



INTEGRATING FILENET[®] IMAGE SERVICES WITH NETAPP UNIFIED STORAGE FOR WINDOWS[®] PLATFORM: SQL SERVER

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TABLE OF CONTENTS

Abstract	3
Overview	3
Purpose and Scope	3
Introduction	3
Infrastructure	7
Setting up and Configuring Local Disks	9
FileNet Image Service and SQL Server Preinstallation Requirements	13
Installing FileNet Image Services Software	17
Completing the Installation	25
Configuring the MSAR Storage Library	26
Managing Image Services Data	28
Integration of Image Services Connector for SnapLock	28
Conclusions	29
Caveats	29
References	29

ABSTRACT

The need to deliver rapid access to numbers of fixed content objects that may run into the hundreds of millions should lead a company to carefully choose an appropriate software and hardware solution. As demand grows over time, it must also address scalability and performance issues. Fixed objects may include images, documents, and rich media content. In addition to meeting these needs, the solution must also provide data security and be capable of permanently storing the information required in business operations. FileNet provides an effective software solution to address this issue, and its integration with the NetApp storage solution offers significant advantages.

OVERVIEW

For successful content management, an enterprise must deliver access to fixed content objects that may number from the hundreds of thousands to the hundreds of millions. It must also be capable of supporting rapid content growth while providing adequate performance and high data availability. Fixed content typically includes electronic documents, faxes, images, and rich media files for large numbers of users. In addition, strong security and data protection solutions should be part of the permanent storage solution for this critical business information. These stringent requirements demand an efficient content management solution.

FileNet has a range of products that provide business solutions for document and content management needs. The most common and best known of these is FileNet Image Services (IS). Optical storage and retrieval (OSAR) was once the preferred (and only) storage media choice for image services technology, but technical improvements led FileNet to consider the advantages of magnetic disk media over optical storage. FileNet IS now supports magnetic disk media using its Magnetic Storage and Retrieval software (MSAR).

Network Appliance™ (NetApp) storage devices are integrated hardware- and software-based network storage systems that serve data using any of the multiple storage protocols that are supported for both storage area network (SAN) and network-attached storage (NAS) environments. These storage devices are known as NetApp filers or NetApp fabric-attached storage (FAS) servers. They act on client/application or server requests for data and process those requests by writing data to or retrieving data from the storage system. Fast, reliable operation and advanced data protection options are made possible by Data ONTAP™, the NetApp microkernel operating system.

PURPOSE AND SCOPE

This paper describes the steps necessary to integrate FileNet Image Services software and Microsoft® SQL Server on Windows with a Network Appliance device on an IP-based Small Computer System Interface (iSCSI) storage server using the NetApp unified storage solution. Unified storage includes both traditional Fibre Channel (FC SAN), IP SAN, and NAS modes. Note that IP-based SAN configurations use iSCSI technology. Configurations and procedures covered in this report in general apply to IS 4.0 on UNIX® platforms with NetApp storage using SAN and NAS architecture, but the specifics of these other configurations are beyond the scope of this document. Refer to technical report '[Integrating FileNet Image Services with Network Appliance Storage Devices](#)' for details about UNIX platforms. This report highlights the importance of using either a NAS or SAN (or both) appropriately to store FileNet IS data.

Note: This information should be taken only as a starting point. Customers should consult FileNet and NetApp Professional Services to determine the configurations most appropriate for their environments.

INTRODUCTION

Integration of FileNet Image Services and Network Appliance storage solution provides an effective solution for content management. This section describes the integration of FileNet Image Services and Network Appliance unified storage.

FileNet Image Service

FileNet enterprise content management (ECM) solutions allow customers to build and sustain competitive advantage by managing content throughout their organizations, automating and streamlining their business processes. It provides the full-spectrum of connectivity needed to simplify their critical content management and everyday decision making. FileNet ECM solutions deliver a comprehensive set of capabilities that integrate with existing information systems to provide cost-effective solutions that solve real-world business problems. Image Server delivers faster access to large numbers (billions) of fixed objects such as documents, reports, print streams, faxes, e-mail, and multimedia content. FileNet IS software provides users with the capability to perform the following functions:

- Improve the operational effectiveness of content information.
- Allow high availability yet ensure the security of information assets
- Improve the content access experience of the customers
- Maintain access while preventing data corruption and ensuring security

With FileNet IS software, customer can create a high-performance repository with failover capability and high availability of data while providing effective security.

Currently FileNet IS software is supported on Windows, Sun™ Solaris™ 8, HP/UX, and AIX platforms.

Network Appliance Storage Devices

Rapid growth in the demand for data requires an efficient storage solution infrastructure. This infrastructure has to provide a tightly integrated solution that delivers the highest level of data availability and scalability. Network Appliance storage solutions help achieve this goal by seamlessly centralizing and consolidating the data. In this context, Network Appliance provides a unified storage solution by supporting multiple protocols on the same NetApp storage device. These include SAN configurations with Fibre Channel and iSCSI protocols and NAS configurations using NFS and CIFS protocols.

The unified storage solution from NetApp enables effective use of industry-leading enterprise database and business applications, providing a number of key benefits:

- Operational efficiency
- Efficient resource utilization
- Support for technology and partnership experience

Fabric-attached storage servers are required for FC SAN configurations. SAN configurations using iSCSI software can be used on other NetApp storage devices. On UNIX platforms, FileNet IS software requires configuration for block access for storage of multikeyed file (MKF) datasets. FC SAN can be configured to meet this requirement for MKF data. Windows does not restrict block access for configuring MKF/cache. However, it is recommended to configure SAN using either the FC SAN or the IP-SAN (iSCSI) option. On Windows it is highly recommended to configure SnapDrive™ software, which makes data storage management easier. The installation procedure described in this paper uses either FCP or iSCSI with NetApp SnapDrive to set up and install the database and IS server.

Network Connectivity

A SAN on an existing network infrastructure using iSCSI is known as an iSAN configuration. Both SAN and iSAN configurations provide local SCSI disks to the Windows operating system. FC host bus adapters (HBAs) come with a dedicated 2Gbps Fibre Channel link. Usually FC SAN configurations have a failover server, NetApp storage server, and multipath access to address any single point of failure. If the SnapLock® connector for IS software is

planned, network connectivity must be CIFS on the Windows platform or NFS on UNIX platforms. Either the network mapped drive or the Universal Network Connectivity (UNC) path is supported with SnapLock.

The following diagram shows a simple single-path point-to-point configuration. Both the Gigabit Ethernet and FC connections are made without using a switch. However, for mission-critical projects it's best to configure the full SAN configuration to address any single point of failure.

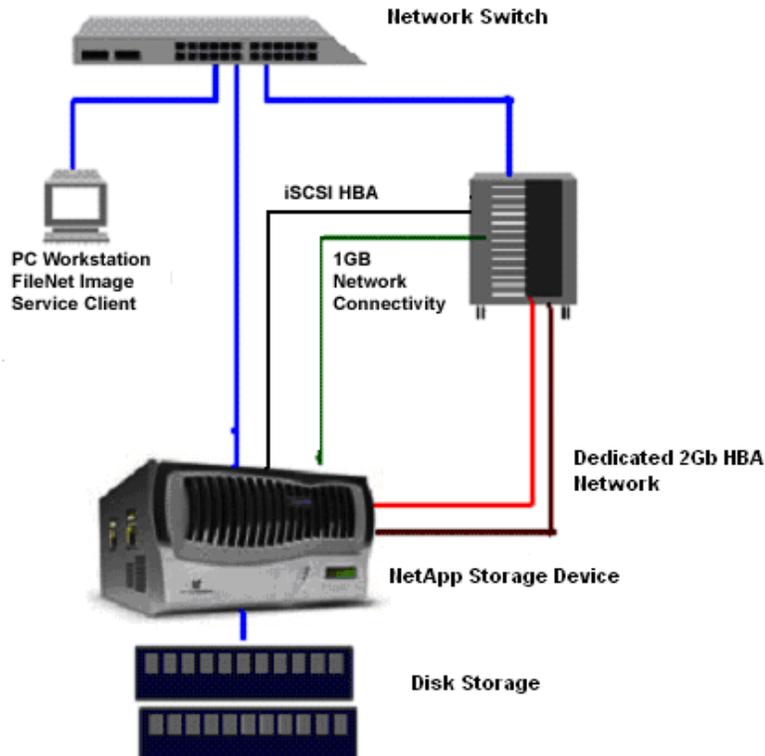


Figure 1. Network connections

Design Architecture

FileNet IS on Windows works with NetApp storage devices either in SAN or NAS configurations. MSAR and MKF/cache can be configured on network-shared disks. However, the database and FileNet IS software can be installed on local SCSI disks configured using NetApp FC SAN or iSCSI software or a hardware iSCSI HBA. For easier storage management, this paper strongly suggests installation of SnapDrive software. SnapDrive allows the storage to grow without affecting the application by growing online. Backup of data stored in these LUNs (configured disks) can be performed using NetApp Snapshot™. NetApp unified storage allows some of the storage on a filer to be deployed as SAN for MKF/cache, while the rest can be deployed as NAS for data sharing across multiple servers.

For NAS storage, any NetApp storage device will work well with this setup. For SAN, only fabric-attached storage devices that support Fibre Channel Protocol (FCP) will work with IS. Regarding the license requirement, NAS requires the NFS license to be activated, and SAN requires a FCP license with FCP services up and running. For SAN configuration using iSCSI, an iSCSI license must be enabled and the iSCSI service must be running. This

paper recommends that verifying the current list of supported configurations on the [NOW™](#) (NetApp on the Web) customer support site. On Windows, it is suggested to use either FCP or iSCSI protocol to configure the SAN storage. The products required are the database server and FileNet IS software installation and the data. This can be accomplished by having LUNs and local virtual disks.

On UNIX, FileNet IS requires a raw disk (block storage) to store the MKF database and cache data. If your configuration uses only NAS for integrating IS services, MKF/cache storage can be configured by using the iSCSI protocol on available platforms to create raw devices. On the Windows platform you can use SnapDrive software and FCP or iSCSI hardware or software. iSCSI is supported on Windows Linux®, HP/UX, and IBM AIX and Sun Solaris. Both the database and FileNet Image services software must be installed on the locally configured SCSI disks or on the local disks. For this purpose, our test setup used Microsoft iSCSI and SnapDrive software on a Windows server to configure the LUNs and local disks. FileNet IS can also be configured using FC SAN. In addition, the clustered failover option (CFO) provides higher data availability in an enterprise-level configuration by eliminating a single point of failure for the filer. For FileNet IS configuration, CFO configuration is optional.

