



Integrating FileNet® Images Services with NetApp Unified Storage for Windows® Platform

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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.

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2. Overview

To successfully manage 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 management 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 and reliable operation as well as advanced data protection options are made possible by Data ONTAP™, the NetApp microkernel operating system.

3. Purpose and Scope

This paper describes the steps necessary to integrate FileNet Image Services software and Oracle® 9.2.0.x on Windows® with a Network Appliance filer on a fabric-attached 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. 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.

4. Introduction

Integration of FileNet Image Services 4.0 and Network Appliance storage solution provides an effective solution for content management. This section describes the integration of FileNet Image Services 4.0 and Network Appliance unified storage.

4.1. FileNet Image Services 4.0

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, and providing the full-spectrum of connectivity needed to simplify their critical 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 4.0 delivers faster access to large numbers of fixed objects (billions of them) such as documents, reports, print streams, faxes, e-mail, and rich media content. FileNet Image Server (IS) provides the ability to:

- 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.

Network Appliance Inc.

Currently FileNet Image Services is supported on Windows 2000. Supported UNIX platforms are Sun™ Solaris™ 8, HP/UX and AIX.

4.2. 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 Image Services 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, this installation described in this paper uses either FCP or iSCSI with NetApp SnapDrive™ 3.0 to set up and install the database and IS server.

4.3. Network Connectivity

A SAN on an existing network infrastructure using iSCSI (Internet Protocol Small Computer System Interface) is known as an iSAN configuration. Both SAN and iSAN configurations provide local SCSI disks to the Windows operating system. FC-host bus adapters (FC HBAs) come with a dedicated 2Gb per second Fibre Channel link. Usually FC SAN configurations have a failover server, NetApp storage server, and multipath to address any single point of failure. If the SnapLock™ connector for Image Services is planned, network connectivity must be CIFS on the Windows platform or NFS on UNIX platforms.

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.

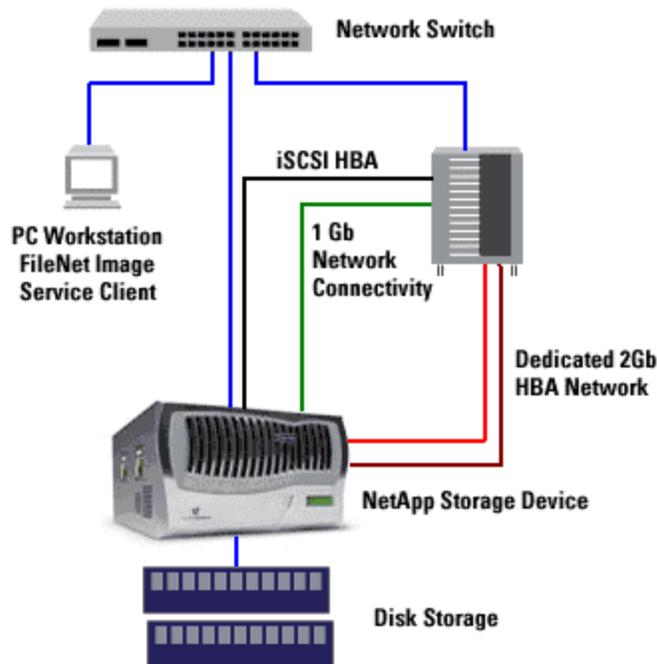


Figure 4-31. Simple Storage Area Network Configuration.

4.4. Design Architecture

FileNet Image Services 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 3.x software. SnapDrive allows the storage to grow without affecting the application by growing online. Backup of data stored in these LUNs (locally 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 appliances will work well with this setup. For SAN, only fabric-attached storage appliances that support Fibre Channel Protocol (FCP) will work with IS 4.0. 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 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 Windows 2000, you can use SnapDrive software and FCP or iSCSI hardware or software. iSCSI is supported on Windows 2000 and on Linux®, HP/UX, and AIX; there is also limited support on 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 filer cluster failover (CFO) option 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.

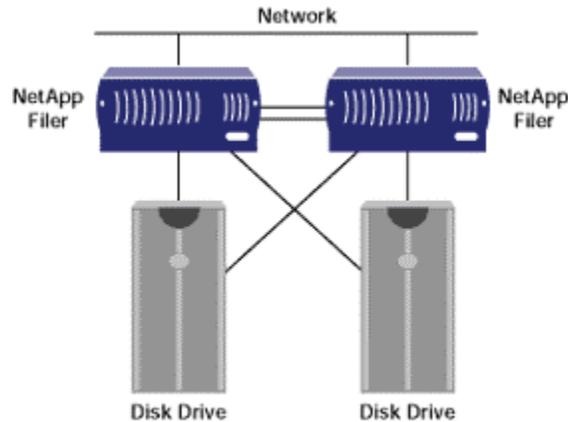


Figure 4-41. NetApp filer cluster fail-over configuration.

