complain about the missing storage pool. When everything is filled in properly, click on the **Add** button. See Figure 33 on page 67.
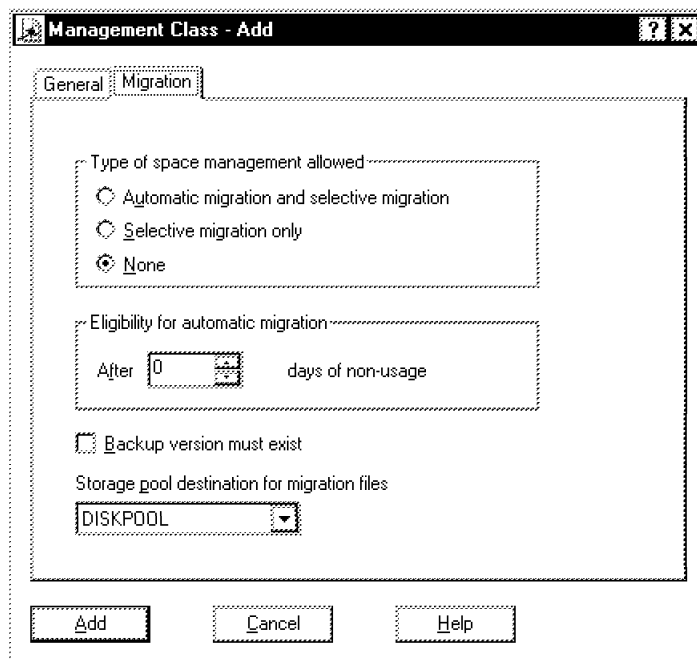
Figure 33. Creating Your Management Class

We have also created a second management class, SRV5MC, which is
intended to reflect that this management class should contain up to five
backup versions. See Figure 34 on page 68.
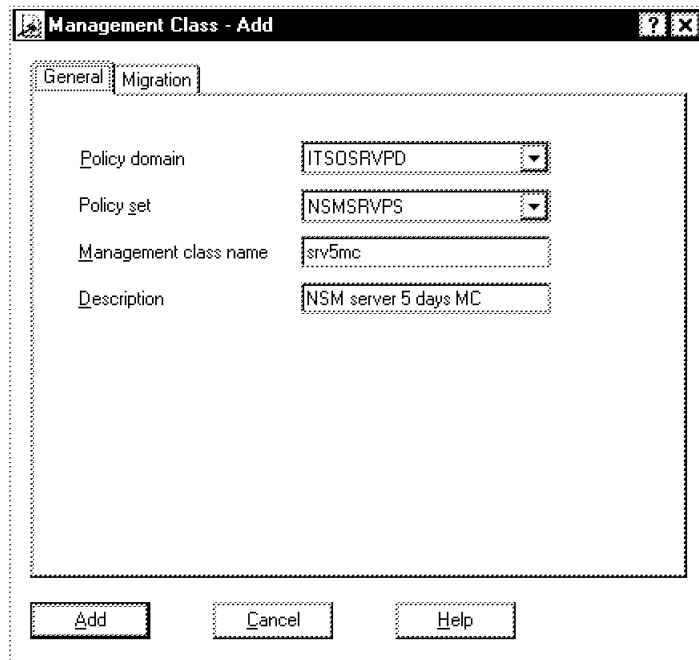
Figure 34. Creating Your Second Management Class

4.3.4 Create New Archive and Backup Copy Groups

Now we have to create an archive and backup copy groups, just to tell ADSM how to handle different files. We first create a archive copy group and a backup copy group and connect them to a management class, SRV2MC, that we assign as default for our new policy domain. We then create another backup copy group for files or directories that we want to keep more versions of. From the **Component Tree** window, select **Archive Copy Group**. On the **ADSM System Administration** window, select **Edit** from the menu bar. From the **File** pull-down menu select **Add..** . In the popup window **Archive Copy Group - Add**, fill in the required information on all three pages. On the page of the first tab, you have three pull-down menus, where you choose:

- Policy domain **ITSOSRVPD**
- Policy set **NSMSRVPS**
- Management class **SRV2MC**

See Figure 35 on page 69.
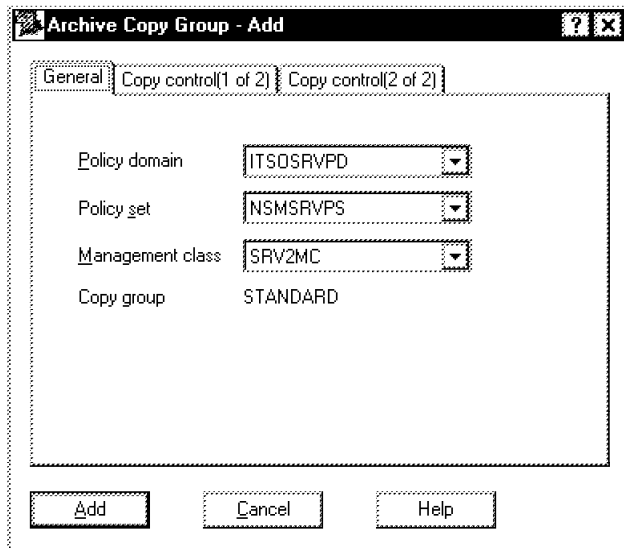
Figure 35. First Tab (General Page) on Archive Copy Group - Add Window

On the second tab (Copy Control 1 of 2) page, make sure Copy serialization is **Shared static** (Figure 36).
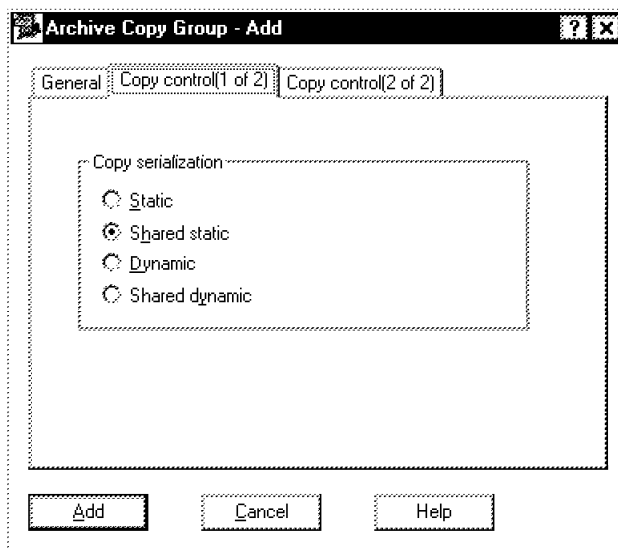
Figure 36. Second Tab (Copy Control Page 1) on Archive Copy Group - Add Window

On the third tab (Copy Control 2) in the Destination storage pool field and, on the pull-down menu, choose **DISKPOOL** (Figure 37 on page 70).
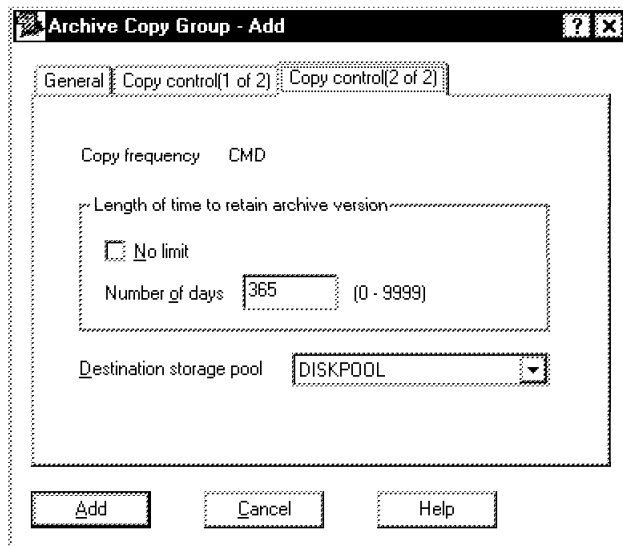
Figure 37. Third Tab (Copy Control Page 2) on Archive Copy Group - Add Window

4.3.5 Validation and Activation of Your Changes

Before you validate and activate all your changes, you must first assign a default management class to your new policy set by selecting **Management Class** from the **Component Tree** window. See Figure 29 on page 63. Highlight the **ITSOSRVPD NSMSRVPS SRV2MC** row. On the **ADSM System Administration** window, select **File** from the menu bar. From the **File** pull-down menu, select **Assign Default**. Now you are ready to proceed with validation and activation of your new policy set.
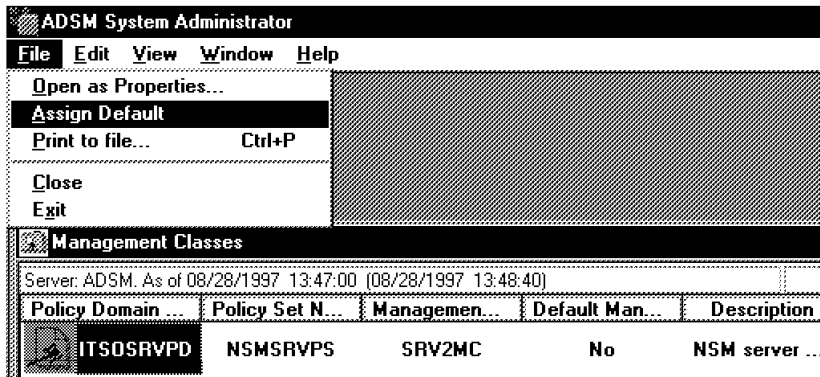
Figure 38. Assign Your Default Management Class

4.3.5.1 Validation

From the **Component Tree** window, select **Policy Set** and highlight the row
ITSOSRVPD NSMSRVPS SRV2MC (Figure 39). On the **ADSM System
Administration** window, select **File** from the menu bar. From the **File**
pull-down menu, select **Validate**. In the popup window **Policy Sets - Validate**,
click on **Validate** (Figure 40 on page 72).
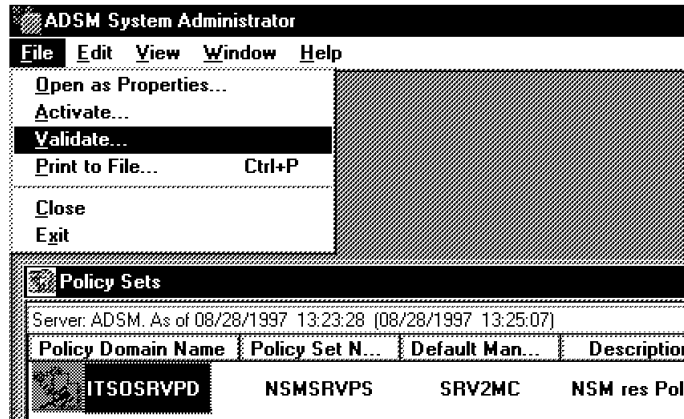
Figure 39. Validate Your Policy Set

```
┌─────────────────────────────────────────────────────────┐
│ Policy Sets - Validate                            ? X     │
├─────────────────────────────────────────────────────────┤
│  Send results to a client window and:                     │
│                                                           │
│  ☐ Print file                                             │
│                                                           │
│         File name    ┌──────────────────────────────┐    │
│                      └──────────────────────────────┘    │
│                  ☑ Append                                 │
│                                                           │
│   ┌─────────────┐    ┌─────────────┐   ┌─────────────┐   │
│   │  Validate   │    │   Cancel    │   │    Help     │   │
│   └─────────────┘    └─────────────┘   └─────────────┘   │
└─────────────────────────────────────────────────────────┘
```
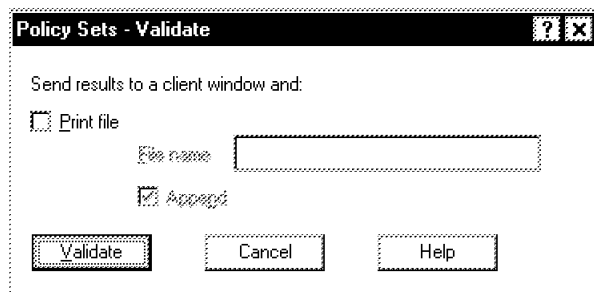
Figure 40. Policy Sets - Validate Window

When you click on **Validate**, you receive a response similar to the following:

```
ANR1515I Policy set NSMSRVPS validated in domain ITSOSRVPD (ready for
  activation).
```

Now your new policy set in your policy domain is ready for activation.