In cluster failover mode, each filer is capable of taking over the other failed filer. This configuration adds security for data protection and availability in an enterprise environment. The following diagram shows a filer CFO configuration.

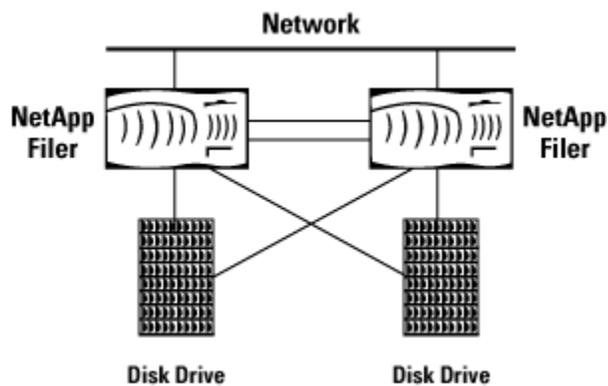


Figure 2. NetApp filer clustered failover configuration

Application server clustering can also be configured with or without NetApp storage device clustering. A typical diagram for application server clustering is shown below.

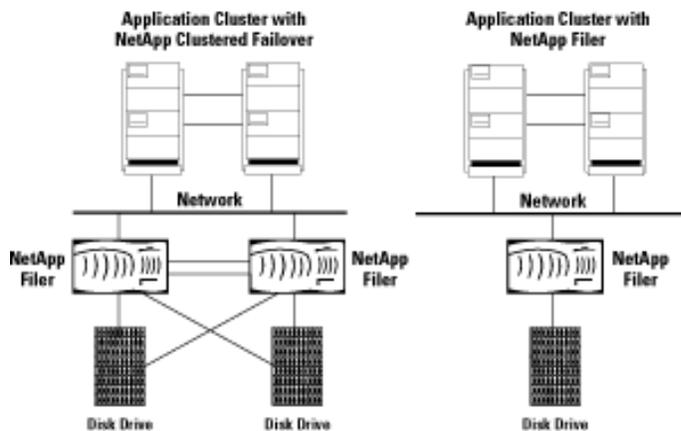


Figure 3. Application server clustering with/without NetApp storage clustering configuration

In a FileNet customer environment, the operating system can host both IS software and the database server, or the database server can be run on a separate, remote server connected to the storage. Recently FileNet IS supports only site-controlled RDBMS configuration. The design diagram below shows how the FileNet solution integrates with storage. In addition, for enterprise customers with more than a few terabytes of MSAR data, IS images and documents can be sent to NetApp NearStore[®] disk-based storage, which provides higher performance and availability at a lower cost than optical storage. Using a filer or NearStore, MSAR can be deployed alone or with optical storage/OSAR in a hybrid environment. NetApp also offers SnapLock, which brings magnetic disk write once, read-many (WORM) storage to filers and NearStore, but the integration of FileNet IS with SnapLock will be discussed separately.

Assumptions

The reader is assumed to be familiar with the operation of Network Appliance storage devices and the concepts of a storage area network and network-attached storage. The reader is also assumed to have a system administrator's knowledge of the FileNet IS server software. The term *filer* refers interchangeably to the NetApp filer or NetApp FAS server storage devices, with the caveat that not all NetApp storage devices support the FC SAN protocol options.

INFRASTRUCTURE

A sample system configuration was selected to install and test the product to validate the information in this document. The purpose was to show the procedure for integrating FileNet IS software with a NetApp storage device. Performance specifications and tuning are not within the scope of this document.

The simple configuration required to run the Microsoft SQL Server 2000 database with FileNet IS 4.0 on a Windows 2000 host with a filer is listed below:

- FileNet IS 4.0 on a Windows 2000 server
- NetApp filer with CIFS, iSCSI, and FCP capability
- Network for management and dataflow
- FileNet IS-required environment settings such as user accounts, software, storage appliance mount points, and/or SAN storage

In this document, the following infrastructure is used for completing the installation of IS software:

Name of the filer	boy
Filer command prompt	boy>
Windows host name	dell14350-clus1
Operating system users	'fnsw' 'oracle' 'root'
Command output is in	courier font

FileNet Image Services on Windows Server

A supported Windows host is required to run IS 4.0 software. FileNet supports Windows for installation and configuration of FileNet IS services. To set up a SAN configuration, this document assumes that the host server is running Windows 2000 with SP32000 or later. The server should have at least one free PCI slot available for installing the Fibre Channel HBA supplied with the NetApp Host Attach Kit (HAK) for Windows.

To connect the server to the SAN, install the software, which comes with the Host Attach Kit from NetApp that includes the HBA drivers and the `sanlun` utility.

FileNet supports both UNIX and Windows platforms. Supported UNIX platforms are Solaris 2.8, HP/UX, and AIX. In our test configuration, we used a Windows 2000 system. Similar NetApp storage configurations will also work for IS on HP/UX, AIX, and Solaris platforms, though specific settings will be different for other versions of UNIX. The patch requirements for UNIX platforms should be checked with FileNet documentation. Any discussion of UNIX platforms is beyond the scope of this document but is discussed in the technical report, "[Integrating FILENET® Image Services with NetApp UNIX® Platforms](#)" (TR-3286).

The FileNet IS requires a specific version of the operating system, and an additional patch installation is required. FileNet supports Oracle® and SQL server. Our test environment used Windows 2000, MSSQL 2000 with SP3, and Data ONTAP 7.0.1R1 with FileNet IS 4.0 software.

Network Connectivity

Network connectivity is required between the SQL/IS server and the NetApp storage device(s). In a SAN configuration, the primary connection for the flow of SCSI block data is a dedicated 2Gbps FC link. Out-of-band communications for management purposes and other NFS-related communications are handled via either gigabit Ethernet (GbE) or a regular 100-Base-T Ethernet network connection. If iSCSI is used, a GbE network connection is required between FileNet IS, the database servers, and the NetApp storage device(s).

Configuring the network properly, plays an important role in using the FileNet IS services solution with NetApp storage. High-performance access to binary objects is one of the main business objectives, hence we recommend use of a dedicated GbE network connecting the filer, IS server, and MSSQL database servers, except where FC SAN connections are used. This GbE storage network is used for IS and SQL server data transfer activities to avoid competition with regular network traffic. Setting up a separate GbE switch using an existing switch's VLAN capabilities will suffice for this purpose. Note that a dedicated network connection provides the additional benefits of less network latency and data contention in the network

A simple single-path point-to-point configuration can be configured to use FileNet IS. Both the GbE and FC connections are made directly without a switch. Note that in many GbE and FC-SAN configurations, it is assumed that one or two GbE or FC switches will be used to connect the server(s) to the storage. Using two switches with multipathing is optional but can be done to eliminate any possible single point of failure in the storage network. Different filer configurations will be discussed later in this paper.

FileNet Image Service and the MSSQL Database Environment

Both the MSSQL database and FileNet IS software require some preinstallation tasks to be completed on the server host. Currently FileNet supports database servers such as Oracle 9.2.0.2, DB2, and SQL Server 2000. Our test setup used MSSQL 2000 on Windows 2000 with iSCSI and SnapDrive 3.1 configuration.

Installation Tasks

A user account and appropriate groups must be created. Table 1 below shows the required user accounts and their group and permission requirements.

After these tasks are completed, setup and configuration of local disks must be performed. This may involve configuration of a SAN using either FCP or iSCSI protocols.

- Install MSSQL database server
- Perform postinstallation tasks for SQL server
- Install FileNet IS software

- Perform postinstallation tasks
- Configure MSAR storage libraries
- Install NLS module to support SnapLock

SETTING UP AND CONFIGURING LOCAL DISKS

This section describes the procedure for installing and configuring local SCSI disks using iSCSI. This section provides a high-level overview to guide you through the setup of your NetApp storage system in the SAN environment using FCP for SCSI. The following diagrams show a single-path host connection, a direct-attached host connection, and a multipath connection. This paper recommends connecting the target HBAs to the different switches. This will avoid connecting the target HBAs to the same switch, introducing a chance for a single point of failure at switch level. It is important to install the initiator HBA in the host machine. In a direct-attached configuration, a second port is not used, hence a terminator must be attached to that port. Before proceeding further, check the NetApp [SAN support matrix](#) on the NOW site to verify that the host and operating system have all the required patches or service packs.

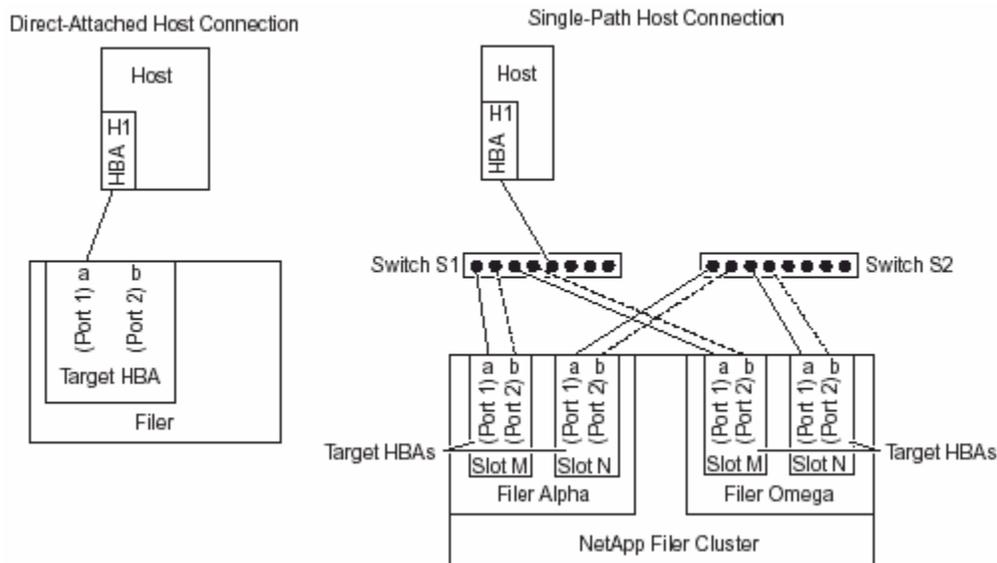


Figure 4. Direct connect and single-path host connection

Fabric-attached configurations use the host to connect to the switches, for multipath host connection to provide protection against a single point of failure. For details, refer to the FCP configuration product manual available in the knowledge base on the [NOW site](#).