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

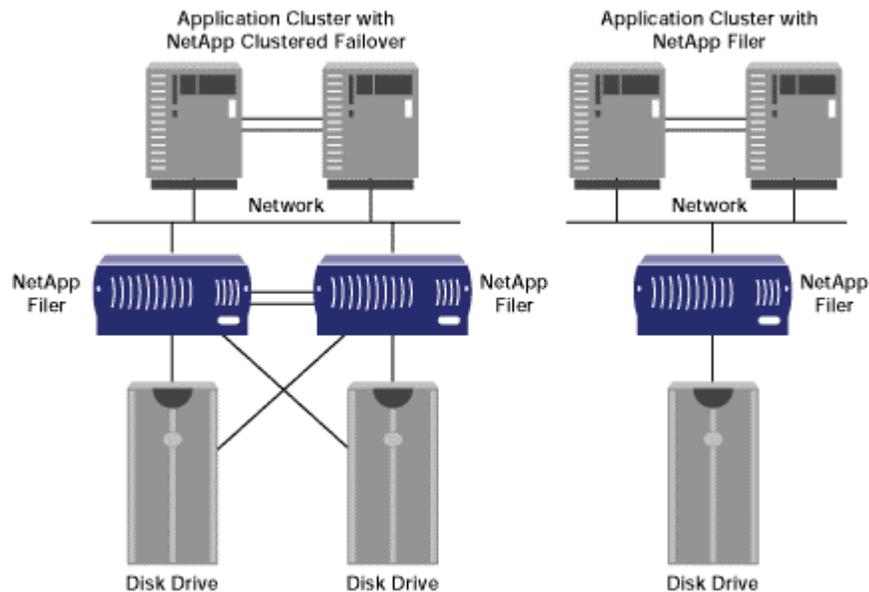


Figure 4-42. Application server clustering with/without NetApp storage clustering configuration.

In a FileNet customer environment, the operating system can host both Image Services and the database server, or the database can be run on a separate, remote server connected to the storage. The design diagram is 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 achieved to NetApp NearStore® disk-based storage, which provides higher performance and availability than optical storage and at a lower cost than optical storage. Using a filer or NearStore, MSAR can be deployed alone or together 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.

4.5. 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 Image Services server software. The term "filer" can refer interchangeably to the NetApp filer or NetApp FAS server storage appliances, with the caveat that not all NetApp storage devices support the FC SAN protocol options.

5. 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 Oracle 9.2.0.5 database with FileNet Image Services 4.0 on a Windows 2000 host with a filer is listed below:

- FileNet IS 4.0 Server 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 Image Services software:

The name of the filer `boy`
 The filer command prompt is shown as `boy>`
 The Solaris host name `beavis`
 Operating system users referenced in this document `'fnsw' 'orcl' 'root'`
 Oracle database username `oracle`
 Command output is displayed in courier font

5.1. FileNet Image Services 4.0 on Windows 2000 Server

A supported Windows host is required to run IS 4.0 software. Currently, FileNet supports Windows 2000 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 SP3 or later. The server should have at least one free PCI slot available for installing the Fibre Channel host bus adapter 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 2000 platforms. Supported UNIX platforms are Solaris 2.8, HP/UX, and AIX. In our test configuration, we used 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 in FileNet documentation. Any discussion of UNIX platforms is beyond the scope of this document.

Software: The FileNet IS requires a specific version of the operating system, and an additional patch installation is required. FileNet supports Oracle 9.2.0.2 or later with FileNet IS 4.0 servers. Our test environment used Windows 2000, Oracle 9.2.0.5, and Data ONTAP 6.5R1 with FileNet IS 4.0 software.

5.2. Network Connectivity

Network connectivity is required between the Oracle/IS server and the NetApp storage appliance. In a SAN configuration, the primary connection for the flow of SCSI block data is a dedicated 2Gb per second Fibre Channel link. Out-of-band communications for management purposes and other NFS-related communications are handled via either Gigabit Ethernet (GigE) or a regular 100-Base-T Ethernet network connection. If iSCSI is used, a Gigabit Ethernet network connection is required between FileNet IS, the database servers, and the NetApp storage device.

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 dedicated Gigabit Ethernet network connecting the filer, IS server, and Oracle database servers, except where FC SAN connections are used. This GigE storage network is used for IS and Oracle data transfer activities to avoid competition with regular network traffic. Setting up a separate GigE 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 Image Services. Both the GigE and FC connections are made directly without a switch. Note that in many GigE and a FC-SAN configurations it is assumed that one or two GigE 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.

5.3. FileNet Image Service 4.0 and the Oracle Database Environment

Both the Oracle database and FileNet Image Services require some preinstallation preparations on the server host. Both Oracle and IS services software installation require X Windows support on the server machine. Currently FileNet supports database servers such as Oracle 9.2.0.2 , DB2, and SQL Server 2000. Our test setup used Oracle 9.2.0.5 on Windows 2000 with iSCSI and SnapDrive 3.1.

5.4. Installation Tasks

A user account and appropriate groups must be created. Figure 7-41 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 Oracle database
- Perform postinstallation tasks
- Install FileNet Image Services
- Perform postinstallation tasks
- Configure MSAR storage libraries
- Install Image Services Connector for SnapLock

6. Setup and Configuration of Local Disks

This section describes the procedure for installing and configuring local SCSI disks using iSCSI. (The procedure to install and configure FC-SAN storage is explained in detail [online](#).) This section provides a high-level overview to guide you through the setup of your NetApp storage system in the SAN environment using Fibre Channel Protocol 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 to verify that the host and operating system have all the required patches or service packs.