4.3.5.2 Activation
As you are ready to activate your new policy domain from the **Component
Tree** window, select **Policy Set** and highlight the row **ITSOSRVPD
NSMSRVPS SRV2MC**. On the **ADSM System Administration** window, select
File from the menu bar. From the **File** pull-down menu, select **Activate**. In
the popup window **Policy Sets - Activate**, click on **Activate**. Figure 39 on
page 71 shows **Activate** right above **Validate**. Selecting it brings a response
similar to the following:

```
ANR1514I Policy set NSMSRVPS activated in policy domain ITSOSRVPD.
```

Now your new policy set and policy domain are activated and ready for use.
You can start to assign client nodes immediately.

4.4 Device Classes

ADSM uses device classes to represent a device type, for which device and
storage volume type to use in the storing process. As a storage pool is only
connected to one device class, multiple storage pools can be dedicated to
one device class, if desired. The ADSM server has three device classes
(DISK, DLT, FILE) defined as follows:

```
adsm> q devclass

Device      Device       Storage   Device     Format   Est/Max
Class       Access       Pool      Type                Capacity
Name        Strategy     Count                         (MB)
---------   ----------   -------   ---------  ------   --------
DISK        Random          2
DLT         Sequential      3       DLT        DRIVE      0.0
FILE        Sequential      0       FILE                  4.0
```

We recommend you reduce the mount retention value from the default value
to prevent the ADSM server from very long waits if a lower priority job is
started. A job such as move data has a lower priority than migration, for
example. A scenario like the following can occur with the Mount Retention
(min) value at the original limit of of 60 minutes. The ADSM server is
performing a migration of data from storage pool DISKPOOL to TAPEPOOL
while the ADSM administrator has decided to perform a move data, within
the same tape pool, to replace a bad tape cartridge. With a mount retention
value of 60 minutes, the lower priority job move data must wait for one hour
before the migrated tape is dismounted and the move data can be
performed.

```
adsm> q devclass dlt format=detailed

            Device Class Name: DLT
      Device Access Strategy: Sequential
          Storage Pool Count: 3
                 Device Type: DLT
                      Format: DRIVE
      Est/Max Capacity (MB): 0.0
                 Mount Limit: 2
           Mount Wait (min): 60
      Mount Retention (min): 60
                Label Prefix: ADSM
                     Library: 7337LIB
                   Directory:
Last Update by (administrator): ADMIN
      Last Update Date/Time: 08/08/1997 13:58:41
```

Figure 41. Default Values for the DLT Format

We recommend that you use a mount retention value of 5 minutes for a DLT
device class or a mount retention value of 2 minutes for a Magstar MP

device class. The only way you can change the settings in a device class is
through the administrative command line client. Start up the administrative
command line client and type in the command **update devclass dlt
mountretention=2** at the adsm> command prompt as shown below:

```
adsm> update devclass dlt mountretention=5
ANR2205I Device class DLT updated.

adsm> q devclass dlt format=detailed

              Device Class Name: DLT
         Device Access Strategy: Sequential
             Storage Pool Count: 3
                    Device Type: DLT
                         Format: DRIVE
           Est/Max Capacity (MB): 0.0
                     Mount Limit: 2
               Mount Wait (min): 60
           Mount Retention (min): 5
                   Label Prefix: ADSM
                        Library: 7337LIB
                      Directory:
    Last Update by (administrator): ADMIN
           Last Update Date/Time: 08/21/1997 13:57:19
```

Figure 42. Reduced Retention Time for the DLT Format

4.5 Storage Pool

The ADSM server storage pool DISKPOOL is set up to redirect files larger
than 100 MB directly to TAPEPOOL. This is done to prevent the DISKPOOL
from being filled up to the high migration threshold level that will start a
migration during the night when your backups are running. Adding
migration can slow the backup process. You may consider changing this
value to fit your environment.

Chapter 5. Common Problems

Once installed, the IBM 3466 Network Storage Manager should run very well and have few if any problems. However, if a problem does come up, the customer or business partner should be prepared to go through some basic problem determination procedures, which are documented in the appendices of the *IBM 3466 Start Up Guide*, GA32-0386.

In this chapter, we discuss the typical problems that a customer might face with an IBM 3466, and give some practical advice on what should be checked.

5.1 common problems

One of the most common problems that many customers face is the loss of electrical power. We tested a few power loss scenarios to see what would happen. We do not recommend that you try any of these tests in a production environment.

5.1.1 Total Power Loss

We carried out two total power loss scenarios. The first involved shutting off all power to our IBM 3466 while the system was not actively engaged in any operations. The second test was done while the 3466 had two tape volumes mounted and was actively doing client backups and storage pool migrations.

In both cases, following power-on, the IBM 3466 came back up without any problems whatsoever. This confirms the robustness of both AIX and ADSM. The only indication on the system that there had been total power loss was seen in the ADSM activity log and the AIX error log.

In the ADSM activity log, which you can access from the administrative GUI client, administrative command line client, or Web administrative interface, we saw a list of entries that indicated the ADSM server was restarted (Figure 43 on page 76).

```
970818-165025 ANR0990I ADSM server restart-recovery in progress.
970818-165026 ANR0200I Recovery log assigned capacity is 1980 megabytes.
970818-165026 ANR0201I Database assigned capacity is 7424 megabytes.
970818-165026 ANR0306I Recovery log volume mount in progress.
970818-165104 ANR0353I Recovery log analysis pass in progress.
970818-165104 ANR0354I Recovery log redo pass in progress.
970818-165105 ANR0355I Recovery log undo pass in progress.
970818-165107 ANR0352I Transaction recovery complete.
970818-165108 ANR2100I Activity log process has started.
970818-165108 ANR2803I License manager started.
970818-165109 ANR8200I TCP/IP driver ready for connection with clients
                       on port 1500
970818-165109 ANR1305I Disk volume /bfaa1dk4/bf varied online.
970818-165109 ANR1305I Disk volume /bfaa1dk2/bf varied online.
970818-165109 ANR8285I Shared Memory driver ready for connection with
                       clients on port 1510
970818-165109 ANR1305I Disk volume /bfaa1dk5/bf varied online.
970818-165109 ANR0993I ADSM server initialization complete.
970818-165109 ANR1305I Disk volume /bfaa1dk3/bf varied online.
970818-165114 ANR2835I Server is licensed for 5001 clients.
970818-165114 ANR2843I Server is licensed to support UNIX clients.
970818-165114 ANR2844I Server is licensed to support desktop clients.
970818-165114 ANR2855I Server is licensed to support space-managed clients
970818-165114 ANR2860I Server is licensed to support disaster recovery
                       manager
970818-165114 ANR2854I Server is licensed for device support module 4.
970818-165244 ANR8439I SCSI library 7337LIB is ready for operations.
```

Figure 43. Log Entries Indicating Restart

The AIX error log can be viewed one page at a time by entering one of the
following commands from an AIX command prompt:

```
errpt | more (for a summary report)
errpt -a | more (for a detailed report)
```

The following entry was seen in the AIX error log as a result of our power
loss:

```
74533D1A  0818164897  U H SYSIOS    LOSS OF ELECTRICAL POWER
```

5.1.2 Power Loss to 7337 Library

We then tried a test where we powered off just the DLT library while one of the drives was loaded and running. This scenario did create a few problems that took us some time and effort to recover from.

The first thing that we saw on the ADSM client when trying to do a backup was the message "Server media mount not possible." We then checked the ADSM activity log on the 3466 and saw the series of messages shown in Figure 44

```
970818-171053 ANR1401W Mount request denied for volume A02077
                       - mount failed.
970818-171054 ANR1401W Mount request denied for volume A02077
                       - mount failed.
970818-171055 ANR1401W Mount request denied for volume A02077
                       - mount failed.
970818-171055 ANR0525W Transaction failed for session 8 for node
                       SODIUM (Win95) - storage media inaccessible
970818-172537 ANR8302E I/O error on drive MT1 (/dev/mt1) (OP=FLUSH,
                       CC=205, KEY=FF, ASC=FF, ASCQ=FF, Description=SCSI
                        adapter failure).  Refer to Appendix B in the
                       'Messages' manual for recommended action.
970818-172537 ANR1411W Access mode for volume A02086 now set to
                       "read-only" due to write error
970818-172537 ANR1181E astxn.c280: Data storage transaction 0:155415
                       was aborted.
970818-172537 ANR9999D dfmigr.c(1602): Error committing transaction.
970818-172537 ANR1032W Migration process 30 terminated for storage pool
                       DISKPOOL - internal server error detected
970818-172538 ANR8469E Dismount of DLT volume A02086 from drive MT1
                       (/dev/mt1) in library failed
```

Figure 44. Messages Resulting from Power Disruption to the DLT Library

You can see by the error messages that ADSM is not able to mount tape volume A02077. As for tape volume A02086, which was in use at the time, ADSM has changed its status to "read only" as the result of a write error. Also, a message shows that ADSM is unable to dismount volume A02086.

In the AIX error log, we received the following entries:

```
IDENTIFIER TIMESTAMP    T C RESOURCE_NAME  DESCRIPTION
4225DB66   088018172797 T H mt0            OPERATOR INTERVENTION REQUIRED
4225DB66   088018172797 T H lb0            OPERATOR INTERVENTION REQUIRED
```

Figure 45. Activity log

These entries point to problems with the first DLT drive (mt0), and the library itself (lb0). In the detailed error log report, one of the recommended actions is to check the power.

We then switched the power to the 7337 library back on. After a few minutes, the ADSM activity log showed the entries presented in Figure 46.

```
970818-172928 ANR1404W Scratch volume mount request denied-mount failed.
970818-172928 ANR8300E I/O error on library 7337LIB (OP=00006C03,
                       CC=315,KEY=05,ASC=3B,ASCQ=0D,Description=The
                       destination slot or drive was full in an
                       attempt to move a volume).  Refer to Appendix B
                       in the 'Messages' manual for recommended action.
970818-172928 ANR1404W Scratch volume mount request denied-mount failed.
970818-172928 ANR0525W Transaction failed for session 11 for node SODIUM
                       (Win95) - storage media inaccessible.
970818-172933 ANR8337I DLT volume A02077 mounted in drive MT0 (/dev/mt0).
```

Figure 46. Messages Following Power Resumption

What we see in Figure 46 is that a scratch volume mount attempt was made but failed, because the destination drive was full. We can assume that the destination drive was full because, as we saw in the the activity log of 4 minutes earlier (Figure 45), a dismount of volume A02086 from MT1 failed. We now have volume A02086 stuck in drive MT1 and ADSM unable to resolve the problem. The last message in Figure 46 indicates that volume A02077 was mounted successfully in drive MT0, which indicates that the library and one of the drives is operational.

To recover from this problem, we took the following steps:

1. Disable backup/archive client access to the 3466 by issuing the command **disable** from an ADSM administrative client.

2. Cancel currently connected backup/archive clients with the **cancel session** function of the ADSM administrative client. It is easiest to perform this from the administrative GUI client by double clicking on the

Sessions icon, and then using the pull-down menu under **Edit** to cancel
sessions.

3. Unlock the 7337 front panel.

4. Place the library in Diagnostic Maintenance mode from the front LED
panel.

5. Remove the 10 cartridge magazine to gain access to the drives.

6. Slide the autoloader arm to the left, to gain access to the drives.

7. Press the **Unload** button (that is the upper button on each of the DLT
drives) to rewind the tape that is stuck in the drive. Once the rewind is
complete, the green operator-handle light will be displayed.

8. Unload the tapes from the drives by pulling the cartridge insert/release
handle open. Remove the cartridge and then push the handle closed.

Note:

You can also remove the cartridge after it has been rewound by
using the 7337 control panel. However, you will need to know the
numbers of the magazine slots that are open.