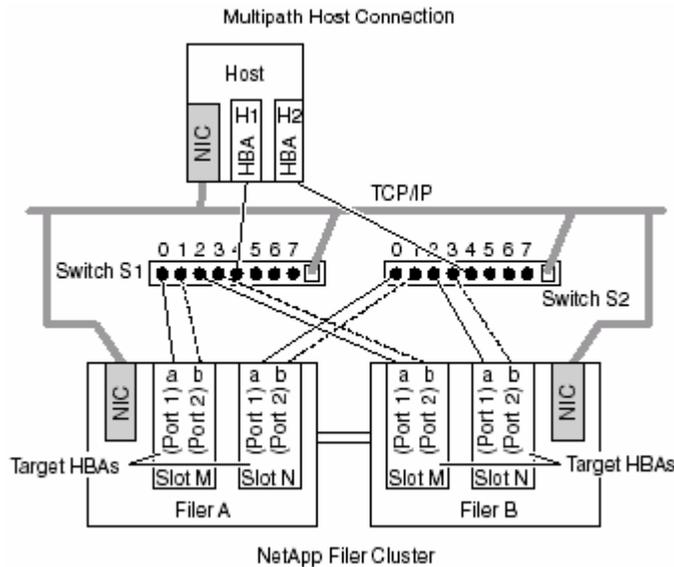


Figure 5. Multipath host connection with NetApp storage system cluster

Installation and Configuration of a SAN Using the iSCSI Protocol

This section describes the procedure for installing and configuring local disks using iSCSI software. The configuration may use the iSCSI Host Attach Kit from NetApp using hardware HBAs. Software configuration uses the software initiator software available from the [Microsoft download site](#). Search for the latest available iSCSI software initiator for your platform. This test setup used iSCSI software initiator version 1.06, but the setup and configuration routine applies to later releases as well. For detailed instructions on how to install and configure iSCSI, refer to the [iSCSI Host Attach Kit documents](#) available in the knowledge base on the NOW site. A brief description of the steps involved appears below:

1. Verify that the Windows server has the required service pack and that network connectivity exists. Note that a fast Ethernet network is required for configuring and using the iSCSI software initiator. even though the network will work with the software initiator configuration.
2. Verify that the licenses for SnapDrive, ISCSI, and CIFS are enabled and that CIFS and iSCSI services are running on the NetApp storage devices.
3. For higher performance and better CPU utilization, deploy iSCSI HBA attach kit from NetApp.

Note: For detailed procedures on how to install SnapDrive, refer to the [SnapDrive installation and administration guide](#). For additional information on best practices for SnapDrive, refer to the [SnapDrive best practices guide](#).

After the installation of the iSCSI software initiator, configure the iSCSI initiator to establish a network connection to the target device. The procedure is shown below:

Click the Microsoft iSCSI initiator icon, choose Target Portals, and click the Add button to add a target port with a socket number and the port number. A sample diagram is shown below.

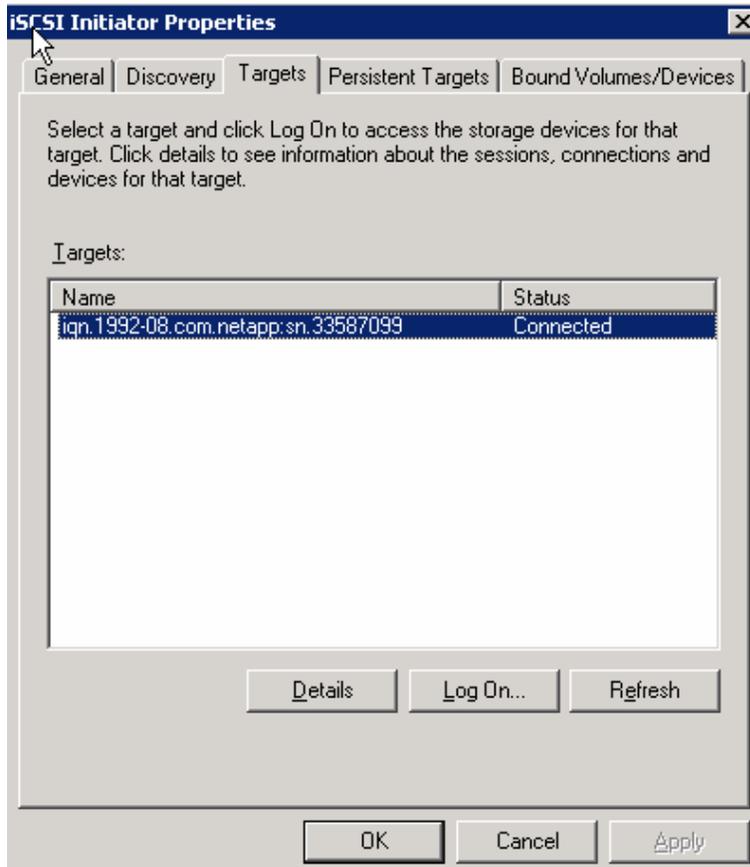


Figure 6. Available target portals

Note that you can add multiple target portals to the iSCSI initiator. For example, multiple NetApp storage devices can be added to the host iSCSI initiator to configure local disks. Complete the initial iSCSI initiator settings to set up an initiator group and CHAP service to allow the initiator to authenticate targets when performing mutual CHAP.

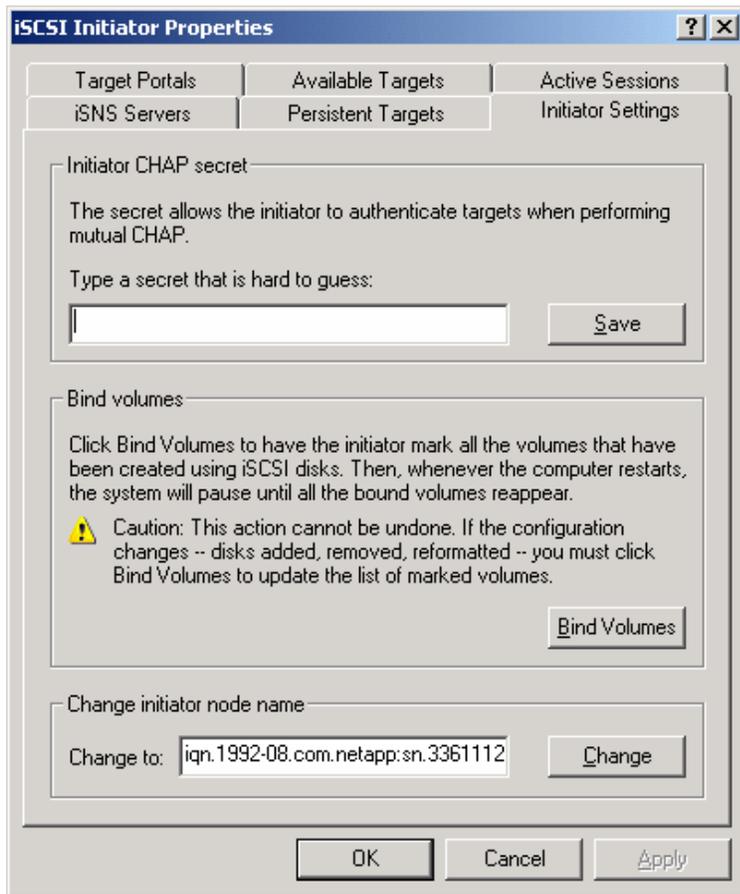


Figure 7. Initiator initial settings

Now verify that the iSCSI initiator host has at least one available target portal that is connected. If it is not connected, click the Login button to connect to the target portal. Install SnapDrive software, verify the installation, and complete the local disk configuration using the Computer Management utility. SnapDrive software installation requires system Administrator's privileges.

FCP/iSCSI-Related Tasks

This section assumes that you have reviewed the design architecture and some of the options discussed earlier in Section 3.5. Complete installation of the software provided with the FCP Host Attach Kit for the OS host. Before creating LUNs, analyze the storage and file system space requirements for FileNet IS software configuration, including the space requirement for the database. This paper strongly suggests having "space reservation" enabled on any LUN to take advantages of quick backup and recovery using Snapshot and SnapRestore[®] features. For detailed steps on creating LUNs and a file system, refer to the [NetApp documentation](#) for Windows [Installation and Setup Guide](#) for SAN.

Setting Up the Fibre Channel Switches

NetApp supports different types of switches, including most Brocade and McData switch models. Additional brands and models are being added to the list of officially supported switches on a regular basis. For support of a particular type of FC switch, please refer to the [Fibre Channel switch support](#) available in the knowledge base on

the NOW. The switches supplied with the NetApp storage appliance include the proper microcode, and both switches in a SAN fabric must be the same model and running the same microcode. Configuring FC switches and FC SAN fabric can be complex, especially when you are using a multipath I/O. You are strongly encouraged to involve NetApp Professional Services, a NetApp system integrator, or Fibre Channel storage experts before configuring or changing your NetApp FC SAN. The setup instructions below assume a Brocade FC switch, but the same storage networks can also be built using other switches supported by NetApp.

SAN Configuration Procedure

Define an initiator group on the filer with the FileNet IS host included as a member. On the OS host, get the World Wide Port Number (WWPN) information of the FCP adapter using the `sanlun` command. This information is required to create an igroup on the filer:

```
# sanlun fcp show adapter
lpfc0 WWPN:10000000c92d60b2
#
```

Using the information obtained for the WWPN, create an igroup. You may use the FilerView® utility to create the necessary igroups.

If the required volumes do not exist already, create volumes on the filer. Depending upon the storage space requirement, a single or multiple volumes may be configured under a larger aggregate. If needed, different NetApp storage devices may be configured for RDBMS and FileNet IS servers. A large aggregate may be created with one volume or qtree each for the MSSQL database, the FileNet IS services installation, and the MSAR storage library and datasets. To create aggregate and necessary volumes, use the FilerView GUI utility. Use of FlexVol™ with a RAID protection of RAID-DP™ helps in data management and data protection.

Because NetApp supports multiple LUNs on one volume, you can use a single volume for all LUN setup in your FileNet environment. (If you are using multiple NetApp devices for your FileNet data, you will need different volumes for the different filers.) Multiple volume setups can be configured depending on configuration and usage requirements. In a SAN configuration, backup of LUNs requires that space reservation be configured to enable you to take advantage of the almost instant backup and quick restore features of Snapshot and SnapRestore. Space reservation may be enabled during the LUN creation time.

On Windows, the FilerView and SnapDrive utilities can be used to configure SAN storage and manage the storage (local configured disks) configured.