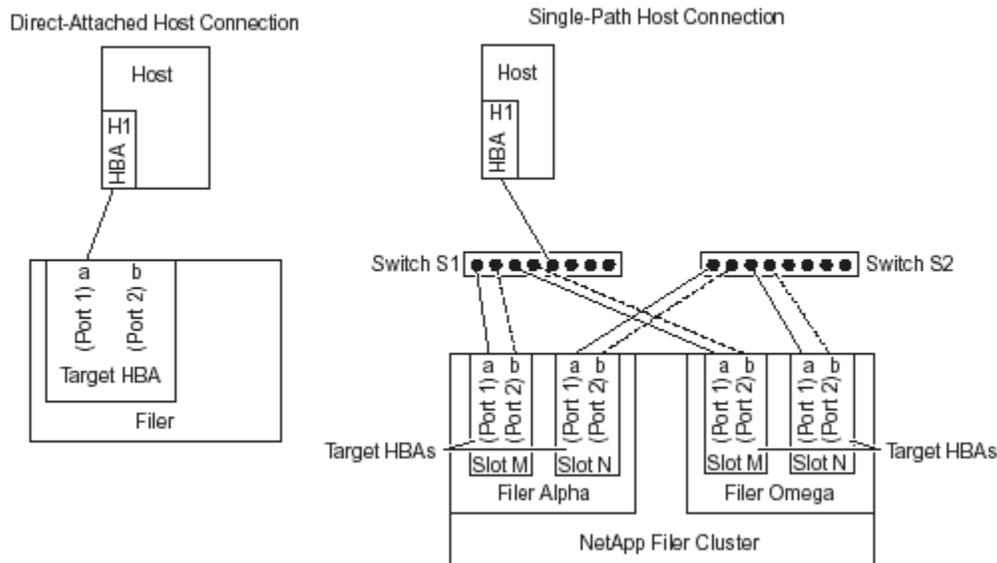


Figure 6-01. Direct connect and single-path host connection.

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 FCP configuration product manual available [online](#).

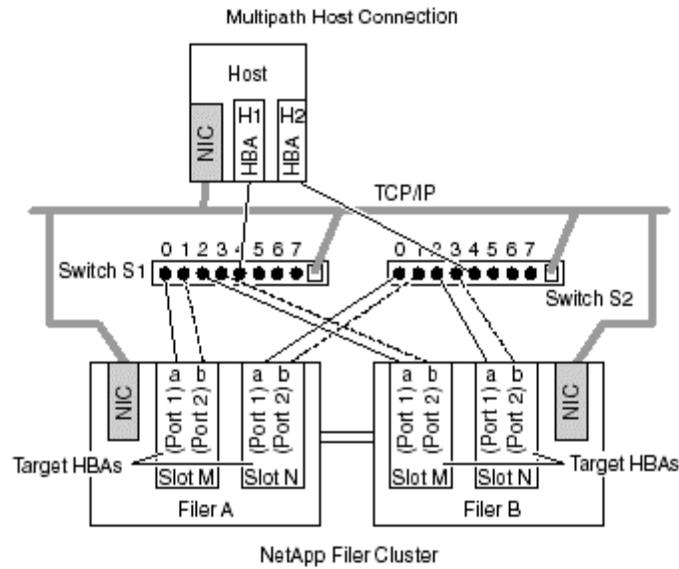


Figure 6-02. Multipath host connection with NetApp storage system cluster.

6.1. 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 1.04a, but the setup and configuration routine applies to later releases as well. For detailed instructions on how to install and configure iSCSI, refer to documents available [online](#). A brief description of the steps involved appears below.

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. This is required even though the network will work with the software initiator configuration. Verify that the licenses for SnapDrive, iSCSI, and CIFS are enabled and that CIFS and iSCSI services are running on the NetApp storage devices. For the detailed procedure to install SnapDrive, refer to documents that are [available online](#).

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 portal with a socket number and the port number. A sample diagram is shown below.

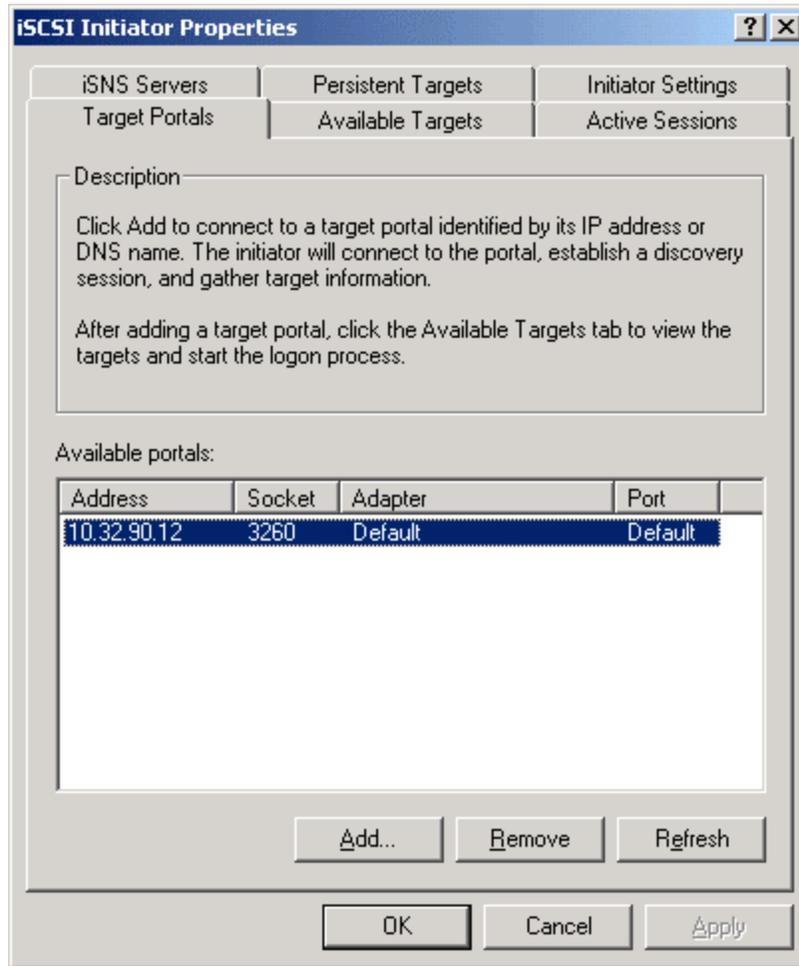


Figure 6-11. Available target portals.

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.