---

9. Insert the tape back into the magazine slot. It is not important which
slot you place it in.

10. Replace the magazine in the library and close the door.

11. Place the 7337 back ONLINE using the control panel, and then lock the
door.

12. Run the command **audit libr 7337lib** from the administrative command
line client or the Web administrative interface. This causes ADSM to
load each of the tapes from the library in order to synchronize the
ADSM library volume inventory with the physical inventory.

13. Run the command **audit volume A02086** to check for any inconsistencies
between database information and the volume itself. In our case, the
volume checked out fine. If the command had returned an error
indication, we could have fixed the problem with the command **audit
volume A02086 fix=yes**. The audit volume function is also available
from the administrative GUI client by double clicking on **Storage Pool
Volumes** and then clicking once on the **A02086** tape volume icon. Select
the **audit** option from one of the pull-down menus.

14. Run the command **update vol A02086 access=readw** from administrative
command line client or Web administrative interface. This changes the
volume status back to read/write from read only. You can also do this
task from the administrative GUI client by double clicking on **Storage**

Pool Volumes and then double clicking on the **A02086** tape volume icon. From the menus presented, you can then change the access mode back to read/write.

15. Enable backup/archive client access to the 3466 by issuing the command **enable** from an ADSM administrative client.

> **Note**
>
> We did try to duplicate the 7337 power loss scenario again to validate our recovery procedures. However, the second time we tried it, after we manually unloaded the tapes, the only way we could recover was to halt ADSM and then reboot the RS/6000. Following this, we still performed the **audit libr**, **audit volume**, and **update vol** procedures outlined above. The lesson from this story is, try to use the gentle procedures first, and only if they fail, then go to the brute-force approach of shutting down and rebooting.

5.2 Client/Server Communication Problems

Communication problems between the ADSM clients and server can be caused by many things. There could be physical problems or logical problems. In order to identify the specific difficulty, you need to go through some diagnostic procedures.

In this section, we explain two scenarios we encountered, to give you some insight on the diagnostic procedures that you must follow in order to pinpoint difficulties.

5.2.1 System Crash

One day, we came into our lab, and tried to connect to the ADSM server. The backup/archive GUI client and backup/archive command line client either hung while trying to make the connection, or we received the ADSM message "TCP/IP communications failure, Error connecting to server." In order to diagnose why we were receiving this message, we took the following actions:

1. We checked TCP/IP communications to the ADSM server by typing `ping 3466servername`. Our ping test failed, indicating to us that we could not communicate with the 3466.

2. We checked communications with another client machine by typing `ping otherclientname`. This test succeeded, which told us that the physical network was okay, and that TCP/IP was running correctly on our ADSM clients.

3. We checked the status of the RS/6000 inside the 3466. We checked the server, saw that it was powered on, and noticed that the console was not active. Upon further investigation, we noticed code 4B20101 on the LED of the RS/6000. These codes are documented in *RS/6000 7026 H Series CPU Drawer Installation and Service Guide*, SA38-0538. This code basically means that the system crashed for any number of reasons. If this were to happen again, service should be called.

4. We repowered the RS/6000. This brought the system back up again, with AIX and ADSM both operational.

5.2.2 Network Connection Problem

One very common problem that users encounter is physical network connection problems. These problems can affect all users on a particular LAN segment or even on a single machine. As an example, we loosened the token ring cable on the 3466 so that client/server communication was lost. Our ADSM clients were immediately unable to connect to the server, or if they were already connected, they hung in the process that was currently active. To diagnose this problem, we took the following steps:

1. We checked TCP/IP communications to the ADSM server by typing `ping 3466servername` from the failing client machine. Our ping test failed, indicating to us that we could not communicate with the 3466.

2. We checked communications to another client machine by typing `ping otherclientname`. This test succeeded, which told us that the physical network was okay, and that TCP/IP was running correctly on our ADSM clients.

3. We checked the status of the RS/6000 inside 3466. We checked the server, saw that it was powered on, and the console was active.

4. We logged into the RS/6000 inside the 3466 and checked the ADSM and AIX logs. Nothing unusual was reported in the ADSM activity log, but the AIX error log showed the following:

```
 IDENTIFIER TIMESTAMP  T C RESOURCE_NAME  DESCRIPTION
 2A9F5252   0820132597 P H tok0           WIRE FAULT
```

5. We checked the token-ring cable connection and found our loose cable. Reconnecting the cable restored communications and the following entry appeared in the AIX error log:

```
 IDENTIFIER TIMESTAMP  T C RESOURCE_NAME  DESCRIPTION
 5BF9FD4D   0820134697 T H tok0           PROBLEM RESOLVED
```

5.3 Media Problems

Media problems can occur for a variety of reasons. In this section, we give a couple of real-world examples of problems which can occur.

5.3.1 Media Write Error

In our first scenario, we wanted to see what happened if ADSM was unable to write to a particular tape cartridge. To find out, we took one of our cartridges from TAPEPOOL out of the library, made it write-protected, and then placed it back. The procedures that we used to diagnose and correct the problem are applicable to most media write-error problems.

The first indication of a problem came from the backup/archive when trying to back up to a tape. The error that we received was "Server detected system error." To diagnose the problem, we took the following steps:

  1. We checked the ADSM activity log. Figure 47 shows the message we saw:

```
970821-100151 ANR8337I DLT volume A02077 mounted in drive MT1 (/dev/mt1).
970821-100207 ANR8302E I/O error on drive MT1 (/dev/mt1) (OP=WRITE,
              CC=407, KEY=07, ASC=27,ASCQ=82, Description=Write protect).
              Refer to Appendix B in the 'Messages' manual for
              recommended action.
970821-100207 ANR8463E DLT volume A02077 is write protected.
970821-100207 ANR1411W Access mode for volume A02077 now set to
              "read-only" due to write error.
970821-100207 ANR1181E astxn.c280: Data storage transaction 0:219864
              was aborted.
970821-100207 ANR0532W smnode.c841: Transaction 0:219864 was aborted
              for session 17 for node SODIUM (Win95) .
970821-100243 ANR8468I DLT volume A02077 dismounted from drive MT1
              (/dev/mt1) in library 7337LIB.
```

Figure 47. ADSM Activity Log Portion Identifying Problem

As is seen in the messages, ADSM reported an I/O error and was able to identify the problem as being due to write-protected media. As a result, the media is marked "read-only," and dismounted from the drive.

  2. We disabled backup/archive client access to the 3466 by issuing the command **disable** from an ADSM administrative client.

  3. We canceled connected backup/archive clients with the **cancel session** function of the ADSM administrative client. It is easiest to perform this

from the administrative GUI client by double clicking on the **Sessions** icon, and then using the pull-down menu under **Edit** to cancel sessions.

4. We removed the problem cartridge from the library and write-enabled it (by moving the write-protect switch on the cartridge), and then placed it back in the same slot. (To identify the correct cartridge, look at the volume number written on the bar code sticker.)

5. We ran the command **update vol A02077 access=readw** from the administrative command line client (or you could use the Web administrative interface). This changes the volume status back to read/write from read/only. You can also do this task via the administrative GUI client by double clicking on **Storage Pool Volumes** and then double clicking on the **A02077** tape volume icon. From the menus presented, you can then change the access mode back to read/write.

6. We enabled backup/archive client access to the 3466 by issuing the command **enable** from an ADSM administrative client.

For other types of write errors, audit the problem volume before changing its status back to read/write. You can do this from the administrative command line client by issuing the command:

```
audit volume volname (volname is the name of the tape volume)
```

If after the audit procedure, you feel that your tape is unusable, you can attempt to salvage the readable files by moving them to another volume in the same storage pool. This can be done with the **move data** command. For more information on this procedure and on auditing storage volumes, see *Adstar Distributed Storage Manager for AIX Administrator′s Guide*, SH35-0134, and particularly the chapter on managing storage pools.

5.3.2 Media Location Error

Another problem that can occur is the accidental reordering of cartridges within the library, usually caused by operator handling. This problem could show up in a number of ways. If your ADSM clients back up to DISKPOOL, they might not see the problem. However, when a migration to TAPEPOOL is started, errors will begin showing up in the ADSM activity log.

In our lab, to test out the media location problem, we opened up the 7337 library and reordered several of the tapes. We then tried to run a couple of backup sessions, one from a client that backed up directly to TAPEPOOL, and another that backed up to DISKPOOL.

With the client that backed up directly to TAPEPOOL, we received the error message "ANS7368S Server out of data storage space." On the client that backed up to DISKPOOL, no error was identified, since the process of moving files to DISKPOOL was not affected. However, once a migration from DISKPOOL to TAPEPOOL had begun, errors showed up in the ADSM activity log on the server. Figure 48 shows the relevant activity log output:

```
970822-090001 ANR1000I Migration process 1 started for storage pool
                       DISKPOOL.
970822-090127 ANR8356E Incorrect volume A02079 was mounted instead
                       of volume A02085 in library 7337LIB.
970822-090159 ANR1402W Mount request denied for volume A02085 -
                       volume unavailable.
970822-090159 ANR1410W Access mode for volume A02085 now set to
                       "unavailable".
970822-090159 ANR1025W Migration process 1 terminated for storage pool
                       DISKPOOL - insufficient space in subordinate
                       storage pool.
970822-090159 ANR1002I Migration for storage pool DISKPOOL will be
                       retried in 60 seconds.
970822-090259 ANR1003I Migration retry delay ended; checking migration
                       status for storage pool DISKPOOL.
970822-090259 ANR1000I Migration process 2 started for storage pool
                       DISKPOOL.
970822-090352 ANR8356E Incorrect volume A02081 was mounted instead of
                       volume A02086 in library 7337LIB.
970822-090424 ANR1402W Mount request denied for volume A02086 - volume
                       unavailable.
970822-090424 ANR1410W Access mode for volume A02086 now set to
                       "unavailable".
970822-090602 ANR8337I DLT volume A02078 mounted in drive MT1 (/dev/mt1).
970822-090602 ANR1340I Scratch volume A02078 is now defined in
                       storage pool TAPEPOOL.
```

Figure 48. ADSM Activity Log Entries Showing Migration Problem

What we see in the activity log is a migration process that fails and is retried until an available volume is found. On the first attempt, volume A02079 is mounted instead of A02085. Then A02081 is mounted instead of A02086. Both A02085 and A02086 become marked as "unavailable." Finally, ADSM finds volume A02078, which is a scratch volume, adds it to TAPEPOOL, and then the migration process proceeds.

To recover from this problem, we took the following steps:

1. We disabled backup/archive client access to the 3466 by issuing the command **disable** from an ADSM administrative client.

2. We canceled the currently connected backup/archive clients with the **cancel session** function of the ADSM administrative client. It is easiest to perform this from the administrative GUI client by double clicking on the **Sessions** icon, and then using the pull-down menu under **Edit** to cancel sessions.

3. We ran the command **audit libr 7337lib** from the administrative command line client (or you could use the Web administrative interface). This caused ADSM to load each of the tapes from the library in order to synchronize the ADSM library volume inventory with the physical inventory.

4. We ran the command **update vol A02085 access=readw** and then **update vol A02086 access=readw** from the administrative command line client (or you could use the Web administrative interface). This changed the volume status from ″unavailable″ back to ″read/write.″ (You could also do this task from the administrative GUI client by double clicking on **Storage Pool Volumes** and then double clicking on the **A02085** and **A02086** volume icons. From the menus presented, you can then change the access mode back to read/write.)

5. We enabled backup/archive client access to the 3466 by issuing the command **enable** from an ADSM administrative client.

5.4 Disk Problems

Although disk drive problems are not as common as they once were, they still exist, so it is important to understand how a disk failure affects the IBM 3466. In this section, we discuss the loss of an operating system disk and an ADSM disk.

5.4.1 Loss of AIX Disk

The RS/6000 contains a pair of mirrored SCSI disks that hold AIX and ADSM. If there is a failure of either of these disks, the 3466 should continue to run. We tested this assumption twice by pulling out hdisk1 while the system was running. Once after we pulled the disk, the only indication we had that something had happened was the following entries in the AIX error log:

```
IDENTIFIER TIMESTAMP  T C RESOURCE    DESCRIPTION
B188909A   0826163997 U S LVDD        PHYSICAL PARTITION MARKED STALE
B188909A   0826163997 U S LVDD        PHYSICAL PARTITION MARKED STALE
CBE1D1A5   0826163997 U H LVDD        PHYSICAL VOLUME DECLARED MISSING
1A9465A3   0826163997 U H LVDD        MIRROR WRITE CACHE WRITE FAILED
35BFC499   0826163997 P H hdisk1      DISK OPERATION ERROR
35BFC499   0826163997 P H hdisk1      DISK OPERATION ERROR
```

The second time that we pulled the disk, we were in the middle of doing an AIX find command, and pulling the disk hung the system. We then had to do a reboot to bring the system back up. In both cases, we had ADSM client backups taking place.