FILENET IMAGE SERVICE AND SQL SERVER PREINSTALLATION REQUIREMENTS

This section provides the information required to complete the preinstallation tasks prior to software installation and configuration. The integration of IS software with NetApp storage requires installing and configuring SnapDrive and iSCSI initiator/FCP setup on the Windows server. The installation and configuration procedure requires Administrator privileges. FileNet Image Service requires installation of the supported database server and that the database server be up and running. Since FileNet IS supports a specific version of each database, it's important to verify and configure the supported version. Starting with IS 4.0, FileNet supports only site-controlled database configuration. It has discontinued support for database configuration controlled by FileNet. FileNet IS requires the system administrator to create the user names and their corresponding groups with certain privileges. If your configuration requires the VERITAS® volume manager to manage file systems on the SAN setup, refer to the *FileNet Image Services Installation Procedure for Windows Guide* for details. The following table lists the requirements for user names and their corresponding user groups.

Group Name	Members	Remarks
fnusr	fns, Administrator oracle sql	These members can operate any FileNet software. Operators and administrators belong to this group. Creation of oracle user is required if the system has previous installation of Oracle or environment variables are set
dba	fns, sql oracle	These members must also belong to the dba group. Users in the dba group should have Administrator privileges.
fnadmin	fns, oracle sql Administrator	Members can administer FileNet software. Administrators must belong to this group. This group can do configuration changes and backup and recovery operations.
ora_dba	fns oracle, Administrator	If oracle is added to FileNet groups, ora_dba group must be present.
fnop	fns Administrator, sql	Members can start and stop all FileNet software. Administrators also belong to this group.

Table 1. User account information

Operating System Information

For a successful completion of software installation, follow these steps in getting the system information. As many as 16 peer systems can be configured, so organization and domain name information are very important. FileNet IS supports both Windows and UNIX platforms such as Solaris , AIX, and HP/UX. The following table may serve as a preinstallation requirement worksheet. System serial number (SSN) plays an important role in the FileNet environment.

Installation Information	Remarks
Server IP address	Use the GbE address. Host name resolution may be required.
Network address	Optional additional network path.
System serial number	This is a 10-digit number provided by FileNet.
Domain name	Domain:Organization is a two-part information.
Organization name	An example of domain:Organization is ntap:NetApp where ntap is the domain and NetApp is organization.

Table 2. Networking information

Determining Dataset Space Requirements

By knowing in advance the space requirement for the datasets, storage configuration can be made in an efficient method by employing the right kind of design. We assume that you have taken the space requirement into consideration while creating the LUNs during the disk format phase. For more information, refer to the [Image Services Installation Procedures Guide](#) that comes with IS software. Once dataset sizes have been decided, determine the appropriate size for system cache information. This includes the default size, minimum size required, and the maximum size available for the configuration. For details on how to determine these numbers, see the FileNet IS product information.

Printer information will help you to configure NCH server name with the printer type and printer server IP address. Configuring or tuning the operating system kernel parameters: This information was discussed in earlier section. Choosing the type of image server: Before installing the software, choose the type of servers:

- Root/index server during a DUAL server installation
- Root/index/storage library server during a combined or entry server installation
- Whether to install FileNet IS software in cluster mode

Database Server Installation

The database server must be installed and configured properly for a successful installation and configuration of FileNet IS. FileNet IS supports Oracle, SQL Server 2000, and DB2 databases. In our test setup we installed SQL server database and a service pack 3 was applied. Installing and configuring the MSSQL database server is critical for successful installation of FileNet IS. Since FileNet IS supports site-controlled SQL databases, it's best to install the SQL database server as a sql user on a different path or on a different server in the network. This will avoid the need to remove all the binaries and data files if the FileNet software needs to be uninstalled for any reason.

MSSQL Database Server Installation

The SQL database server can be installed from scratch or you can use an existing SQL database server. It is important to apply the MSSQL service pack (SP) to upgrade to SQL Server 2000 with SP3 or later. This document recommends installing SQL at a location outside the FileNet IS software installation directory. This will avoid the loss of data and binaries in case you need to uninstall FileNet IS software. The procedure for completing the database configuration is documented below:

1. Install the MSSQL server and you can skip the database creation step.
2. If it's a new install, register the SQL server.
3. Verify that the SQL service has been created, that related services have been started, and that necessary environment variables have been set.
4. If required, configure the SQL server to start automatically.
5. If the service has not been created, verify that the database server was installed successfully.

The following figure shows the status of SQL database installation.

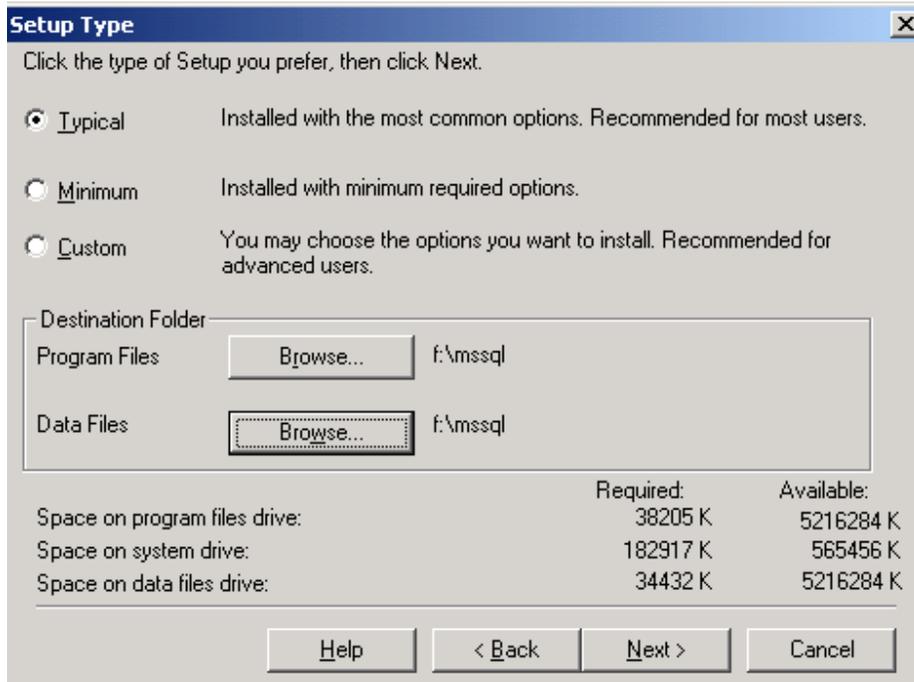


Figure 8. SQL Setup Type

1. Verify that `fnsw sql oracle` users have been created and the corresponding user groups have been created, such as `DBA`, `FNADMIN`, and `FNOP` for database and FileNet configuration setup.
2. If the SQL database software is already installed, verify that the related services have been started. This can be checked with `Services` tool from the Control Panel.

Once the SQL server is installed, on our test setup, the installation status was displayed as shown in the figure.



Figure 9. MS-SQL setup status

After installing the MS-SQL server, install the appropriate Service Pack (SP) to upgrade an existing instance of SQL server 2000. You need to specify an authentication mode and register SQL server to complete the database server installation and setup. On our test setup, the SQL server was upgraded and started using SQL Server Enterprise Manager.



Figure 10. SQL Server Enterprise Manager

With SQL server there is no need to create FileNet specific database(s). FileNet installation process will create the necessary databases, unlike the Oracle database configuration.

Before proceeding further, ensure that the SQL Server is configured properly and the setup is complete. If the SQL server is not upgraded to the latest service pack, the upgrade process can be completed at this time.

Verify that the SQL database is installed and configured as described in the FileNet document Site-Controlled RDBMS for IS 4.0.

Note: Before starting Image Services, start the SQL Server. On our system, SQL Server was up and running.

To recover the SQL Server, we suggest that you make a backup copy of all related system databases and log files and store them at a different location. This will help you restore the SQL server if required.

INSTALLING FILENET IMAGE SERVICES SOFTWARE

This section discusses the procedure for installing FileNet IS software. As part of the preinstallation process, verify that the appropriate users have been created and that their permissions have been set appropriately. To complete the use of the image services, make sure that Software License Access Control (SLAC) has been applied and that FileNet has supplied the appropriate SLAC license code.

Adding Users on the Image Services Server Machines

FileNet Image Services needs to have a user account called `fnsw`. The user group and other details are discussed in Section 7. After the user `fnsw` is created, log off the system and login as `fnsw` user.

Preinstallation Requirements

Before installing IS software, please check the FileNet documents for any required OS patch installations. Windows 2000 must be upgraded to at least SP3.

Install IS Software

This section describes the procedure for completing installation of IS software.

1. Login as Administrator.
2. Start the Installation wizard by running the file setup.exe; double-click the file if it does not start automatically.

This utility starts a window to enable you to install the software. Continue with the software installation. On our test setup, fnsfw product installation status was displayed as shown below:

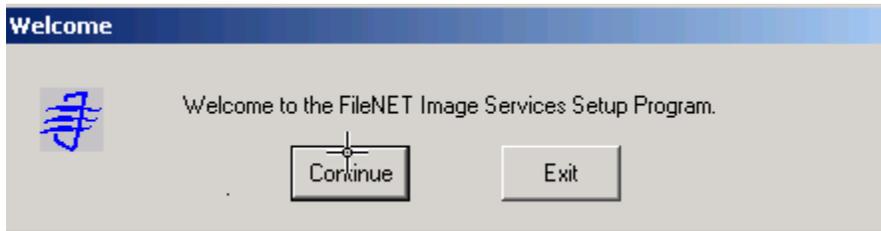


Figure 11. FileNet Image Services setup program

If the FileNet Image Services software is being installed as a cluster system, select the appropriate option and continue the installation. On our test setup, we used the default option of using a single system. Next it displays the available disks for the software installation. Now select the destination for the software installation. On our system, the available local NTFS drives and the Windows drive are displayed as shown below.

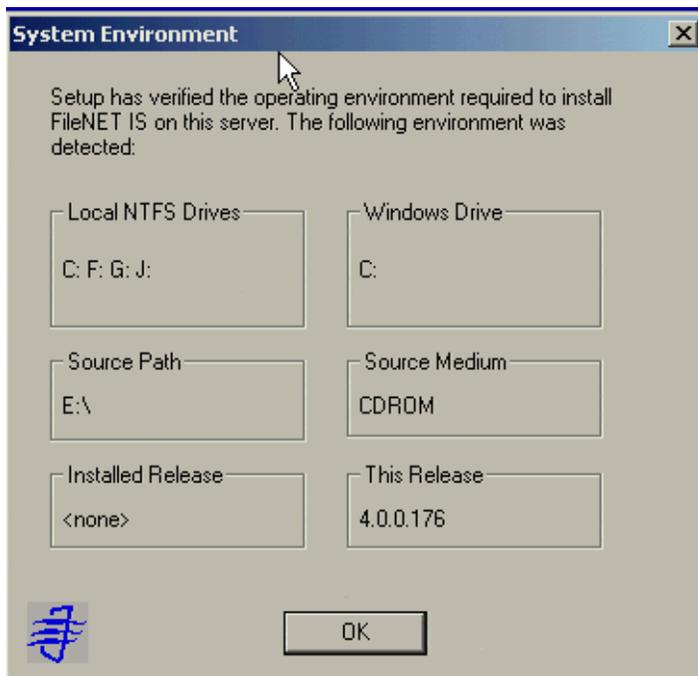


Figure 12. Available local NTFS drives

Next select the directory for the software installation. On our setup, we selected a local NTFS drive called G: \, which is configured using iSCSI and SnapDrive.