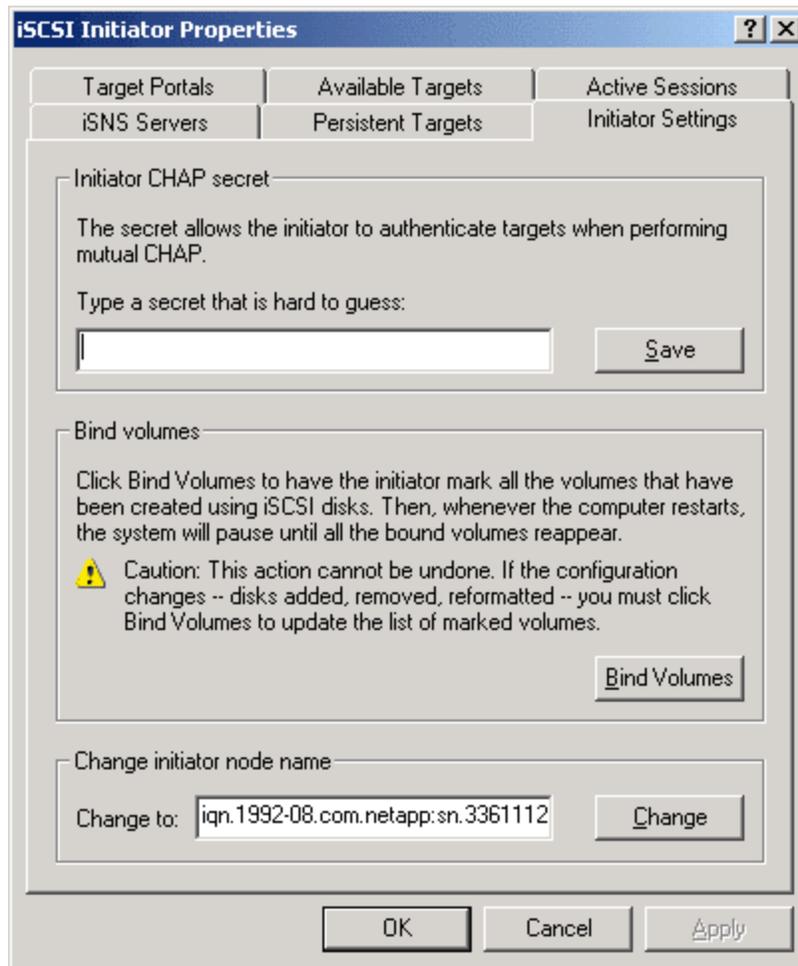


Figure 6-12. Initiator initial settings.

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 3.x, verify the installation, and complete the local disk configuration using the Computer Management utility.

6.2. FCP-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](#) on Fibre Channel Protocol for Solaris Installation and Setup Guide for SAN.

Setting Up the Brocade 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. Please check for support of a particular type of Fibre Channel switch. 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. An example is shown below:

```
sunday> igroup create -f -t windows beavis 10000000c92d60b2
```

If the required volumes do not exist already, create volumes on the filer. In our test environment, we created one volume for the Oracle database, the FileNet IS services installation, and the MSAR surfaces. The sample command to create these volumes is shown below:

```
sunday> vol create sri 8
```

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 appliances 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. To enable space reservation, we entered the following command:

```
sunday> vol options sri space_reservations on
```

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

7. FileNet Image Service and Oracle Database Preinstallation Requirements

This section provides the information required to complete the preinstallation tasks prior to software installation and configuration. The integration of Image Services with NetApp storage system(s) requires installing and configuring SnapDrive and iSCSI initiator/ FCP setup on the Windows server.

The installation and configuration procedure requires having Administrator privileges. FileNet Image Service 4.0 requires previous installation of the supported database server and that the database server is up and running. Since FileNet Image Services 4.0 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 4.0 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	fnsr, Administrator, oracle	These members can operate any FileNet software. Operators and administrators belong to this group.
dba	fnsr, oracle	These members must also belong to the dba group. Users in the dba group should have Administrator privileges.
fnadmin	fnsr, oracle	Members can administer FileNet software. Administrators must belong to this group. This group can do configuration changes, backup, and recovery operations.
fnop	fnsr	Members can start and stop all FileNet software. Administrators also belong to this group.

Figure 7-01. User account information.

7.1. 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 Image Services supports both Windows 2000 and UNIX platforms such as Solaris 8, AIX 5.1, and HP/UX 11.00. The following table may serve as a preinstallation requirement worksheet.

Installation Information	System Information	Remarks
Server IP Address		Use the Gigabit Ethernet 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		An example would be domain.company.com
Organization Name		

Figure 7-11. Networking information.

7.2. Determining Dataset Space Requirements

By knowing in advance the space requirement for the datasets, we can better configure the filer volume and `qtree`. 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 Image Services software. Once dataset sizes have been decided, determine the number needed 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

7.3. Database Server Installation

The database server must be installed and configured properly for a successful installation and configuration of Image Services. FileNet Image Services 4.0 supports Oracle, SQL Server 2000, and DB2 databases. In our test setup we installed Oracle database and upgraded to Oracle 9.2.0.5. Installing and configuring the Oracle database server is critical for successful installation of FileNet Image Services. Since FileNet IS supports site-controlled Oracle databases, it's best to install the Oracle database server as an Oracle 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.

7.3.1. Oracle Database Server Installation

The Oracle database server can be installed from scratch or you can use an existing Oracle database server. It is important to apply the Oracle patch to upgrade to at least version 9.2.0.4 or later. This document recommends installing Oracle at a location outside the FileNet Image Services 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.