In a real world situation, if an operating system disk fails, it will be replaced with a new disk drive. ***The procedure for removing and replacing the failed disk both logically and physically is the responsibility of the IBM CE***. The full procedure to accomplish this is found in *IBM 3466 Model A00/A01 Network Storage Manager Maintenance Information*, under part number 05H9625.

5.4.2 Loss of ADSM Resource Disk

All of the ADSM resources are located on SSA disks. If one of these disks should fail, then there should be error messages in both the AIX and ADSM logs. We tried to simulate a disk failure by pulling out hdisk2 which contains a database file, a recovery log file, and a DISKPOOL file. After we pulled the disk, ADSM continued to run but we saw the entries in the ADSM activity log shown in Figure 49 on page 87

```
08/26/97 09:34:12  ANR9999D blkdisk.c(1232): Error reading from disk
                   /dbaa1dk2/db.
08/26/97 09:34:13  ANR0246E Error reading logical page 3655 (physical
                   page 3911) from database volume /dbaa1dk2/db.
08/26/97 09:34:13  ANR0247I Database page 3655 successfully read from an
                   alternate copy on volume /dbaa1dk5/db.
08/26/97 09:34:13  ANR9999D blkdisk.c(1232): Error reading from disk
                   /dbaa1dk2/db.
08/26/97 09:34:13  ANR0246E Error reading logical page 10369 (physical
                   page 10625) from database volume /dbaa1dk2/db.
08/26/97 09:34:13  ANR0247I Database page 10369 successfully read from an
                   alternate copy on volume /dbaa1dk5/db.
08/26/97 09:34:13  ANR9999D blkdisk.c(1232): Error reading from disk
                   /dbaa1dk2/db.
08/26/97 09:34:13  ANR0246E Error reading logical page 10396 (physical
                   page 10652) from database volume /dbaa1dk2/db.
08/26/97 09:34:13  ANR0247I Database page 10396 successfully read from an
                   alternate copy on volume /dbaa1dk5/db.
08/26/97 09:34:15  ANR0202W Database volume /dbaa1dk2/db varied offline
                   due to excessive read errors.
08/26/97 09:35:30  ANR9999D blkdisk.c(1232): Error reading from disk
                   /lgaa1dk2/lg.
08/26/97 09:35:31  ANR0249E Error reading logical page 63 (physical page
                   319)from recovery log volume /lgaa1dk2/lg.
08/26/97 09:35:31  ANR0250I Recovery log page 63 successfully read from
                   an alternate copy on volume /lgaa1dk5/lg.
```

Figure 49. ADSM Activity Log Entries Relevant to Disk Removal

What we see in the ADSM log is several read errors for the database
volume /dbaa1dk5/db, followed by the volume being taken offline. Then
read errors on the recovery log volume /lgaa1dk2/lg show up. Only one
read error was reported on this volume so ADSM did not take it offline yet.
Finally, DISKPOOL volume /bfaa1dk2/bf also became inaccessible, although
messages did not show up in the activity log, ADSM changed this volume's
status to read-only.

The AIX error log showed the following errors:

```
IDENTIFIER TIMESTAMP  T C RESOURCE DESCRIPTION
0C1EC9FA   0826093197 U H LVDD    FAILED TO WRITE VOLUME GROUP STATUS AREA
B188909A   0826093197 U S LVDD    PHYSICAL PARTITION MARKED STALE
625E6B9A   0826093097 P H ssa0    ADAPTER DETECTED OPEN SERIAL LINK
ABECECFD   0826093097 T H ssa0    LINK ERROR
```

In a real world situation, if a disk fails, it will be replaced with a new disk drive. ***The procedure for removing and replacing the failed disk both logically and physically is the responsibility of the IBM CE***. The full procedure to accomplish this is found in *IBM 3466 Model A00/A01 Network Storage Manager Maintenance Information*, under part number 05H9625.

The only thing that a customer would normally have to do following the IBM CE procedure is first run the command **restore volume volname copystgpool=copypool** (volname is the name of the DISKPOOL volume that was on the failed disk) in order to try to restore backed up DISKPOOL files from the COPYPOOL. The customer then needs to run the command **delete volume volname discard=yes** against the same DISKPOOL volume to delete the destroyed volume and the files within it.

In our lab, we resolved the problem ourselves. Generally, a customer would not have to go through the steps that we took. However, there could be a soft disk failure from which a customer could recover taking steps similar to these:

1. Place hdisk2 back into its slot.

2. Disable backup/archive client access to the 3466 by issuing the command **disable** from an ADSM administrative client.

3. Cancel currently connected backup/archive clients with the **cancel session** function of the ADSM administrative client. It is easiest to perform this from the administrative GUI client by double clicking on the **Sessions** icon, and then using the pull-down menu under **Edit** to cancel sessions.

4. Log into the RS/6000 as root and run **endadsm**.

5. Unmount all ADSM file systems by running **umount all**.

6. Vary the ADSM volume group offline by running **varyoffvg adsmvg**.

7. Repair damaged file systems on hdisk2 by running **fsck -p /dbaa1dk2**, **fsck -p /lbaa1dk2**, and **fsck -p /bfaa1dk2**.

8. Vary the ADSM volume group online by running **varyonvg adsmvg**.

9. Remount the ADSM file systems by running **mount all**.

10. Restart ADSM by running **startadsm**.

11. Vary the database volume /dbaa1dk5/db online from an administrative GUI client, an administrative command line client, or a Web administrative interface.

12. Change the access mode of DISKPOOL volume /bfaa1dk2/bf to read/write from read only. This can be done from an administrative GUI

client, an administrative command line client, or a Web administrative interface.

13. Enable backup/archive client access to the 3466 by issuing the command **enable** from an ADSM administrative client.

Chapter 6. Care and Feeding of the IBM 3466 Network Storage Manager

The start-up guide and the maintenance information books, *3466 Start-Up Guide*, GA32-0386, and *IBM 3466 Model A00/A01 Network Storage Manager Maintenance Information*, part number 05H9625, contain extensive procedures about taking care of the 3466.

When the 3466 is installed, the software is autostarted. On rare occasions, you may have to stop and restart the 3466 server — for example, before service is to be performed or if the system hangs.

You may also need to occasionally use AIX commands to work with the 3466. Appendix B of the *IBM 3466 Model A00/A01 Network Storage Manager Maintenance Information* contains a list of the commonly used AIX commands, aliases, and ADSM commands to be used on the 3466.

Most ADSM server procedures have been taken care of with administrative schedules. However, some tasks must be performed manually (see 6.3, "Manual Procedures" on page 92)

6.1 Automated Administration Procedures

The automatic ADSM administrative scheduled procedures include these:

- Starting and stopping disk storage pool migrations

- Starting the expire inventory process

- Performing the storage pool backups (disk storage pool and tape storage pool)

- Performing the database backup

- Recycling the tapes used for the backups (volume history file maintenance)

- Reclaiming storage pool and copy pool tapes

For a detailed description of the schedules for these procedures, see 4.2.1, "Administrative Command Schedules" on page 59.

6.2 AIX File Cleanup

There are some files on the system that will grow continuously and need to be cleared occasionally or else they will take up more of the system storage resource than is necessary. An AIX cron job for the system administrator

(root) has been set up to run at noon every day. The skulker (3466skulker script) will do the following:

- Remove files from the mail queue and from /tmp temporary directory that are more than 5 days old.

- Remove all *.bak, *.out, core, proof, gally, and ed.hup files that are more than 5 days old.

- Archive and clear the following files daily:

    - /var/adm/wtmp (connect time accounting records)
    - /etc/security/failedlogin (unsuccessful logins)
    - /var/adm/sulog (log of su command history)

- Archive the following files:

    - smit.log (SMIT log)
    - dsmserv.err (ADSM Server error log)
    - dsmerror.log (ADSM Client error log)

    The archived files are moved to the /tmp directory, from which they are removed after 5 days.

See Appendix B.6, "AIX Housekeeping Schedules" on page 117 for the exact contents of 3466skulker.

You can modify the script or add your own cron job. If you do modify the supplied script, however, you should keep a copy of it in a separate directory to keep it maintained and supported.

See your *AIX Version 4 Commands Reference*, SBOF-1851, for more information about working with cron jobs.

6.3 Manual Procedures

The manual procedures that you perform are presented in the start-up guide. Procedures performed by the IBM CE or other service personnel are described in the maintenance information.

The manual procedures include:

- Starting and stopping the system

- Determining the engineering change level of the software

- Creating system backup tapes and restoring from backup tapes

- Querying server processes, monitoring sessions, and monitoring resource usage

- Pruning logs

- Cleaning the tape heads of the tape drives for the Model A01 DLT Configuration

In the following sections, we discuss the manual care and feeding of your server.

6.4 Starting and Stopping the System

On rare occasions, you may have to stop and restart the 3466 server (for example, before service is to be performed or if the system hangs.)

To avoid severely affecting administrative and client node activity, you should stop ADSM only after current sessions have completed or have been cancelled. It is also advisable to make sure that any processes are completed or cancelled.

6.4.1 Stopping ADSM

To stop ADSM, take one of the following actions:

- If using the Administrative command line interface or server console, issue the command

      halt

- If you are using *telnet* or you are at an AIX prompt on the server logged in as root, then use the endadsm script.

- If you are using the Administrative GUI, then

    1. Double click on **Server**
    2. Click on **Server** from the menu bar
    3. Click on **Halt** from the pull-down menu

This shuts down the server immediately and cancels all client sessions, even if activity has not completed.

6.4.2 Stopping NSM

To stop the 3466, do the following:

1. Enter the command:

   shutdown -F

2. Toggle the ON/OFF power button on the RS/6000 to the **OFF** position.

This does not shut down the tape library.

6.4.3 Restarting NSM

To restart the 3466

- Toggle the ON/OFF power button on the RS/6000 to the **ON** position.

If ADSM is autostarted, then it should restart automatically.

If ADSM is not autostarted in inittab, or if it must be started manually for any other reason, then issue the startadsm command at the AIX prompt of root.

6.5 Check the EC Level of the Software

You can determine the EC level of the 3466 software package by performing the following through a *telnet* session or from the attached AIX console:

1. Start an AIX session:

   login root

   Enter the password when prompted to do so.

2. Enter:

   lsSSlevel

This will list the applied ECs.

6.6 Taking Care of Maintenance

All maintenance on the IBM 3466 Model A00/A01 will be the result of a call to IBM for service. Calls for service are the end result of either a direct call from you to IBM service, or a call generated on your behalf by ADSM Software support. Part of the information necessary to complete the call includes the serial number of the 3466 machine and the EC level.

6.6.1 IBM 3466 Model A00/A01 Machine Serial Number

For machine type 3466, the serial number has seven digits, for example, 13 00018. A metal plate in the lower right corner of the back door gives the machine type and serial number.

6.6.2 Determining the EC Level

6.5, "Check the EC Level of the Software" shows you how to get the EC level information you need for the problem call.

6.6.3 Contacting IBM Service

The number to call when you cannot resolve a software problem is **1 800-237-5511**, voice response unit (VRU) option 3, for IBM Software Service. The number to call if you cannot resolve a hardware problem is **1 800-IBM-SERV**, for U.S. IBM Hardware Service.

A very handy pamphlet to have for the telephone numbers of support services in the U.S. and other countries is in *IBM Software Support Handbook*, G326-9002. It is also available to you on the World Wide Web at: `http://ps.software.ibm.com` or from your IBM representative who can obtain the document as ISFHNDBK TERS3820 on ISFDOCS (ISFDOCS is a tool on MKTTOOLS). This document carries the IBM security classification "Unclassified."