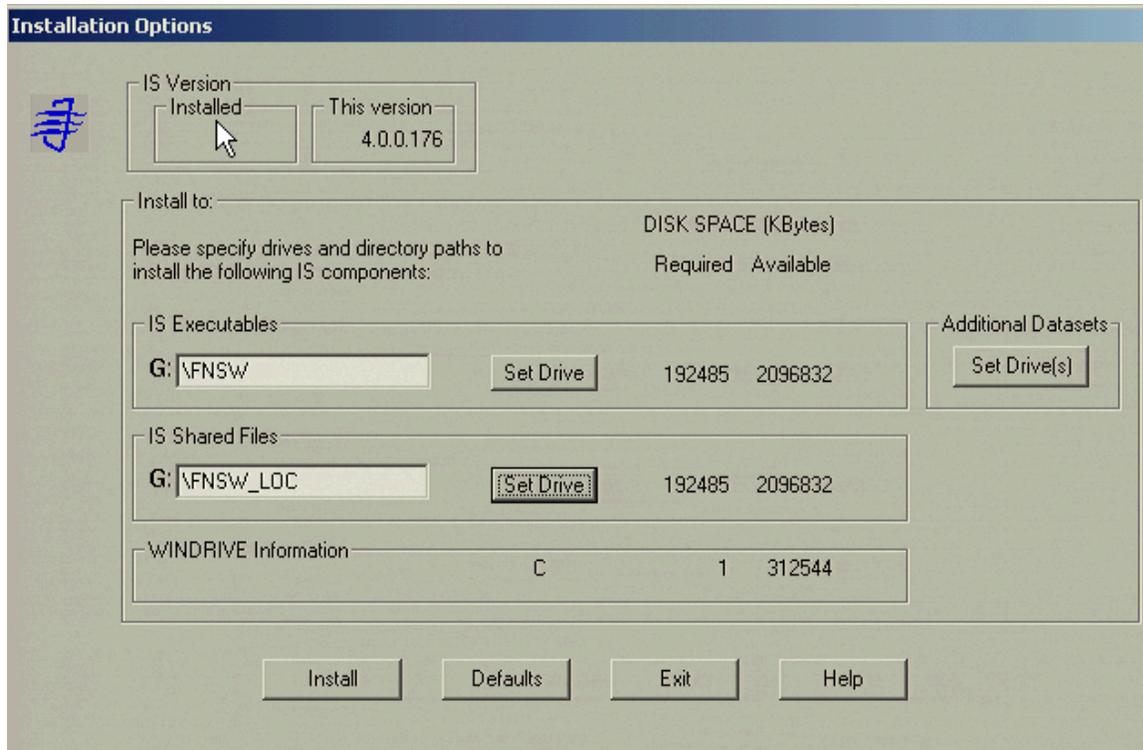


Figure 13. FileNet Image Services installation options

Next, choose the type of Image Services mode, such as Combined Server, as shown below.

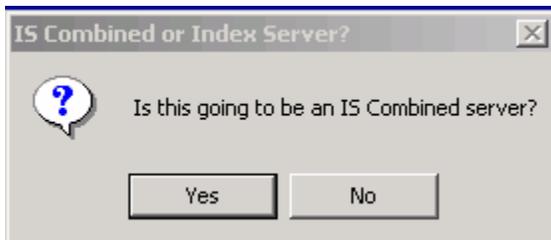


Figure 14. Image Services server type

From the preinstallation worksheet, obtain the system serial number (SSN) and determine the network clearing house (NCH) and domain name and enter that information. On our setup, these parameters are as shown below. Note that the SSN shown below does not reflect the actual number. Complete this parameter with the information obtained from FileNet.

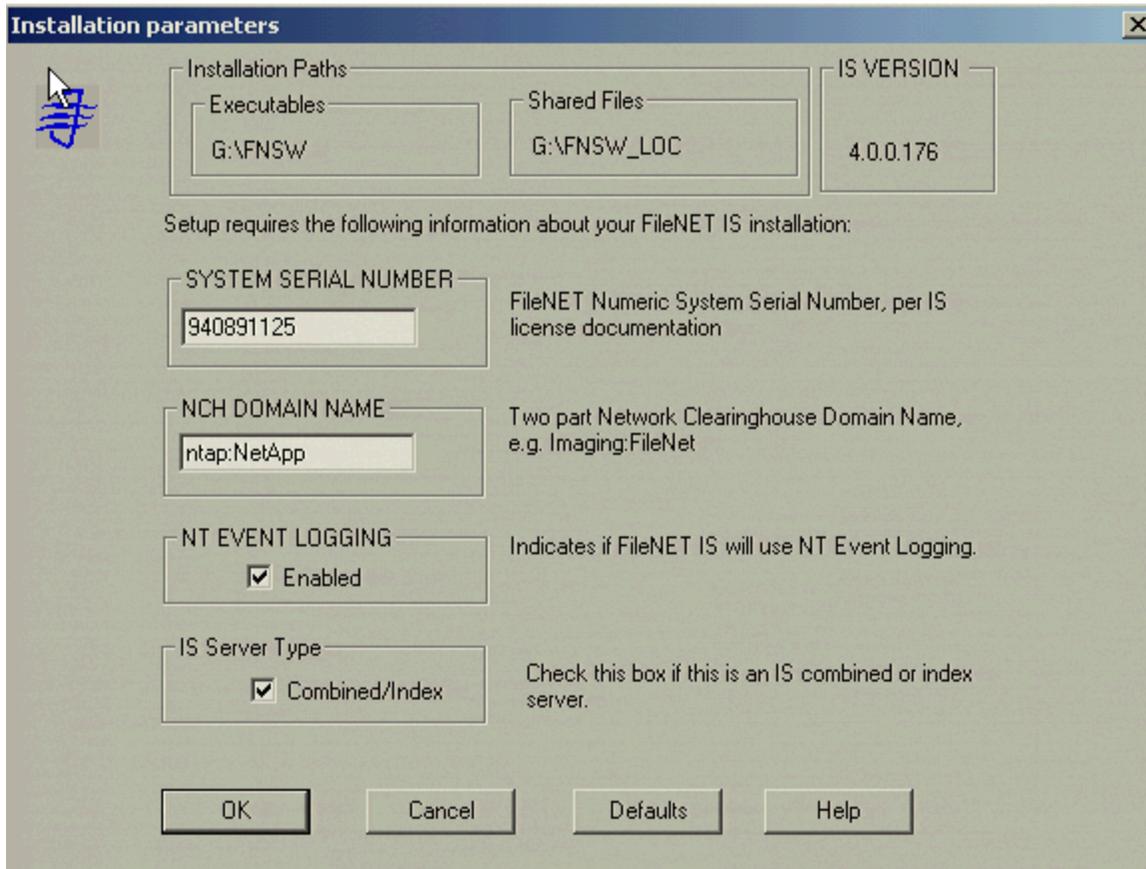


Figure 15. FileNet Image Services installation parameters

Continuing with the above step allows you to validate the license key using SLAC. Apply the appropriate license obtained from FileNet. If you have a valid license, click Yes and continue the installation: the installation utility will validate the license key.

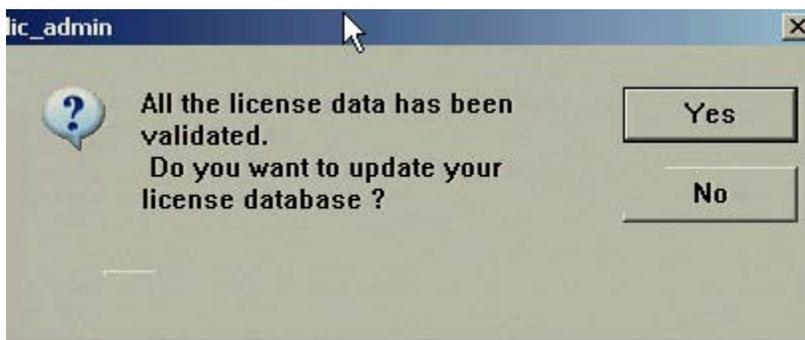


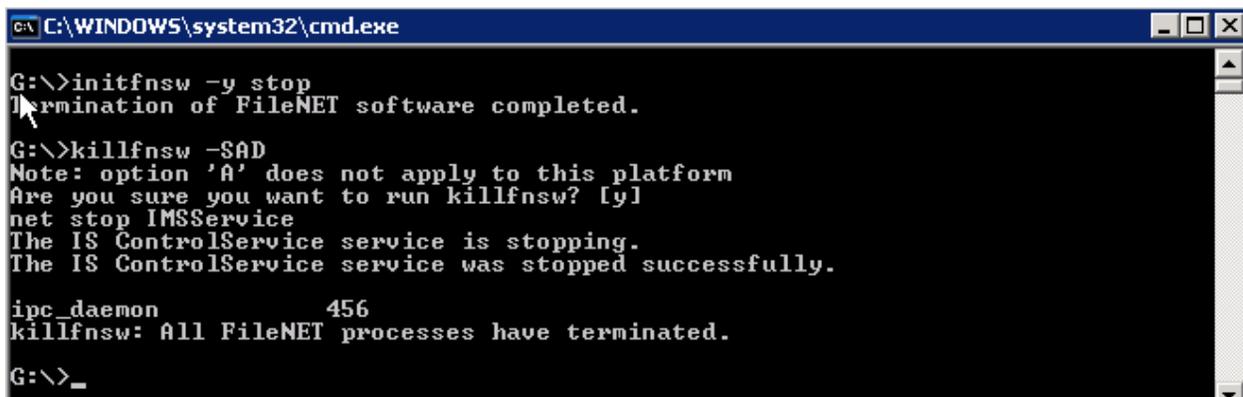
Figure 16. FileNet Image Services license administration

With the validation of SLAC, FileNet IS software installation is completed. Since the release of IS 4.0 software, FileNet has addressed several issues, added new features, such as support for IS connector for SnapLock (ISCS), and released a service pack called IS 4.0 SP3. FileNet requires users to upgrade to the latest release level. Even though IS 4.0 works with SnapLock, it is recommended that you upgrade the server to support native retrieval from a SnapLock archived destination. The next section will describe the procedure for upgrading FileNet IS.