Install the Oracle server and you can skip the database creation step. Verify that the Oracle service has been created, that related services have been started, and that necessary environment variables have been set. `ORACLE_HOME` and `ORACLE_SID` are some of the variables required. If required, modify the Oracle services to start automatically. If the service has not been created, verify that the database server was installed successfully. If so, you can create a service using the `oradim` Oracle utility. Using the `oradim` utility may create a new Oracle service. On our test setup, we used the Oracle Database Configuration utility `dbca` to create the service and the complete database creation and configuration requirements. A sample of the output used to create an Oracle service called IDB is shown below where `G:\` is a locally configured SCSI drive created using the iSCSI Protocol and managed by SnapDrive 3.0 software.

```
G:\oracle\ora92>oradim -new -sid IDB
G:\oracle\ora92>
```

The following figure shows the status of Oracle database installation.

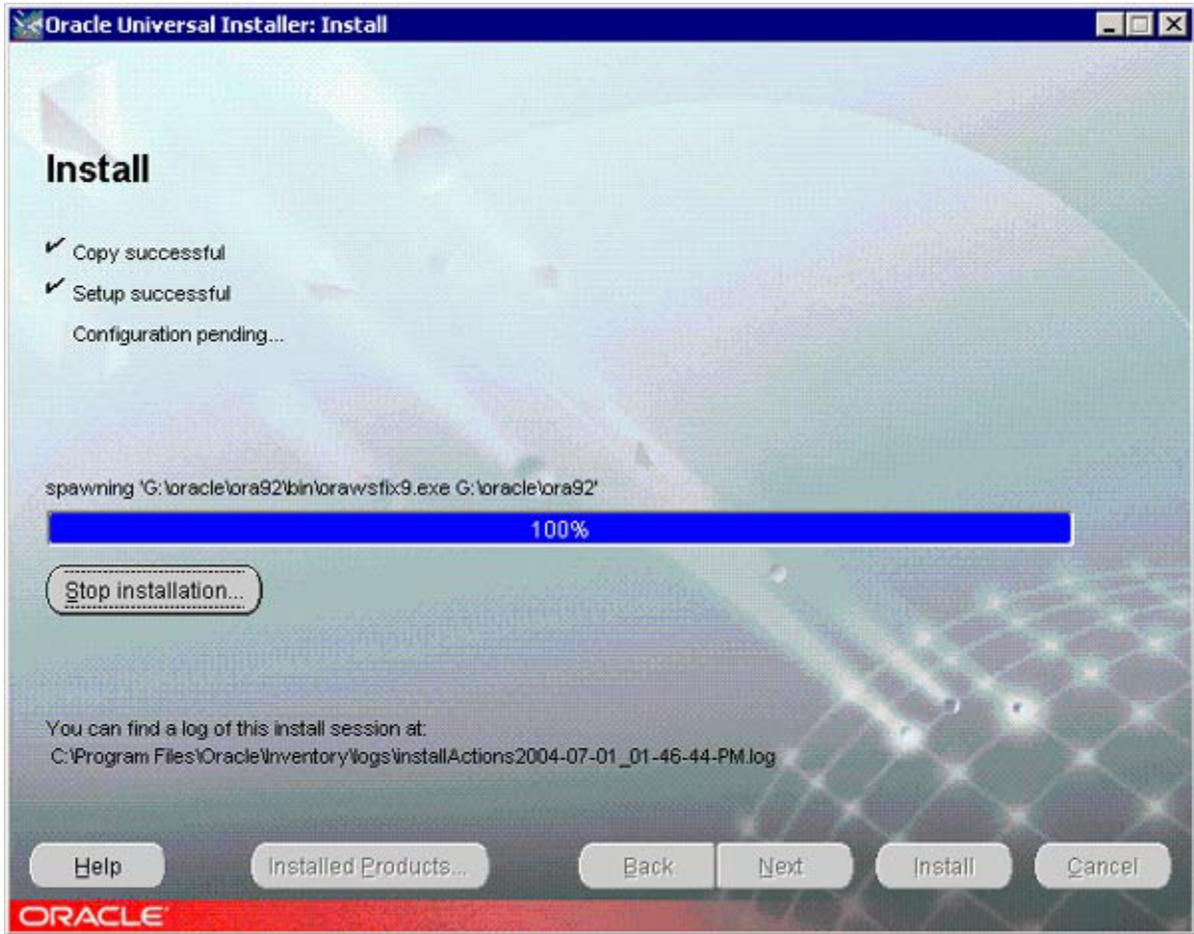


Figure 7-31. Oracle installation status.

Figure 7-32 shows Oracle user configuration details such as the SYS and SYSTEM user password, Global database name, and the System Identifier. It is important to save this information for a future use.