6.7 System Backup and Restore

Two mksysb backup tape cartridges come with the IBM 3466. The tape labeled MKSYS1 contains a bootable copy of the operating system and other software shipped with the 3466. MKSYS2 is blank. The IBM CE creates a new backup copy on MKSYS2 after the 3466 installation and customization.

If you need to make a backup tape in addition to the backup tapes maintained by your IBM CE, then use mksysb to create the backup.

The procedure is documented in the *3466 Start Up Guide*, GA32-0386, in Appendix E, ″IBM 3466 Problem Diagnosis.″ Here is a summary of the tasks involved:

- Backup

    1. Halt ADSM if it is running, using either the ADSM `halt` command or the endadsm script at the AIX command prompt.

    2. Export the ADSMvg volume goup with the script `prebackup`.

    3. Mount the backup tape manually (requires the tape magazine to be removed) in the first drive in the bottom library (**rmt0**).

    4. Enter the command: `mksysb /dev/rmt0` and press Enter to start the backup, which will take about one hour to complete. It is finished when `OK` appears at the top of the screen.

        Press PF3 to return to the command line.

    5. Press the unload button on the tape drive, and when the green light turns on, remove the tape.

    6. Replace the cassette magazine and close the library.

7. Bring the ADSMvg online with the postbackup script.

8. Restart ADSM with the startadsm script.

• Restore

1. Halt ADSM if it is running, using either the ADSM halt command or the endadsm script at the AIX prompt.

2. Export the ADSMvg volume group with the script prebackup.

3. Shut down the RS/6000.

4. Toggle the RS/6000 ON/OFF Power Switch to the **ON** position.

5. Press PF1 when the display unit power light turns from amber to green.

6. Select the **boot** icon.

7. Move the cursor to the lowest SCSI tape address.

8. Mount the restore tape manually (requires the tape magazine to be removed) in the first drive in the bottom library.

9. Follow the instructions on the subsequent AIX screens to restore your system.

   The restore operation can take up to 1.5 hours to complete.

10. After the restore operation is completed, the RS/6000 will reboot itself from the hard disk.

11. Restore the ADSMvg with the postbackup script.

12. Press the unload button on the tape drive and when the green light turns on, remove the tape.

13. Replace the cassette magazine and close the library.

14. Redefine the library with the def7337 script (or the def3575 script if this is with the 3575 library).

15. Restart ADSM with the startadsm script.

6.8 Monitoring the Server

Various commands and modes of operation using the administrative command-line client let you monitor the server as well as control it. Here are some ways to monitor your server.

6.8.1 Console Mode

As the server is running in the background on the 3466, you do not see the server console output. The way to monitor server activities as they occur is by using the console mode of the administrative client.

To start the administrative client in console mode, enter:

```
dsmadmc -console
```

Enter the administrative user ID and password at the prompt.

Note: you will be unable to enter commands from this session in this mode. You may start another session using the same user ID and password for command entry.

Refer to the "Using ADSTAR Distributed Storage Manager Interfaces" in the *ADSM Administrator's Guide*, SH35-0134, for additional modes of operation.

6.8.2 Monitoring Root User Mail

You should regularly peruse, action, and discard mail that gets sent to the root user. If users try to register themselves though the Web interface, a note will be sent to root. Also, SSA failures could send a note to root, and indications of cron job successes or failures need to be monitored.

6.8.3 Monitoring the AIX Error Report

To minimize 3466 down time, you should check the error log daily looking for hardware failures. The startup guide covers the *smit* method of getting the error report. It can also be obtained by using the command:

```
errpt | more
```

to obtain all the error log records. You can also redirect the output to a file for report purposes. Review the results for indication of hardware failure and contact hardware service if necessary.

6.8.4 Monitoring ADSM

ADSM administrative query functions can be used to monitor the resources of the server. The more important functions that can be invoked by the administrative GUI client and administrative command line client are discussed in this subsection.

Note: The Web browser interface can also be used to monitor the server, as all of these functions are also available on the StorageSmart Home Page of the IBM 3466 server.

6.8.4.1 Monitor the Database

Query the database to monitor the utilization and what is known as the *cache hit percentage*. As the utilization of the database increases, additional space may be needed for the database. The cache hit percentage is a value that reflects the performance health of the server. If it goes lower than 95%, then the server may perform poorly. The cache hit percentage is affected by the server BUFPOOLSIZE option in dsmserv.opt. By increasing the size, you can get better performance.

The recommended command to monitor the database is **query db format=detail**.

You can also monitor the database by double-clicking on the **Database** icon on the ADSM Administrator GUI and paging through the properties.

6.8.4.2 Monitor the Recovery Log

You can use the **query log** administrator command to monitor the utilization of the recovery log.

6.8.4.3 Monitor the Database Volumes

The query dbvol command can be useful to check on the status of the database volumes. If the volumes are not synchronized, that may indicate a hardware problem and you should have it checked. After the problem is resolved, the volumes are resynchronized by using the **copy dbvol** command.

6.8.4.4 Monitor the Recovery Log Volumes

The query logvol command can be useful to check on the status of the recovery log volumes. Again, if the volumes are not synchronized, that may indicate a hardware problem and you should have it checked. After the problem is resolved, the volumes are resynchronized by using the **copy logvol** command.

6.8.4.5 Monitor the Storage Pool Volumes

The storage pools and the storage pool volumes can be monitored with the commands **query stgpool** and **query volume**, which you use to check on the space utilization of your disk and tape storage pools.

6.8.4.6 Monitor the Activity Log

The command **query actlog** can be very useful in problem determination and watching the activity of the ADSM server. Client sessions and server processes are logged in the activity log as well as mount activity on the tape libraries.

6.8.4.7 Monitor the Results of Scheduled Operarations

Monitor scheduled administrative and client operations to make sure that
the schedules are running successfully. The command **query event** is used
to determine completed schedules as well as those that did not complete
successfully. If schedules did not complete, then you may need to tell the
user to run the operation manually or create a special schedule for the
operation. Some possible reasons for an operation not completing include
these:

- The client machine was not powered on.

- The client schedule (**dsmc sched** command) was not running at the
  scheduled time.

- A network outage had occurred.

6.8.4.8 Monitor Connected Sessions

Use the command **query session** or, from the administrator GUI, you can

1. Expand the **Server**

2. Double click on the **Sessions** icon

to obtain information about client sessions currently connected to the
server.

6.8.4.9 Monitor Server Processes

Use the command **query process** or, from the administrator GUI, you can:

1. Expand the **Server**

2. Double click on the **Processes** icon

to obtain a description and status about active processes on the server.

6.9 Performance Tuning

Here are some macros and scripts that can be useful in running and
monitoring your IBM 3466.

6.9.1 Script for Query Activity Log Output to ActivityLog.Out

The function of the ActLogOut script is to append the output of the ADSM
Query Activity Log to an output file named ActivityLog.Out. The user must
provide administrative user ID and password, and the server must be active.
See Figure 50 on page 100.

```
#!/bin/ksh
#
# Query Activity Log and append to ActivityLog.Out file
#
admin="admin"
pass="admin"
svname="ss-m"

dsmservCount=ps -elf | grep dsmserv | wc -l
if [ "$dsmservCount" -eq "2" ]
then
   echo "What is the ADSM administrative id?"
   read admin
   echo "What is the password?"
   read pass
   dsmadmc -id=$admin -pass=$pass -se=$svname 'query act >> ActivityLog.Out'
else
   echo "ADSM server is not running."
fi
```

Figure 50. Example of ActLogOut Script

6.10 Setting Up a Schedule for Care and Feeding

Care includes pruning logs and cleaning tape drive heads.

6.10.1 Pruning Logs

Here we discuss monitoring and clearing of the error log. A similar procedure can be used to prune other logs that tend to fill up.

The error log can be cleared or pruned by either using the **errclr** AIX command, or by using the **smit** "Clear the Error Log " function under the **Problem Determination** panel.

The default is to clear the error log entries that are older than 30 days. After reviewing or resolving the entries, you can change the default to a shorter time. For example, the command **errclear 1** will clear the error log, leaving only the last day's entries.

6.10.2 Cleaning the Heads

The tape drives of the different libraries need to be cleaned on a regular basis. Some libraries, such as the IBM Magstar MP 3575 Tape Library Dataserver, have automatic drive cleaning, but others such as the IBM DLT drives still need to have their heads cleaned manually. The IBM 7337 DLT Library assists somewhat, so you need not bring in cleaning fluid and cotton swabs.

If you have the Model A00, refer to the documentation that comes with the library and drives for cleaning recommendations for the specific tape models.

6.10.2.1 Model A01 Magstar Cleaning

The 3466 Model A01 Magstar MP Configuration and the 3466 Models B01, B02, and B03 tape head cleaning process is performed automatically when the drive is free. Cleaning can also be initiated from the operator panel at any time.

6.10.2.2 Model A01 DLT Cleaning

The Model A01 DLT Configuration tape library operates in the following way. When the heads in a DLT drive need to be cleaned, the 7337 Tape Library shows a message to that effect on the operator panel and also informs the host computer over the SCSI connection. No message is evident at the host that the heads need to be cleaned, so the condition at the tape library must be monitored to see the message.

A DLT cleaning cartridge is supplied to clean the tape heads. It can be moved by way of the library from a cell to the drive that needs to be cleaned, or you can manually load the cleaning cartridge in the drives. A yellow "Use Cleaning Tape" light on the drive also comes on when the drive head needs cleaning. When cleaning completes, the "Use Cleaning Tape" light turns off and the beeper sounds for you to remove the cleaning cartridge. The cleaning cartridge expires after approximately 20 uses.

For additional details, see the section "Cleaning the Heads" in the *IBM 7337 Digital Linear Tape Library Setup and Operator Guide*, part number 59H3577.

Appendix A. Our Environment

In this appendix, we provide additional detailed information about the hardware and software environment that we used.

A.1 Environment Components

Our laboratory environment consisted of five client workstations and one IBM 3466 connected through a token ring, as shown in Figure 51.
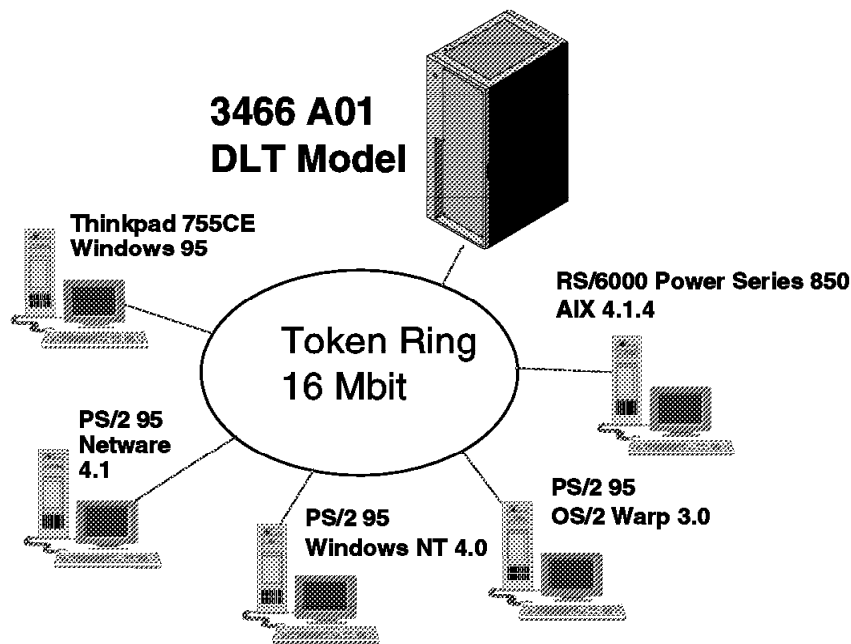

Figure 51. Our Environment

A.2 Our IBM 3466

Our IBM 3466 Model A01 was the first unit shipped from the San Jose manufacturing plant, and comprised the following components:

- RS/6000 H10 (7026-H10)

    - 166 MHz PowerPC 604e

- 256 MB memory

  - Two 2.2 GB F/W SCSI disks

  - CD-ROM drive

  - GXT110P graphics adapter

  - 16/4 token ring adapter

  - Fast Ethernet adapter (not used)