Upgrading FileNet Image Services to a New Service Pack

To upgrade to IS 4.0 SP3, obtain the necessary software by visiting the [FileNet Customer Services website](#). Before upgrading IS, stop the software and the related IS ControlService service.

On our system, we issued the following commands to stop Image Services.



```
C:\WINDOWS\system32\cmd.exe
G:\>initfnsw -y stop
Termination of FileNET software completed.
G:\>killfnsw -SAD
Note: option 'A' does not apply to this platform
Are you sure you want to run killfnsw? [y]
net stop IMSService
The IS ControlService service is stopping.
The IS ControlService service was stopped successfully.
ipc_daemon          456
killfnsw: All FileNET processes have terminated.
G:\>_
```

Figure 17. Stopping Image Services before upgrading the software

Now start the upgrading of Image Services. The installation utility starts the upgrade process and processes all the required information. On our test setup, the following output was shown.

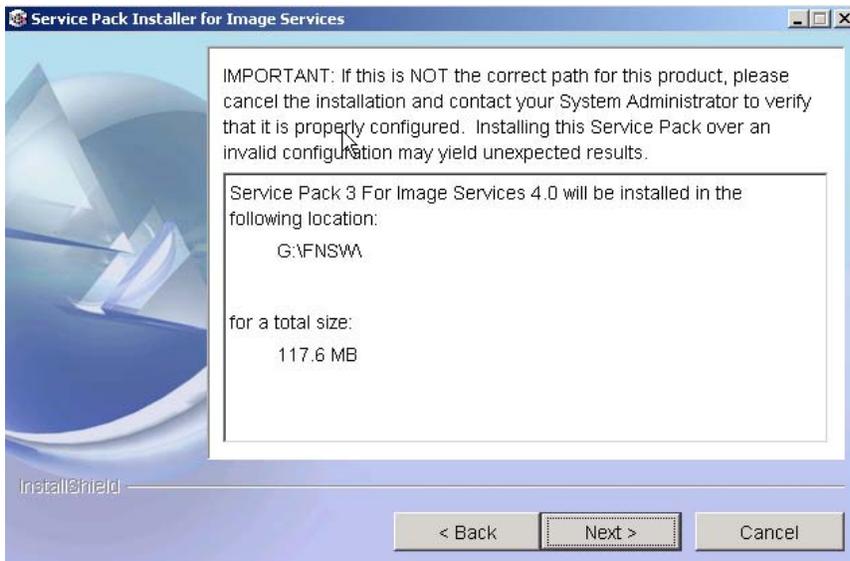


Figure 18. Location for the FileNet IS upgrade with service pack

Configuration files are overwritten on the target system, and any changes to the original configuration must be manually incorporated from the backup directory into the updated file. This procedure will complete the upgrade of FileNet IS to the 4.0 SP3 release.

Configuring FileNet Image Services

After installation and upgrading of FileNet Image Services, certain tasks must be performed before you can start using the IS system. To configure the IS system, use the FileNet IS system editor. When the system editor is started for the first time after installation, it displays the information about new database configuration, including the database, domain name, and database template. On our system, this information is shown below.

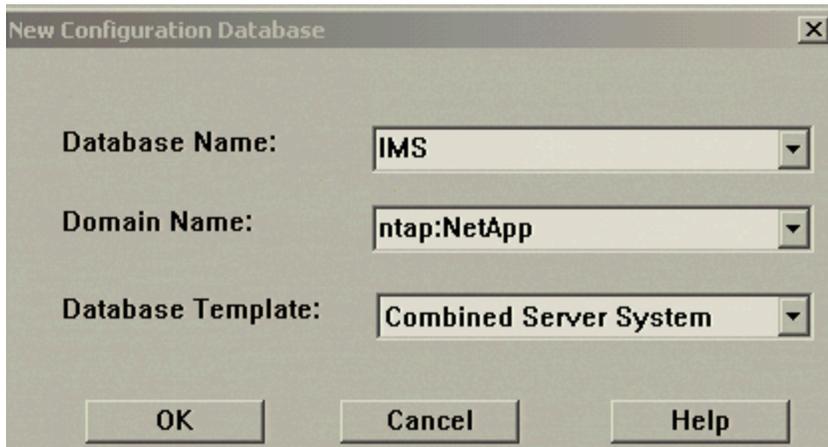


Figure 19. System editor at start-up displaying new database configuration

After verifying the above information—for example, the name of the database template (in this case, Combined Server System), continue the configuration by providing the base directory for storing the default datasets. Next configure the relevant database server type. On Windows 2000, FileNet IS supports both Oracle and Microsoft SQL Server 2000. Select the appropriate relational database in your environment. On our system, we selected Oracle 9.2.0 to configure the relational database for the IS system.

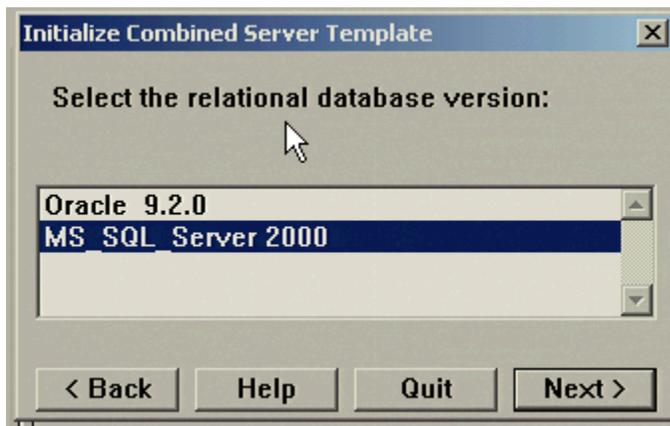


Figure 20. Initialize Combined Server Template

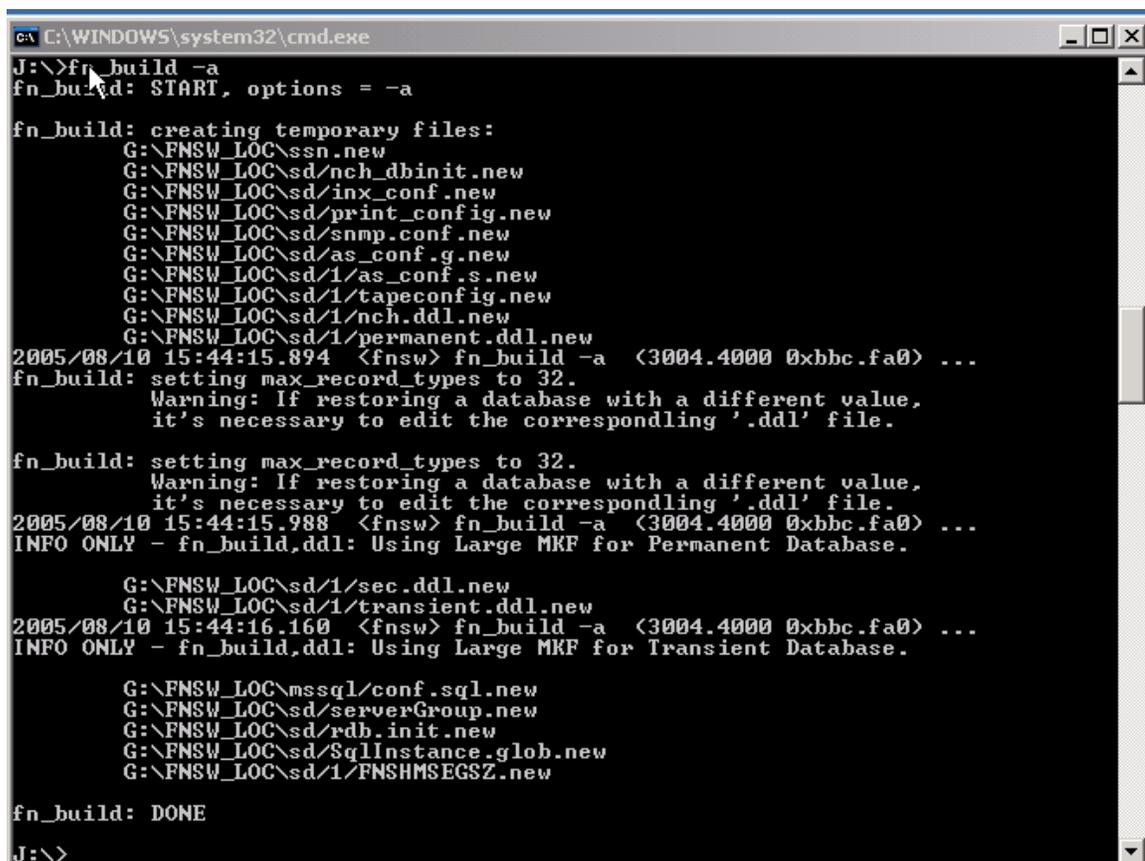
If the tape and printer configurations must be configured, add the appropriate services. With these entries, the customized settings for IS are complete. Verify that the datasets are defined correctly and modify the size of the datasets as needed in your environment. Once configuration is completed, exit the configuration editor and proceed with building the database.

Completing the Configuration of Image Services System

After configuring the necessary parameters using the configuration editor, it is necessary to complete certain post-installation tasks. This section will explain the procedure to be completed before using the IS system.