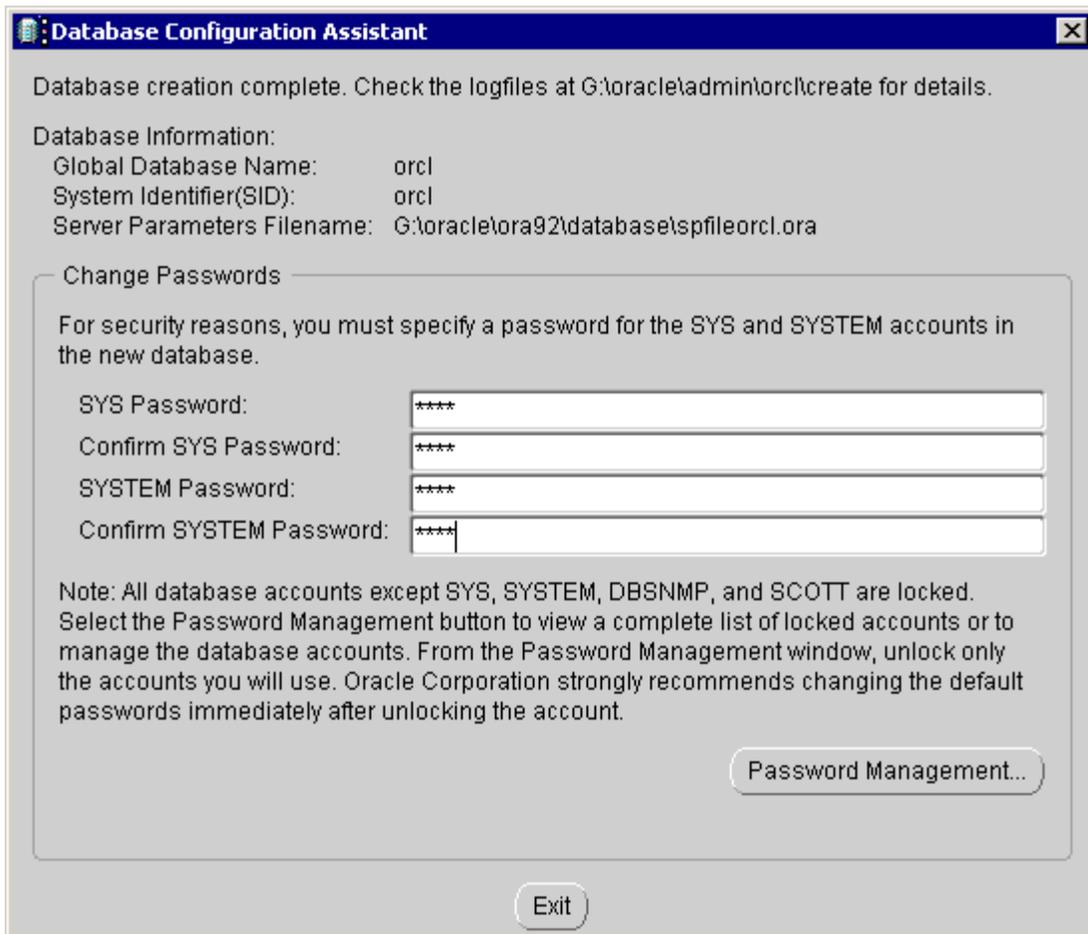


Figure 7-32. Oracle installation status with the system user information.

Now a new service is created and started called OracleORCL. It can be verified from Control panel -> Admin Tools -> Services. On our test setup, we have configured Oracle services to be started manually every time the system is restarted. This approach gives the Administrator the ability to make sure that the system has the necessary data available. In our test setup, ORACLE_SID is IDB. Oracle services may be configured to automatic so that the services are started automatically if the data is available.

Verify that `fnsw_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. If the Oracle database software is already installed, verify that the related services have been started. This can be checked with `Services` tool from the Control Panel.

If the database was created using the Oracle `dbca` utility, skip the following information to Section 7.23. If the database was not created using Oracle's `dbca` utility and wants to create the database and prepare for the FileNet Image Services installation, refer to the following information. Otherwise, skip to Section `fnsw_tables.sql`.

Now bring up the Oracle Database instance without mounting the database. On our setup, we used the following two commands to login to the Oracle SQL interactive session and bring up the Oracle instance without mounting the database.

```
G:\oracle\ora92>sqlplus "/as sysdba"
SQL*Plus: Release 9.2.0.5.0 - Production on Wed Jun 30 15:09:41 2004
Copyright (c) 1982, 2002, Oracle Corporation. All rights reserved.
Connected to an idle instance.
SQL> startup nomount
ORACLE instance started.
Total System Global Area 135339940 bytes
Fixed Size 454564 bytes
Variable Size 109051904 bytes
Database Buffers 25165824 bytes
Redo Buffers 667648 bytes
SQL>
```

Create a database using a script. You can use a script called `mk_db.sql` that contains the SQL statements to create the database.

If the above script is executed, the output is displayed similar to the following.

```
SQL> @'g:\oracle\ora92\dbs\mk_db'
SQL> create database ntap
 2      controlfile reuse
 3      maxlogfiles      2
 4      maxlogmembers    2
 5      maxdatafiles     50
 6      maxinstances     1
 7 logfile
 8      group 1('G:\oracle\rollback\oracle_r11') size 40M,
 9      group 2('G:\oracle\rollback\oracle_r12') size 40M
10 datafile
11      'G:\oracle\data\oracle_sys0' size 400M autoextend on
12 character set US7ASCII
13 spool off
14
```

Use this script to create a database and create the Oracle catalog and `catproc` procedure by running the script files `catalog.sql` and `catproc.sql` files located under `rdbms` directory in the `ORACLE_HOME/rdbms/admin` directory. These scripts take several minutes to complete successfully.

After the `catalog.sql` and `catproc.sql` scripts have been completed successfully, create a file called `fns_w_tables.sql`. The sample code is listed below, and you can make changes as needed to reflect your configuration environment.

If the Oracle utility was used and the Oracle services is started, log into a SQL*Plus session by issuing the following command.

```
I:\FNSW_LOC\oracle>sqlplus "/as sysdba"
SQL*Plus: Release 9.2.0.5.0 - Production on Tue Jul 6 12:10:16 2004
Copyright (c) 1982, 2002, Oracle Corporation. All rights reserved.
Connected to:
Oracle9i Enterprise Edition Release 9.2.0.5.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.5.0 - Production
SQL>
```

7.3.2. Tablespace Creation

If the Oracle service is started and the database is mounted and opened as shown in the above command output, edit a file called `filenet_tables.sql` with the following entries to create two

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tablespaces and a temporary tablespace. Note that the tablespace names and location and size need to be modified to reflect to a specific setup configuration.

```
create tablespace FNSYS_TS
datafile 'G:\oracle\data\oracle_db0'
size 200M
autoextend on;

create temporary tablespace FNTMP_TS
tempfile 'G:\oracle\data\oracle_tr0'
size 400M
autoextend on;

create tablespace FNUSR_TS
datafile 'G:\oracle\data\oracle_udb0'
size 200M
autoextend on;
```

The `filenet_tables.sql` script creates the specified tablespaces according to the specified parameters such as tablespace name, location and size, etc. In the above command, modify the names and directory locations as needed. Note that `FNTMP_TS` must be declared as temporary tablespace in order for the installation to complete successfully.