  - SSA RAID adapter

  - SCSI-2 Differential F/W adapter

  - Integrated SCSI-2 F/W adapters (2)

  - Integrated Ethernet adapter

  - Space-saving keyboard with trackpoint

- 7133-020 SSA drawer with four 9.1 GB disks

- 7337 DLT tape library with two drives, 14 data cartridges, and one cleaner cartridge

- P50 color display

- Network Storage Manager software package (5765-C53)

  - ADSM V2.1

  - Disaster Recovery Module (optional)

  - Space Management (HSM) (optional)

  - Open Systems Environment (optional)

  - AIX V4.2.1

  - Communications Server for AIX V4

  - Internet Connection Secure Server V4.2

  - REXX/6000

The actual 3466 that we used in our laboratory is pictured in Figure 52 on page 105 and Figure 53 on page 106. It is basically a black box about the size of a refrigerator. The mounting frame used is the same as with the IBM Virtual Tape Servers (VTS). You can see by the photo in Figure 52 on page 105 that there is space inside the frame between the P50 display and the 7337 DLT library for a second 7337 DLT library.
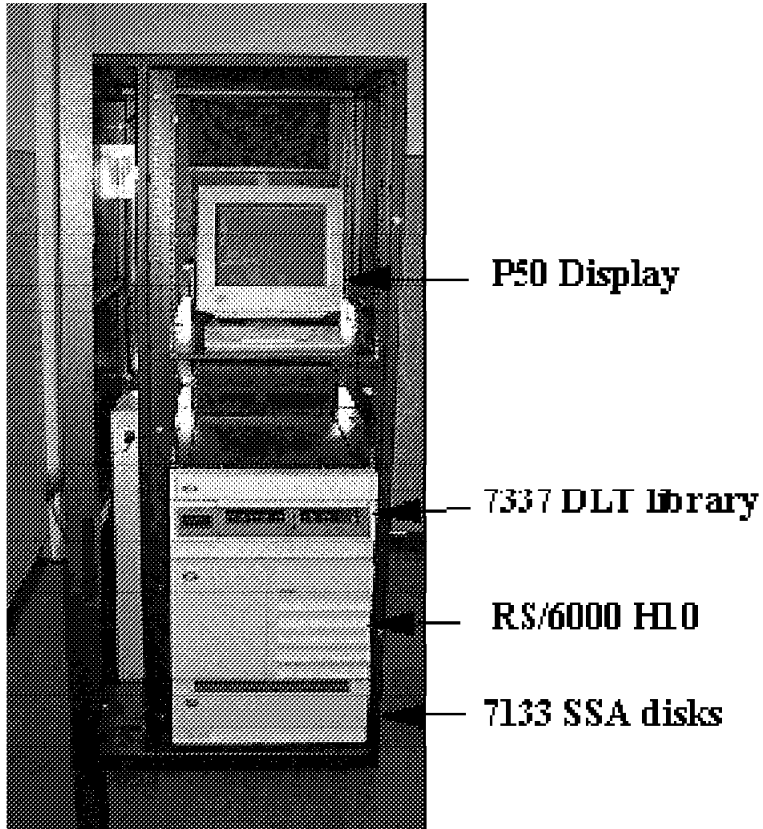
Figure 52. Our 3466 A01 DLT Model

Figure 53. Inside the 3466

A.3 Libraries 7337 and 7133

The 7133 and 7337 library units both come in separate drawers and can be accessed through the front pull-down covers, as shown in Figure 54 on page 107 and Figure 55 on page 107. As you can see in Figure 55 on page 107, the 7337 DLT library has ten tape slots showing. To access the additional five slots and the drives in the DLT library, you must first remove the ten-cartridge magazine. See Figure 56 on page 108.
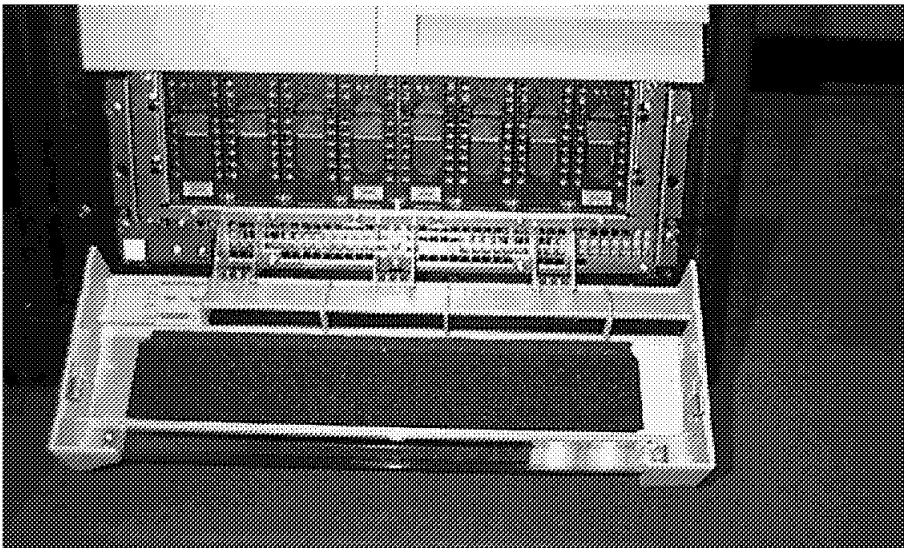
Figure 54. 7133 Disk Drawer

Figure 55. 7337 DLT Library Drawer

Figure 56. Ten-Cartridge Magazine Removed for Access

The DLT tape library and SSA disks are attached to the RS/6000 H10 as shown in the diagram in Figure 57 on page 109. As you can see, the disks are attached to the SSA adapter by two separate loops. The DLT drives are daisy-chained together and attached to the SCSI-2 F/W Differential adapter.
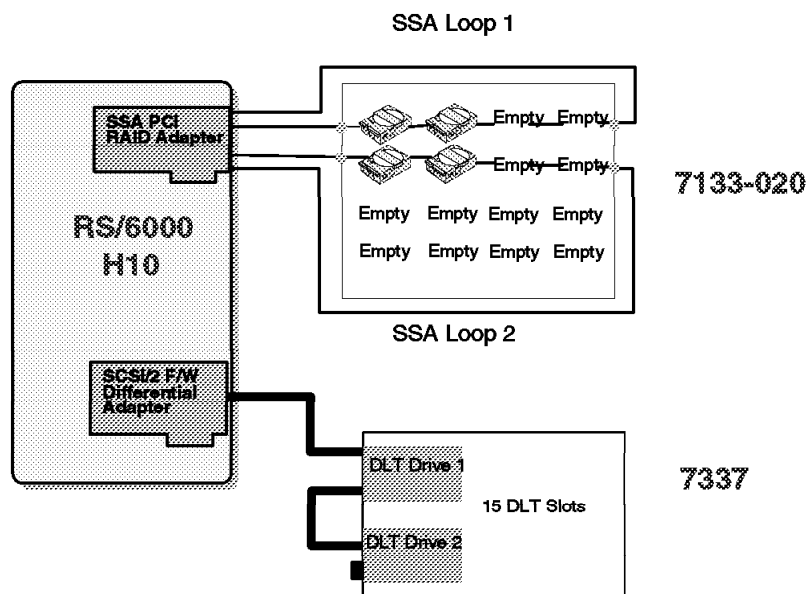
SSA Loop 1

SSA PCI
RAID Adapter

Empty Empty
Empty Empty

7133-020

RS/6000
H10

Empty Empty Empty Empty

Empty Empty Empty Empty

SSA Loop 2

SCSI/2 F/W
Differential
Adapter

DLT Drive 1

15 DLT Slots

7337

DLT Drive 2

Figure 57. 7337 and 7133 Cabling Diagram

A.4 IBM 3466 Power Distribution Unit

All devices within the 3466 frame are attached to a power distribution unit as shown in Figure 58 on page 110. The power distribution unit attaches to a customer-supplied 220V single-phase 30-amp ac service at 50 or 60 Hz. *It is very important that this power requirement be planned for properly.* See the *IBM 3466 Network Storage Manager Introduction and Planning Guide*, GA32-0385, for more information.
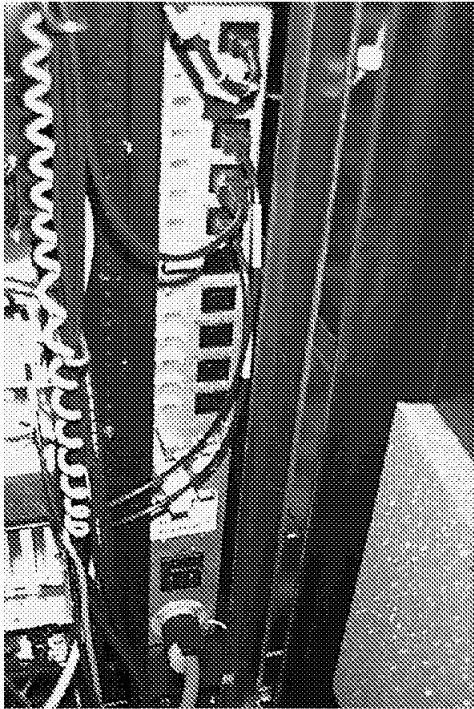
Figure 58. 3466 Power Distribution Unit

Appendix B. 3466 Initial Configuration

This appendix describes what settings the IBM 3466 ships with. This information is current as of August 1997 and is subject to change.

B.1 AIX Configuration

The IBM 3466 is delivered without anything set in the TCP/IP configuration so you have to supply the installing CE with the settings that your network administrator has given you. There is a form in Appendix B of the *Introduction and Planning Guide*, GA32-0385, that either you or your network administrator must fill in before the 3466 arrives, and hand to the installing CE.

The RS/6000 is configured with two internal disks of 2.2 GB each, mirrored to protect the AIX from a disk crash. Main storage is 256 MB.

The SSA 7133 disks are configured with four 9.1 GB SSA Disk Modules, which give a total of 36 GB disk storage. The 7133 is expandable in blocks of four SSA Disk Modules at a time, up to a total of sixteen 9.1 GB SSA Disk Modules, for a total of 144 GB disk storage. If your 3466 is ordered with a second tape library, your base configuration of SSA 7133 disks is eight 9.1 GB SSA Disk Modules, for a total of 72 GB disk storage.

The DLT 7337 library units (Feature 4202) are configured with two tape drives and have slots for 15 DLT cartridges (one is a cleaning cartridge). The 3466 can be expanded with one additional DLT library 7337 (Feature 4202).

The Magstar MP 3575 (Feature 4206) is configured with two tape drives and has room for 120 Magstar MP cartridges (one is a cleaning cartridge). The 3466 can be expanded with one additional Magstar MP 3575 (Feature 4206).

The Magstar MP 3575 (Feature 4208) is configured with three tape drives and has room for 320 Magstar MP cartridges (one is a cleaning cartridge). The 3466 can be expanded with one additional Magstar MP 3575 (Feature 4208).

B.2 ADSM Server Configuration

The ADSM server is set up to start automatically as part of the AIX operating system boot-up process. This is accomplished by the installing CE.

The initial ADSM configuration for Model A00 and A01 is:

- Database, 7.4 GB, with mirroring for a total of 14.8 GB.
- Recovery log, 1.9 GB, with mirroring for a total of 3.8 GB.
- Diskpool, 13.6 GB, divided into four volumes.

For a Model A01 with a 7337 DLT Library (Feature 4202) you will have:

- Tapepool, 322 GB, divided into nine volumes.
- Copypool, 107 GB, divided into three volumes.

  With a second library, you will also have:
- A larger database, 14.2 GB, with mirroring for a total of 28.4 GB.
- Diskpool, 16.7 GB, divided into four volumes.
- Diskpool2, 16.7 GB, divided into four volumes.
- Tapepool2, 322 GB, divided into nine volumes.
- Copypool2, 107 GB, divided into three volumes.

For a Model A01 with a 3575 Magstar MP Library (Feature 4206), you will have:

- Tapepool, 475 GB, divided into 95 volumes.
- Copypool, 75 GB, divided into 15 volumes.