1. Build the database using the `fn_build` utility.

We used the `-a` option to build all. The following was the output of `fn_build -a` command.



```
C:\WINDOWS\system32\cmd.exe
J:\>fn_build -a
fn_build: START, options = -a

fn_build: creating temporary files:
G:\FNSW_LOC\ssn.new
G:\FNSW_LOC\sd\nch_dbinit.new
G:\FNSW_LOC\sd\inx_conf.new
G:\FNSW_LOC\sd\print_config.new
G:\FNSW_LOC\sd\snmp.conf.new
G:\FNSW_LOC\sd\as_conf.g.new
G:\FNSW_LOC\sd\1\as_conf.s.new
G:\FNSW_LOC\sd\1\tapeconfig.new
G:\FNSW_LOC\sd\1\nch.ddl.new
G:\FNSW_LOC\sd\1\permanent.ddl.new
2005/08/10 15:44:15.894 <fns> fn_build -a <3004.4000 0xbbc.fa0> ...
fn_build: setting max_record_types to 32.
Warning: If restoring a database with a different value,
it's necessary to edit the correspondling '.ddl' file.

fn_build: setting max_record_types to 32.
Warning: If restoring a database with a different value,
it's necessary to edit the correspondling '.ddl' file.
2005/08/10 15:44:15.988 <fns> fn_build -a <3004.4000 0xbbc.fa0> ...
INFO ONLY - fn_build,ddl: Using Large MKF for Permanent Database.

G:\FNSW_LOC\sd\1\sec.ddl.new
G:\FNSW_LOC\sd\1\transient.ddl.new
2005/08/10 15:44:16.160 <fns> fn_build -a <3004.4000 0xbbc.fa0> ...
INFO ONLY - fn_build,ddl: Using Large MKF for Transient Database.

G:\FNSW_LOC\mssql\conf.sql.new
G:\FNSW_LOC\sd\serverGroup.new
G:\FNSW_LOC\sd\rdb.init.new
G:\FNSW_LOC\sd\SqlInstance.glob.new
G:\FNSW_LOC\sd\1\FNSHMSEGSZ.new

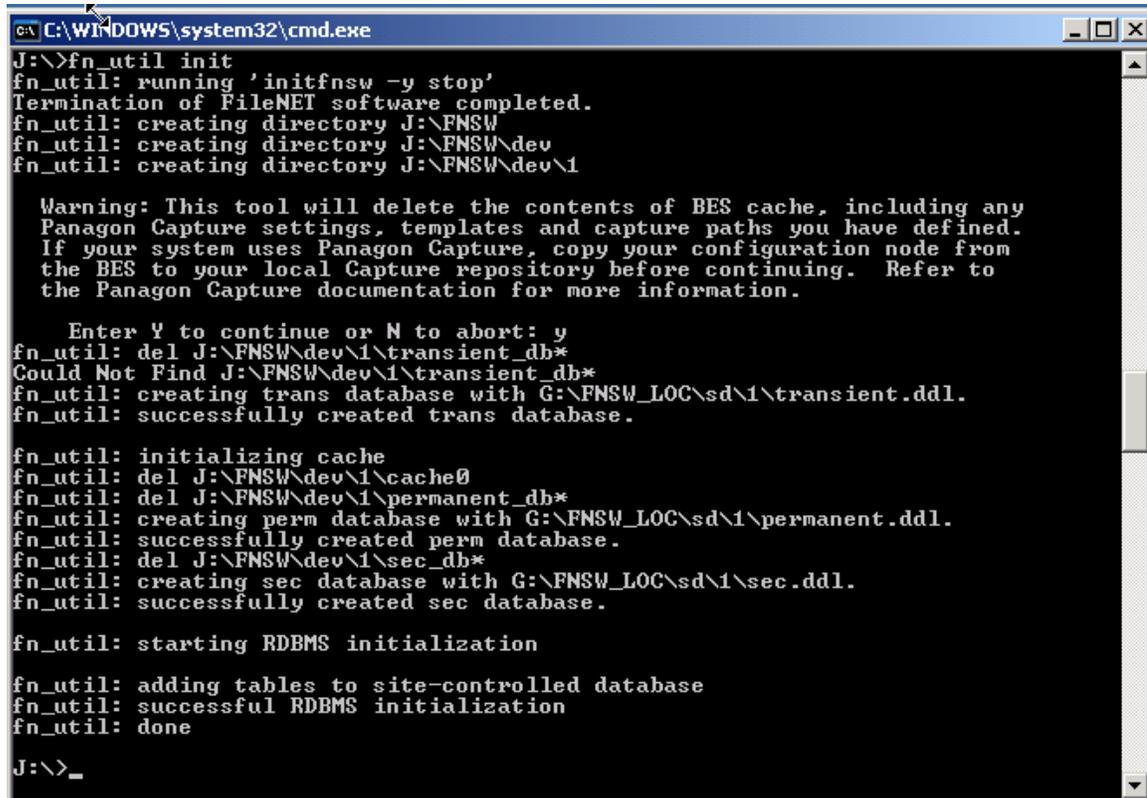
fn_build: DONE
J:\>
```

Figure 21. Using the `fn_build` command

Verify the success of the `fn_build` process by checking its log file, which is created at `\FNSW_LOC\Logs\fn_build\fn_build.log`. If there is no error, continue to initialize the database as explained in the this section.

2. Initialize the datasets using the `fn_util` command.

FileNet software installation has created several commands and utilities to manage the IS system. `Fn_util.exe` will allow the database to be created and initialized, and "n_util init" command initializes all the configured datasets. Note that the FileNet IS system has been stopped properly before executing the `fn_util.exe` command. This utility will create the necessary databases if the file is not present, and hence any related error message during initialization may be safely ignored. On our system, we executed the following command; the output is shown below:



```
C:\WINDOWS\system32\cmd.exe
J:\>fn_util init
fn_util: running 'initfnsw -y stop'
Termination of FileNET software completed.
fn_util: creating directory J:\FNSW
fn_util: creating directory J:\FNSW\dev
fn_util: creating directory J:\FNSW\dev\1

Warning: This tool will delete the contents of BES cache, including any
Panagon Capture settings, templates and capture paths you have defined.
If your system uses Panagon Capture, copy your configuration node from
the BES to your local Capture repository before continuing. Refer to
the Panagon Capture documentation for more information.

Enter Y to continue or N to abort: y
fn_util: del J:\FNSW\dev\1\transient_db*
Could Not Find J:\FNSW\dev\1\transient_db*
fn_util: creating trans database with G:\FNSW_LOC\sd\1\transient.ddl.
fn_util: successfully created trans database.

fn_util: initializing cache
fn_util: del J:\FNSW\dev\1\cache0
fn_util: del J:\FNSW\dev\1\permanent_db*
fn_util: creating perm database with G:\FNSW_LOC\sd\1\permanent.ddl.
fn_util: successfully created perm database.
fn_util: del J:\FNSW\dev\1\sec_db*
fn_util: creating sec database with G:\FNSW_LOC\sd\1\sec.ddl.
fn_util: successfully created sec database.

fn_util: starting RDBMS initialization

fn_util: adding tables to site-controlled database
fn_util: successful RDBMS initialization
fn_util: done

J:\>_
```

Figure 22. Initializing datasets using `fn_util` utility

3. Grant SQL user permissions

FileNet Image Services supports only site-controlled databases and hence appropriate user privileges are necessary for access to data. During the installation process, IS creates several SQL scripts to perform the necessary tasks.

4. Reset the password for `f_sw` user

The password for `f_sw` is done automatically after the successful completion of `fn_util` utility to initialize the database. Reset of password for `fns` is required in the Oracle database configuration.

5. Verify dataset initialization

As explained earlier, run the `fn_util init` command to reinitialize the database. Observe the status by checking the log file created as `\fnsw_loc\logs\fn_util\fn_util.log`;

COMPLETING THE INSTALLATION

Storage library configuration is required if the system is configured for dual-server operation. If so, refer to the FileNet documentation for instructions on configuring the system. Otherwise, skip this section.

About MSS and MSC Configuration

A cross-committal system will have a source Image Services system and a target Image Services system. In this configuration, the source IS system commits images to the target IS system without retaining the images locally.

A remote entry server (RES) is a specific type of cross-committal system that has no storage library and is used only for entering images for committal to a target system that does have a storage library.

Configure Multicommittal Systems

A multi committal system (MSS) commits images both to its own storage library and to the storage library of another independent FileNet IS system. MSS may or may not be compatible systems with non-overlapping document IDs. If they are non-compatible, new doc IDs are assigned on the target system, which may be a minor performance consideration.

Check the System serial number (SSN) of IS, which is a 10-digit number assigned by FileNet. The SSN is written onto all storage media. It must be unique for each IS system.

Start the FileNet Software

Before starting FileNet IS software, check that `IS ControlService` has been started and that the property is set to automatic in the Services Control Panel. Verify that the service has logon properties set properly. Also check that SQL Server has been started and that the database server is up and running. Use the Task Manager on the FileNet IS panel to check the status of the software. On our test setup, the Task Manager displayed the following:

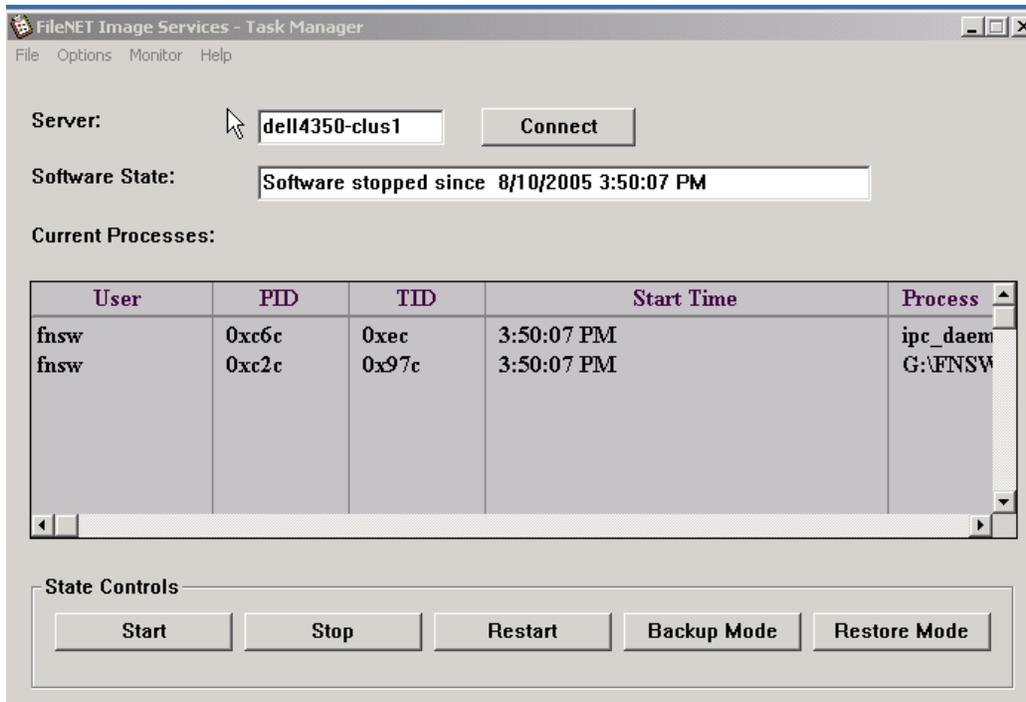


Figure 23. FileNet Image Services showing Task Manager status when the services are stopped

To start the software, click the Start button. A screen similar to the one shown below will appear.