If the database was created manually using the script `mk_db.sql`, a system rollback segment must be created before creation of any other user rollback segments. To create a system rollback segment, use the following commands. If the database was created by `dbca` utility, separate creation of a system rollback segment is NOT required in Oracle 9.2.0.5. After creating the necessary tablespaces, login to Oracle SQL server with the following command:

```
Sqlplus system/manager
SQL> create public rollback segment R1;
SQL> alter rollback segment R1 online;
SQL> quit
```

7.3.3. Creating Rollback Segments (Not required if the database is created using `dbca` utility)

We have now created the database, necessary tablespaces, and a system rollback segment (if needed). Now we'll edit a file called `rollback_segment.sql` with the following statements to create four rollback segments on the tablespace. In our test setup, we used the following parameters to create the rollback segments.

```
select * from sys.dba_tablespaces;
create public rollback segment RS0 tablespace FNTMP_TS
storage (initial 500K NEXT 500K MAXEXTENTS 121);
alter rollback segment RS0 online;
create public rollback segment RS1 tablespace FNTMP_TS
storage (initial 500K NEXT 500K MAXEXTENTS 121);
alter rollback segment RS1 online;
create public rollback segment RS2 tablespace FNTMP_TS
storage (initial 500K NEXT 500K MAXEXTENTS 121);
alter rollback segment RS2 online;
create public rollback segment RS3 tablespace FNTMP_TS
storage (initial 500K NEXT 500K MAXEXTENTS 121);
alter rollback segment RS3 online;

select * from sys.dba_tablespaces;
```

Now run the file `rollback_segment.sql` to create four rollback segments. Note that modification to this file may be required in your configuration. After making any necessary changes, execute the scripts as shown below:

```
SQL> @rollback_segment
```

If this displays a File Not Found error, give the full pathname of the file. Now edit the `orainit.ora` or its equivalent startup script and uncomment the `rollback segments` line.

Verify that the Oracle service is started and the property is changed to automatic. After this, start the Oracle instance by issuing the following command:

```
sqlplus "/as sysdba"
SQL> startup
]
```

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

Verify that the Oracle database is installed and configured as described in the FileNet document [Site-Controlled RDBMS for IS 4.0](#). If the Oracle Service was not created during the installation, it can be created using the `oradim` utility.

7.3.4. init.ora File Sample

If you have created the database using the `dbca` utility, it will create an Oracle initialization file called `init.ora`. If the database was created using the `mk_db.sql` script and then configured, edit the Oracle initialization file `ora.init`. A sample `init.ora` file to start the Oracle server instance is shown below.

```
# uncommenting these parameters, this parameter file can be used
# as a complete stand-alone init.ora file.

db_name = orcl

# Define at least two control files by default
control_files = G:\oracle\control\ctl0.ora,
G:\oracle\control\ctl1.ora, G:\oracle\control\control3.ora
db_block_buffers = 1000
db_block_size = 2048
db_files =96
db_file_multiblock_read_count = 8
dml_locks = 100
log_archive_start = FALSE
log_buffer = 32768
max_dump_file_size = 10240
processes = 96
shared_pool_size = 3500000
compatible = 9.2.0.4
sort_area_size = 131072
rollback_segments = rs0,rs1,rs2,rs3
LOCAL_LISTENER = "(ADDRESS + (PROTOCOL = TCP) (HOST= BEAVIS) (PORT =1521))"
```

7.3.5. Start the Oracle Instance

Before starting Image Services, start the Oracle database by locating the `init.ora` control files. On our system, Oracle instance was up and running after the Oracle services were started. If the SQL session is connected to an idle session, verify in the Control Panel that the Oracle services have been started and issue the following commands:

```
sqlplus "as /sysdba"
sqlplus > startup
```

7.3.6. Configure the Oracle Archive Logging

Even though this step is optional, we suggest that you enable Oracle archive logging. The necessary steps to configure the system are listed below.

- Create a directory for the archival logs.
- Enable the archive log in the `init.ora` file:


```
log_archive-start =TRUE
log_archive_dest = /oras1/orasite/archive
```

7.3.7. Backup of Oracle System-Related Files

In order to recover the Oracle instance, we suggest that you make a backup copy of all related datafiles, log files, control files, and archive logs and store them at a different location. This will help to restore the Oracle server if required.

7.3.8. Shut Down and Restart the Oracle Instance

After configuring the Oracle server, shut down the database instance and restart it. After restarting the Oracle instance, the configured changes will be effective. This is not required if the database was configured using `dbca` utility and no changes were made after the database creation process.

8. Installing FileNet Image Services Software

This section discusses the procedure for installing FileNet Image Services 4.0. As part of the preinstallation process, check to ensure 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 to be applied and that FileNet has supplied the appropriate SLAC license code.

8.1. 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.

8.2. 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.

8.3. Install IS Software

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

- Login as Administrator.

- 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, `fnsw` product installation status was displayed as shown below:

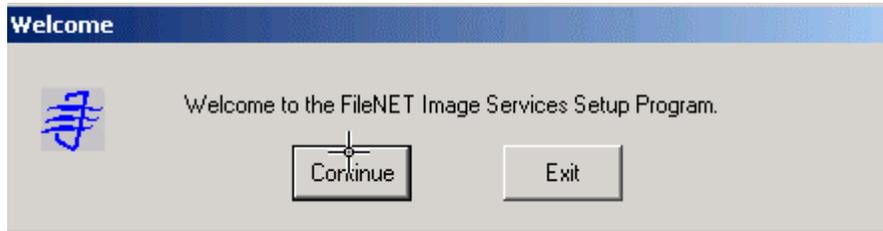


Figure 8-30. FileNet Image Services Setup Program.