  With a second library, you will also have:
- A larger database, 14.2 GB, with mirroring for a total of 28.4 GB.
- Diskpool, 16.7 GB, divided into four volumes.
- Diskpool2, 16.7 GB, divided into four volumes.
- Tapepool2, 475 GB, divided into 95 volumes.
- Copypool2, 75 GB, divided into 15 volumes.

For a Model A01 with a 3575 Magstar MP Library (Feature 4208) you will have:

- Tapepool, 1350 GB, divided into 270 volumes.
- Copypool, 150 GB, divided into 30 volumes.

  With a second library, you will also have:
- A larger database, 14.2 GB, with mirroring for a total of 28.4 GB.
- Diskpool, 16.7 GB, divided into four volumes.
- Diskpool2, 16.7 GB, divided into four volumes.
- Tapepool2, 1350 GB, divided into 270 volumes.
- Copypool2, 150 GB, divided into 30 volumes.

Please observe that all tapepool sizes are uncompressed sizes.

B.3 ADSM Administrative Command Schedules

The ADSM server is set up with 12 different administrative command schedules. If you have a second tape library, there will be an additional eight administrative schedules. See Table 7.

4.2.1, "Administrative Command Schedules" on page 59 describes these schedules briefly.

Table 7 (Page 1 of 2). ADSM Administrative Command Schedules

Schedule name	Description	Start Time	Duration	Period	Day of Week
	Command				
BACKUPSTG_DISK	Backup disk storagepool	05:00	2 Hours	1 Day	Any
	backup stg diskpool copypool				
BACKUPSTG_TAPE	Backup tape storagepool	05:15	2 Hours	1 Day	Any
	backup stg tapepool copypool				
DBBACKUP_FULL	Full db backup	13:00	2 Hours	1 Day	Any
	backup db devclass=dlt type=full scratch=yes				
DELETE_DBVOLHIST	Delete volume history for dbbackup volumes	17:00	2 Hours	1 Day	Any
	delete volhistory todate=today-2 type=DBBackup				
DELETE_VOL_HIST	Delete volume history file	17:00	2 Hours	1 Day	Any
	delete volhistory todate=today-30 type=all				
EXPIRE_INVENTORY	Expire inventory	14:00	2 Hours	2 Days	Any
	expire inventory				
MIGRATION_START	Start migrate to tapepool	09:00	2 Hours	1 Day	Any
	update stg diskpool lowmig=0 highmig=0				
MIGRATION_STOP	Stop migrate to tapepool	18:00	2 Hours	1 Day	Any
	update stg diskpool lowmig=30 highmig=70				
START_RECLAIM	Start reclamation of tapepool	14:00	2 Hours	2 Days	Any
	update stg tapepool reclaim=50				
START_RECL_COPY	Start reclaim of copypool	08:00	1 Hour	1 Week	Tuesday
	update stg copypool reclaim=50				
STOP_RECLAIM	Stop reclamation of tapepool	18:00	2 Hours	2 Days	Any
	update stg tapepool reclaim=100				
STOP_RECL_COPY	Stop reclaim of copypool	18:00	1 Hour	1 Week	Tuesday
	update stg copypool reclaim=100				
With a second tape library, you will also have the following schedules:					
Schedule name	Description	Start Time	Duration	Period	Day of Week
	Command				
BACKUPSTG_DISK2	Backup disk2 storagepool	05:00	2 Hours	1 Day	Any
	backup stg diskpool2 copypool2				
BACKUPSTG_TAPE2	Backup tape2 storagepool	05:15	2 Hours	1 Day	Any
	backup stg tapepool2 copypool2				
MIGRATION_START2	Start migrate to tapepool2	09:00	2 Hours	1 Day	Any
	update stg diskpool2 lowmig=0 highmig=0				
MIGRATION_STOP2	Stop migrate to tapepool2	18:00	2 Hours	1 Day	Any
	update stg diskpool2 lowmig=30 highmig=70				

Table 7 (Page 2 of 2). ADSM Administrative Command Schedules					
Schedule name	**Description**	**Start Time**	**Duration**	**Period**	**Day of Week**
	Command				
START_RECLAIM2	Start reclamation of tapepool2	14:00	2 Hours	2 Days	Any
	update stg tapepool2 reclaim=50				
START_RECL_COPY2	Start reclaim of copypool2	08:00	1 Hour	1 Week	Tuesday
	update stg copypool2 reclaim=50				
STOP_RECLAIM2	Stop reclamation of tapepool2	18:00	2 Hours	2 Days	Any
	update stg tapepool2 reclaim=100				
STOP_RECL_COPY2	Stop reclaim of copypool2	18:00	1 Hour	1 Week	Tuesday
	update stg copypool2 reclaim=100				
Note: All schedules are active and have a run priority of 5.					

B.4 Client Backup Schedules

The ADSM server is set up with eight different client backup schedules. If you have a second tape library, there will be an additional eight backup schedules, defined in policy domain STANDARD2. See Table 8.

Table 8. ADSM Backup Schedules								
Policy Domain Name	**Schedule**	**Description**	**Action**	**Prio**	**Start Time**	**Duration**	**Period**	**Day of Week**
STANDARD	DAILY	Daily schedule for clients	Inc	5	18:00	12 Hours	1 Day	Weekday
STANDARD	WEEKLY	Weekly schedule for clients	Inc	5	01:00	36 Hours	1 Weeks	Weekend
STANDARD	MONTHLY	Monthly schedule for clients	Inc	5	01:00	36 Hours	1 Month	Weekend
STANDARD	MONDAY	Daily Monday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Monday
STANDARD	TUESDAY	Daily Tuesday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Tuesday
STANDARD	WEDNESDAY	Daily Wednesday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Wednesday
STANDARD	THURSDAY	Daily Thursday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Thursday
STANDARD	FRIDAY	Daily Friday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Friday
With a second tape library, you will also have the following schedules:								
Policy Domain Name	**Schedule**	**Description**	**Action**	**Prio**	**Start Time**	**Duration**	**Period**	**Day of Week**
STANDARD2	DAILY	Daily schedule for clients	Inc	5	18:00	12 Hours	1 Day	Weekday
STANDARD2	WEEKLY	Weekly schedule for clients	Inc	5	01:00	36 Hours	1 Weeks	Weekend
STANDARD2	MONTHLY	Monthly schedule for clients	Inc	5	01:00	36 Hours	1 Month	Weekend
STANDARD2	MONDAY	Daily Monday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Monday
STANDARD2	TUESDAY	Daily Tuesday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Tuesday
STANDARD2	WEDNESDAY	Daily Wednesday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Wednesday
STANDARD2	THURSDAY	Daily Thursday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Thursday
STANDARD2	FRIDAY	Daily Friday schedule for clients	Inc	5	18:00	12 Hours	1 Day	Friday
Note: All schedules are active and have a run priority of 5.								

B.5 ADSM Policies

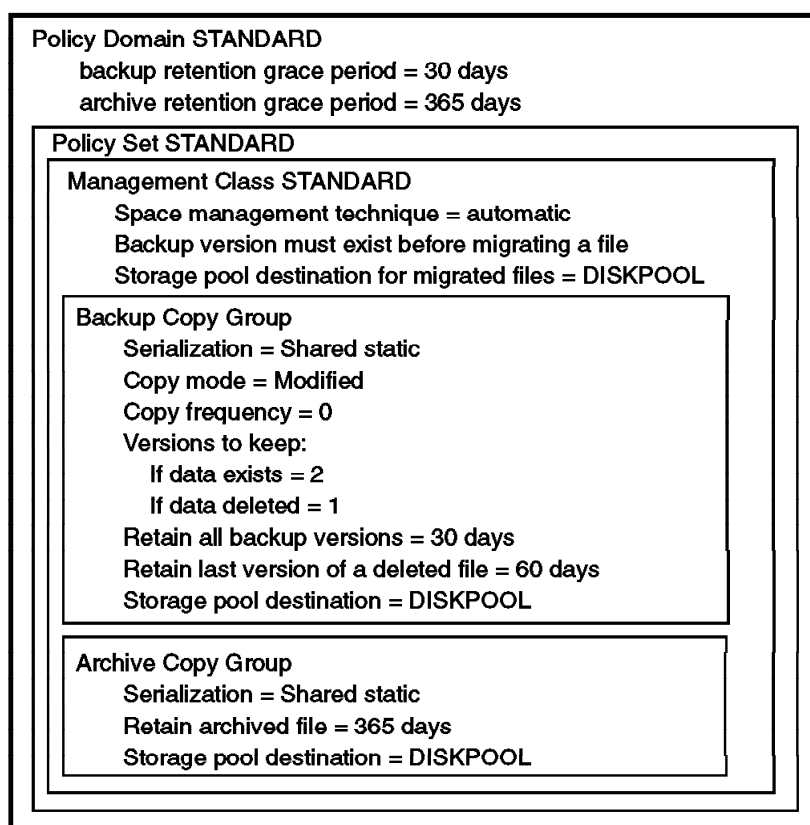Figure 59 shows the initial settings for the policy domain STANDARD.

```
Policy Domain STANDARD
     backup retention grace period = 30 days
     archive retention grace period = 365 days
  Policy Set STANDARD
    Management Class STANDARD
         Space management technique = automatic
         Backup version must exist before migrating a file
         Storage pool destination for migrated files = DISKPOOL
      Backup Copy Group
         Serialization = Shared static
         Copy mode = Modified
         Copy frequency = 0
         Versions to keep:
             If data exists = 2
             If data deleted = 1
         Retain all backup versions = 30 days
         Retain last version of a deleted file = 60 days
         Storage pool destination = DISKPOOL

      Archive Copy Group
         Serialization = Shared static
         Retain archived file = 365 days
         Storage pool destination = DISKPOOL
```

Figure 59. Policy Domain STANDARD

These policies specify the following:

- When a backed up file is no longer associated with a backup copy group, it remains in server storage for 30 days.

- When an archived file is no longer associated with an archive copy group, it remains in server storage for 365 days.

- If you have ordered HSM as an optional feature, files are eligible for automatic and selective migration.

- Space-managed files that are 100 MB or smaller are first stored in the DISKPOOL storage pool. Files greater than 100 MB are stored directly in TAPEPOOL.

- For backup operations:

- Files cannot be backed up while they are being modified.

- An incremental backup is performed only if the file has changed since the last backup.

- Up to two backup versions of a file on the client's system are retained in server storage. The most recent backup version is retained for as long as the original file is on the client file system. The extra version is retained for up to 30 days.

- One backup version of a file that has been deleted from the client's system is retained for 60 days.

- Backup copies that are 100 MB or smaller are first stored in the DISKPOOL storage pool. Files greater than 100 MB are stored directly in TAPEPOOL.

- For archive operations:

  - Files cannot be archived while they are being modified.

  - An archive copy is kept for up to 365 days.

  - Archive copies that are 100 MB or smaller are first stored in the DISKPOOL storage pool. Files greater than 100 MB are stored directly in TAPEPOOL.

When you have an NSM with two tape libraries, you will also have a policy domain called STANDARD2, as shown in

```
Policy Domain STANDARD2
      backup retention grace period = 30 days
      archive retention grace period = 365 days
  Policy Set STANDARD2
    Management Class STANDARD2
          Space management technique = automatic
          Backup version must exist before migrating a file
          Storage pool destination for migrated files = DISKPOOL2
      Backup Copy Group
          Serialization = Shared static
          Copy mode = Modified
          Copy frequency = 0
          Versions to keep:
             If data exists = 2
             If data deleted = 1
          Retain all backup versions = 30 days
          Retain last version of a deleted file = 60 days
          Storage pool destination = DISKPOOL2
      Archive Copy Group
          Serialization = Shared static
          Retain archived file = 365 days
          Storage pool destination = DISKPOOL2
```

Figure 60. Policy Domain STANDARD2

As you can see, all of the settings in STANDARD2 are the same as in STANDARD except that STANDARD2 will direct backup, archive, and space-managed files to DISKPOOL2.