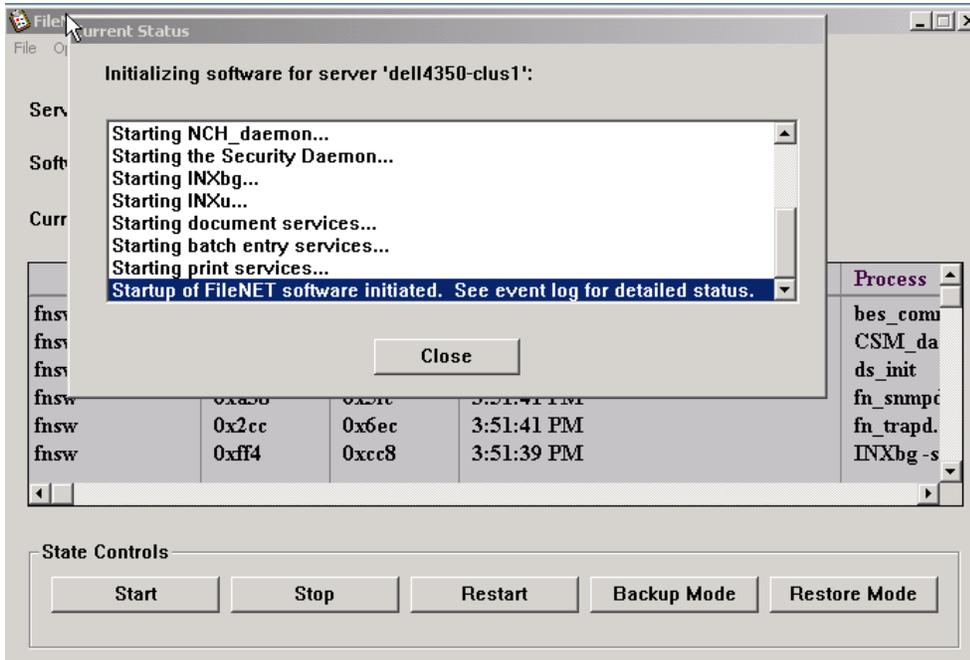


Figure 24. FileNet Image Services showing Task Manager status after the service startup

CONFIGURING THE MSAR STORAGE LIBRARY

Starting with Image Services 4.0, MSAR is supported directly without having to upgrade the FileNet IS server. In July 2002, FileNet added a new feature called Magnetic Storage and Retrieval to Image Services 3.6 ESE (Extended Storage Edition) to support the storage of images and documents on magnetic storage, which can be used along with OSAR or can replace optical storage entirely. Because of MSAR storage library's advantages, many IS customers are replacing optical media with MSAR. Some of the benefits of using MSAR rather than optical media are

- Increased storage scalability and density
- Faster performance due to:
 - Faster drive performance on magnetic drives than on optical drives
 - Elimination of delays due to media swapping and spinup
- Higher availability due to elimination of library robotics
- Instant data backup and quick recovery with NetApp Snapshot and SnapRestore features
- Reduction in end-user delays and complaints
- Improved system manageability

The minimum MSAR surface size is 1GB; the maximum size is 32GB. The maximum number of slots is 1024 per MSAR storage library. Types of MSAR storage library are Model 16, Model 128, Model 256, Model 512, and Model 1024. (The model number corresponds to the number of licenses purchased.) Maximum capacity of MSAR storage

is 128TB. (These MSAR licensing options are subject to change by FileNet in future versions of IS.) Our test configuration used the Model 512 MSAR storage library to configure MSAR surfaces.

Using the MSAR Storage Library

MSAR surface creation using NetApp storage is simple. It is created in the MSAR creation directory. Its path information is stored in the database with each storage, which has one creation directory for storing the MSAR surface. New MSAR surfaces can be created when the existing MSAR surface is full or approaches the configured size. All existing MSAR surfaces will remain intact, and the old MSAR files will not automatically move over to the newly created MSAR surfaces. Migration to the newly created surface requires intentional surface data movement. To guarantee data integrity, FileNet and NetApp have done extensive tests to verify that data written to MSAR to NFS NetApp volumes is written synchronously.

Use the FileNet configuration editor (`fn_edit.exe`) to configure a new MSAR surface or delete an existing MSAR surface library. To add a MSAR surface, choose Configuring an MSAR Storage Library and click Run, and follow the instructions.

Note: The number of disks for favoring writes can be ignored and set to zero.



Figure 25. Configuring the MSAR surface creation directory

Once configuration is completed, save the changes before exiting the configuration editor. Rebuild the datasets by running the `fn_build -a` command.

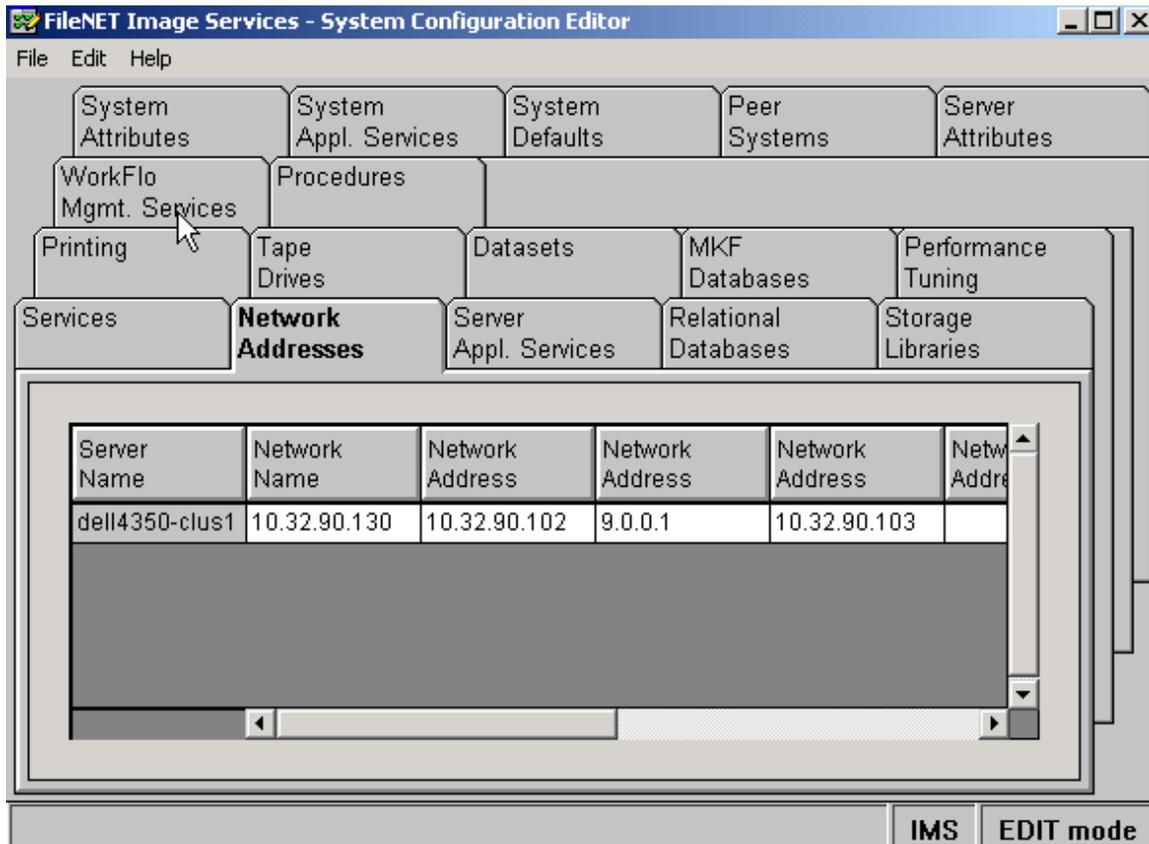


Figure 25. FileNet IS configuration editor

MANAGING IMAGE SERVICES DATA

To increase the MSSQL server availability and prevent problems, avoid filling the volume to capacity.

In a SAN configuration, enable persistent binding so that a device entry to a LUN connection will remain consistent across system reboots.

The NOW [\[link to NOW\]](#) site offers many technical papers that cover deployment of SQL on NetApp storage. In addition, SQL server can be deployed efficiently by using SnapManager for SQL Server, which makes management of the database server more efficient.

INTEGRATION OF IMAGE SERVICES CONNECTOR FOR SNAPLOCK

To take advantage of WORM capability on magnetic media, FileNet has announced support for NetApp SnapLock via SnapLock Storage and Retrieval (SSAR), which works with IS 4.0 servers. To take advantage of native retrieval, this paper recommends upgrading to IS 4.0 SP01 or later.

SnapLock configuration allows users to archive the data onto a permanent nonerasable, nonrewritable magnetic media while taking advantage of NetApp technology for archival, backup, and disaster recovery. For detailed instructions on integrating Image Services Connector for SnapLock, refer to the upcoming technical report.

CONCLUSIONS

FileNet support for image storage on magnetic disk using MSAR combined with NetApp unified storage enables NetApp storage systems to operate in a true unified storage architecture and serve as both file system and raw partition storage for FileNet Image Services, depending on the needs of the system and the preferences of the FileNet administrator. Administrators who need the features of SAN or NAS configurations (block or raw partition storage from SAN and remote file system storage from NAS on UNIX platforms) can now deploy FileNet storage that is fast, scalable, reliable, and flexible enough to store any kind of FileNet data, including database, MKF, cache, and images with MSAR. On Windows 2000, MKF/cache can be configured on network share devices. In addition, NetApp storage system integration provides FileNet customers with quick backup and recovery capabilities as well as simplified data replication and disaster recovery planning. This paper demonstrates that deploying NetApp unified storage solutions for FileNet storage is both technically simple and provides significant technical and business benefits when compared to traditional direct-attached, NAS-only, SAN-only, or optical storage.

CAVEATS

NetApp has not tested all possible combinations of hardware platforms and storage architecture and software options. If you use a different server OS, different version of Image Services, or a different database, significant differences in your configurations may alter the procedures necessary to achieve the objectives outlined in this document. If you find that any of these procedures do not work in your environment or if you need additional information, please contact the [author](#) immediately.

REFERENCES

There are several technical papers related to SAN configuration available in the NetApp technical library. In addition to those papers, see the following documents.

- [Image Services Installation and Configuration Procedures for Windows , Release 4.0](#)
- [MSAR Procedures and Guidelines for Image Services from File Net, Inc.](#)
- [Data ONTAP 7.0.1 System Administrator's Guide](#)
- [Microsoft SQL Server 2000: Implementing MSCS and SQL Server 2000 Virtual Server with a NetApp Filer](#)
- [SnapManager for Microsoft SQL Server 2000 Best Practices](#)



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