B.6 AIX Housekeeping Schedules

AIX crontab executes the job 3466skulker for user root at 12:00 every day. This job performs the following:

1. Removes files left in the mail queue more than 5 days.
2. Removes files left in the /tmp queue more than 5 days.
3. Removes all *.bak, *.out, core, proof, gally and ed.hup files that are more than 5 days old.
4. Archives the following and clears them daily:
   - /var/adm/wtmp
   - /etc/security/failedlogin
   - /var/adm/sulog

5. Archives smit.log, smit.script, dsmserv.err and dsmerror.log.

The script for 3466 skulker is as follows:

3466skulker

```
#!/usr/bin/bsh
# @(#)28     1.31  src/bos/usr/sbin/skulker/skulker.sh, cmdcntl, bos42G, g9713A 3/20/97 16:25:42
#
# COMPONENT_NAME: (CMDCNTL) system control commands
#
# FUNCTIONS:
#
# ORIGINS: 27
#
# (C) COPYRIGHT International Business Machines Corp. 1989, 1996
# All Rights Reserved
# Licensed Materials - Property of IBM
#
# US Government Users Restricted Rights - Use, duplication or
# disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
#


# Remove the file only if no process has it currently open

# WARNING: THE WHOLE PURPOSE OF THIS SCRIPT IS TO REMOVE FILES,
# SO IT HAS THE POTENTIAL FOR UNEXPECTED RESULTS.

remove_file()
{
        if · -z "/usr/sbin/fuser $1 2>/dev/null" '; then
           /usr/bin/rm -f $1
        fi
}

date=/usr/bin/date
uname=/usr/bin/uname -nm
if msg=/usr/bin/dspmsg skulker.cat 1 '\n%1$s started at %2$s on %3$s\n' $0 "$date" "$uname"
then :
else msg='/usr/bin/echo "\n$0 started at $date on $uname\n"'; fi
eval /usr/bin/echo $msg

# Uncomment the NATIVE entry that is appropriate for your system.
# For Distributed environments, '/native' is a path to the local filesystems;
# '/' is sufficient for standalone systems.
# NATIVE=/native/
NATIVE=/

# get rid of old primary.outputs that got lost
if · -d ${NATIVE}var/spool/qdaemon '
then
  /usr/bin/find ${NATIVE}var/spool/qdaemon -mtime +5 -type f -print ] \
  while read FILE2REM
  do
        remove_file $FILE2REM
  done
fi

# get rid of old qdir files
if · -d ${NATIVE}var/spool/lpd/qdir '
then
  /usr/bin/find ${NATIVE}var/spool/lpd/qdir -mtime +5 -type f -print ] \
  while read FILE2REM
  do
        remove_file $FILE2REM
```

```
  done
fi

# get rid of files that get left in the mail queues
if · -d ${NATIVE}var/spool/qftp '
then
  /usr/bin/find ${NATIVE}var/spool/qftp \( -name 'tmp*' -o -name '•0-9'*' \) -mtime +5 -print ] \
  while read FILE2REM
  do
      remove_file $FILE2REM
  done
fi

# get rid of all ordinary files in the ${NATIVE}tmp directory older than 5
# days  and not accessed or modified in the past 5 days.

/usr/bin/find ${NATIVE}tmp -xdev -atime +5 -mtime +5 -type f -print ] \
        while read FILE2REM
        do
                remove_file $FILE2REM
        done

# clean out ${NATIVE}var/tmp
if · -d ${NATIVE}var/tmp '
then
  /usr/bin/find ${NATIVE}var/tmp -atime +5 -mtime +5 -type f -print ] \
  while read FILE2REM
  do
      remove_file $FILE2REM
  done
fi

# get rid of news items older than 45 days
if · -d ${NATIVE}var/news '
then
  /usr/bin/find ${NATIVE}var/news -mtime +45 -type f -print ] \
  while read FILE2REM
  do
      remove_file $FILE2REM
  done
fi

# get rid of *.bak, .*.bak, a.out, core, proof, galley, ...*, ed.hup files
# that are more than 5 days old.
# proof and galley files must not be owner-writable
#
# Use the -xdev flag to prevent find from traversing a filesystem
# on a different device, this will prevent it from searching nfs
# mounted filesystems.  You may want to add filesystems here
# that you want to be cleaned up.
/usr/bin/find $NATIVE ${NATIVE}usr ${NATIVE}var ${NATIVE}tmp ${NATIVE}home \
    \(  \(  \( -name "*.bak" -o -name core      -o -name a.out -o    \
            -name "...*"  -o -name ".*.bak" -o -name ed.hup \)   \
        -atime +5 -mtime +5 -type f                              \
    \)                                                           \
    -o                                                           \
    \(  \( -name proof -o -name galley \)                        \
        -atime +5 -mtime +5 -type f ! -perm -0200               \
    \)                                                           \
    \) -xdev -print ] \
while read FILE2REM
do
      remove_file $FILE2REM
done

# get rid of anything in a .putdir directory more than 5 days old.
for i in /usr/bin/find $NATIVE ${NATIVE}usr ${NATIVE}var ${NATIVE}tmp \
```

```
        -xdev -type d -name ".putdir" -print
do
  /usr/bin/find $i -mtime +5 -type f -print ] \
  while read FILE2REM
  do
        remove_file $FILE2REM
  done
done

date=/usr/bin/date "+%y%b%d

toname="/tmp/wtmp."$date
fromname="/var/adm/wtmp"
echo "  The $fromname file is being archived to $toname."
/usr/bin/who -a $fromname > $toname
/usr/bin/cat /dev/null > $fromname


toname="/tmp/failedlogin."$date
fronmname="/etc/security/failedlogin"
echo "  The $fromname file is being archived to $toname."
/usr/bin/who -a $fromname > $toname
/usr/bin/cat /dev/null > $fromname

fromname="/var/adm/sulog"
if · -f "$fromname" `
then
    toname="/tmp/sulog"$date
    echo "  The $fromname file is being moved to $toname."
    /usr/bin/cp $fromname $toname
    /usr/bin/cat /dev/null > $fromname
fi

fromname="/smit.log"
if · -f "$fromname" `
then
    toname="/tmp/smit.log"$date
    echo "  The $fromname file is being moved to $toname."
    /usr/bin/cp $fromname $toname
    remove_file $FILE2REM
fi

fromname="/smit.script"
if · -f "$fromname" `
then
    toname="/tmp/smit.script"$date
    echo "  The $fromname file is being moved to $toname."
    /usr/bin/cp $fromname $toname
    remove_file $FILE2REM
fi

fromname="/usr/lpp/adsmserv/bin/dsmserv.err"
if · -f "$fromname" `
then
    toname="/tmp/dsmserv.err"$date
    echo "  The $fromname file is being moved to $toname."
    /usr/bin/mv $fromname $toname
    /usr/bin/cat /dev/null > $fromname
fi

toname="/tmp/dsmerror.log"$date
echo "  All dsmerror.log files are being moved to $toname."
/usr/bin/find / -name dsmerror.log -atime +1 -mtime +1 -type f -print ] \
while read FILE2REM
do
 echo "  Deleting $FILE2REM"
 /usr/bin/cat $FILE2REM >> $toname
```

```
 /usr/bin/rm $FILE2REM
done

date=/usr/bin/date
if msg=/usr/bin/dspmsg skulker.cat 2 '\n%1$s finished at %2$s on %3$s\n' $0 "$date" "$uname"
then :
else msg='/usr/bin/echo "\n$0 finished at $date on $uname\n"'; fi
eval /usr/bin/echo $msg
```

Appendix C. Special Notices

This publication is intended to help IBM staff, Business partners and customers to get up and going with the 3466. The information in this publication is not intended as the specification of any programming interfaces that are provided by the 3466 package or ADSM. See the PUBLICATIONS section of the IBM Programming Announcement for the 3466 for more information about what publications are considered to be product documentation.

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Appendix D. Related Publications

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

D.1 International Technical Support Organization Publications

For information on ordering these ITSO publications see "How to Get ITSO Redbooks" on page 131.

D.1.1 ADSM Redbooks

Book Title	Publication Number
General Topics	
ADSM Concepts	SG24-4877
ADSM Version 2 Presentation Guide	SG24-4532
ADSM Advanced Implementation Experiences	GG24-4221
Using ADSM Hierarchical Storage Management	SG24-4631
Client Disaster Recovery: Bare Metal Restore	SG24-4880
Specific Server Books	
ADSM Server for Windows NT Configuration and Recovery Examples	SG24-4878
Getting Started with ADSM/6000	GG24-4421
ADSM for AIX: Advanced Topics	SG24-4601
AIX Tape Management	SG24-4705
ADSTAR Distributed Storage Manager/6000 on 9076 SP2	GG24-4499
ADSM for MVS: Recovery and Disaster Recovery	SG24-4537
ADSM for MVS: Using Tapes and Tape Libraries	SG24-4538
Getting Started with ADSM/2	GG24-4321
ADSM for OS/2: Advanced Topics	SG24-4740
Setting Up and Implementing ADSTAR Distributed Storage Manager/400	GG24-4460
ADSM/VSE Implementation Guide	SG24-4266
Specific Client Books	
Getting Started with ADSM NetWare Clients	GG24-4242
Getting Started with ADSM AIX Clients	GG24-4243
ADSM API Examples for OS/2 and Windows	SG24-2588
ADSM with Other Products	
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

D.1.2 Tivoli Redbooks

Book Title	Publication Number
TME 10 Cookbook for AIX Systems Management and Networking Applications	SG24-4867
Understanding Tivoli's TME 3.0 and TME 10	SG24-4948

D.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
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
Application Development Redbooks Collection	SBOF-7290	SK2T-8037
Personal Systems Redbooks Collection	SBOF-7250	SK2T-8042

D.3 ADSM Product Publications

Book Title	Publication Number
ADSM General Information	GH35-0131
ADSM V2 Installing the AIX Server and Administrative Client	SH35-0136
ADSM V2 for HP-UX Quick Start	GC35-0256
ADSM V2 Installing the MVS Server and Administrative Client	SH26-4043
ADSM V2 for Sun Solaris Quick Start	GC35-0262
ADSM V2 for AIX Administrator's Guide	SH35-0134
ADSM V2 for HP-UX Administrator's Guide	GC35-0257
ADSM V2 for Sun Solaris Administrator's Guide	GC35-0263
ADSM V2 for MVS Administrator's Guide	SH26-4039
ADSM V2 for AIX Administrator's Reference	SH35-0135
ADSM V2 for HP-UX Administrator's Reference	GC35-0258
ADSM V2 for MVS Administrator's Reference	SH26-4040
ADSM V2 for Sun Solaris Administrator's Reference	GC35-0264
ADSM V2 Messages	SH35-0133
ADSM V2 Device Configuration	SH35-0137
ADSM V2 Installing the Clients	SH26-4049
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ADSM V2 Using the OS/2 Backup-Archive Client	SH26-4053
ADSM V2 Using the Microsoft Windows Backup-Archive Clients	SH26-4056

Book Title	Publication Number
ADSM V2 Using the Novell NetWare Backup-Archive Client	SH26-4055
ADSM V2 Using the Apple Macintosh Backup-Archive Client	SH26-4051
ADSM V2 Reference Cards for the Backup-Archive Clients	SX26-6013

D.4 ADSM Online Product Library

All of the ADSM publications are available in online readable format on the CD-ROM listed below. The ADSM library is also available on the following CD-ROMs:

CD-ROM Title	Publication Number
ADSM Online Product Library	SK2T-1893
MVS Base Collection Kit	SK2T-0710
VM Base Collection Kit	SK2T-2067
AS/400 Base Collection Kit	SK2T-2171

D.5 Tivoli Publications

Book Title	Publication Number
TME 10 Tivoli/Plus for ADSM User's Guide	GC31-8405
Tivoli/Courier Documentation Kit	SK2T-6046
Tivoli Enterprise Console Documentation Kit	SK2T-6050
Tivoli/Sentry Documentation Kit	SK2T-6052
Tivoli/Management Platform Documentation Kit	SK2T-6058
Tivoli/ADE Documentation Kit Volume 1	SK2T-6062
Tivoli/ADE Documentation Kit Volume 2	SK2T-6063
Tivoli/ADE Documentation Kit Volume 3	SK2T-6064
Tivoli/ADE Documentation Kit Volume 4	SK2T-6065

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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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