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.

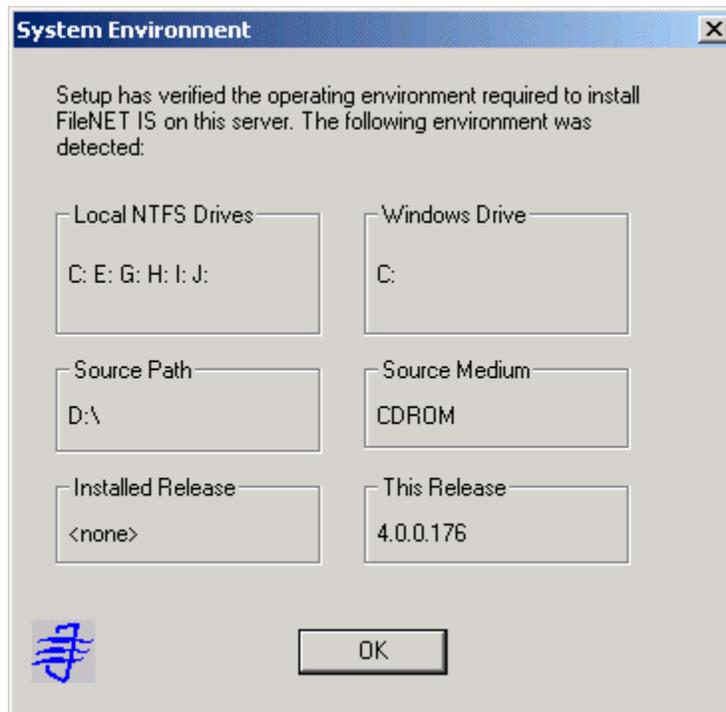


Figure 8-31. Available local NTFS drives.

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

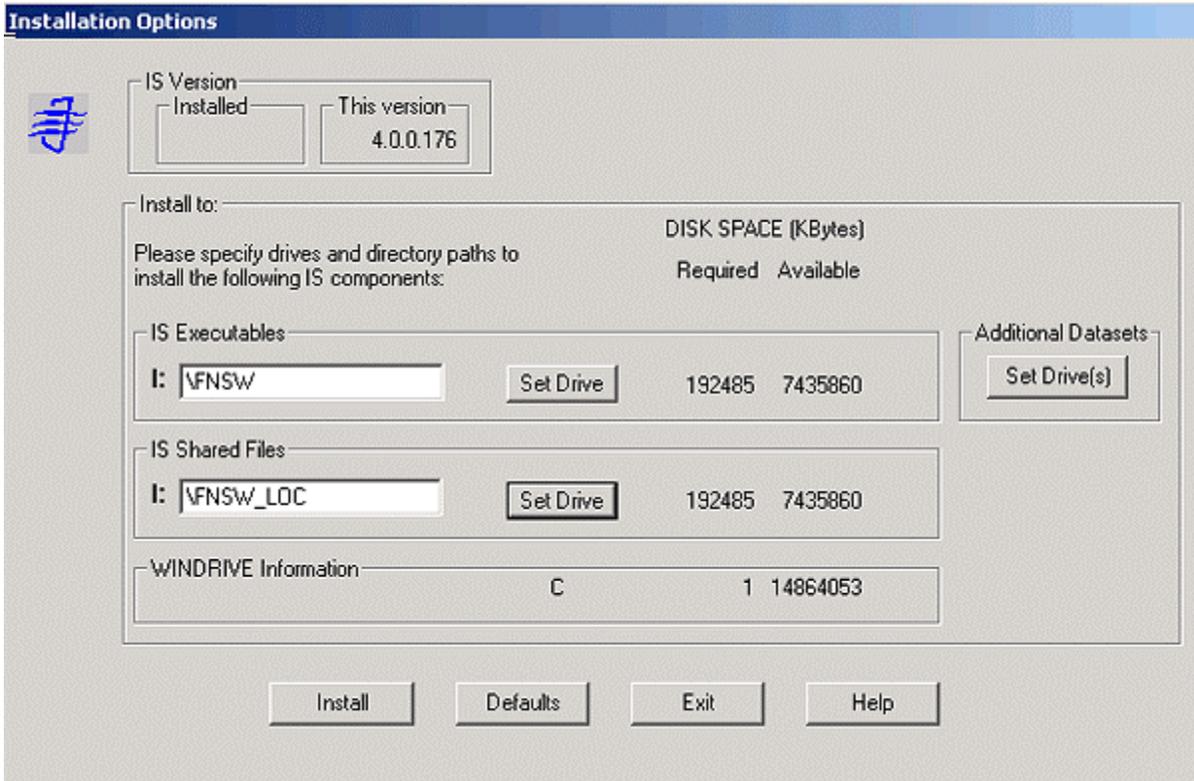


Figure 8-32. FileNet Image Services installation options.

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

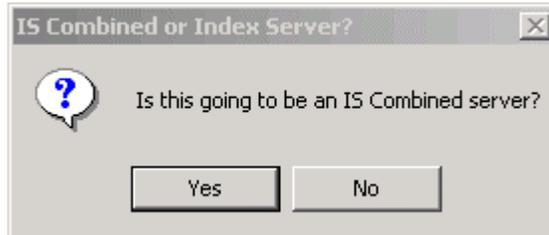


Figure 8-33. Image Services server type.

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.

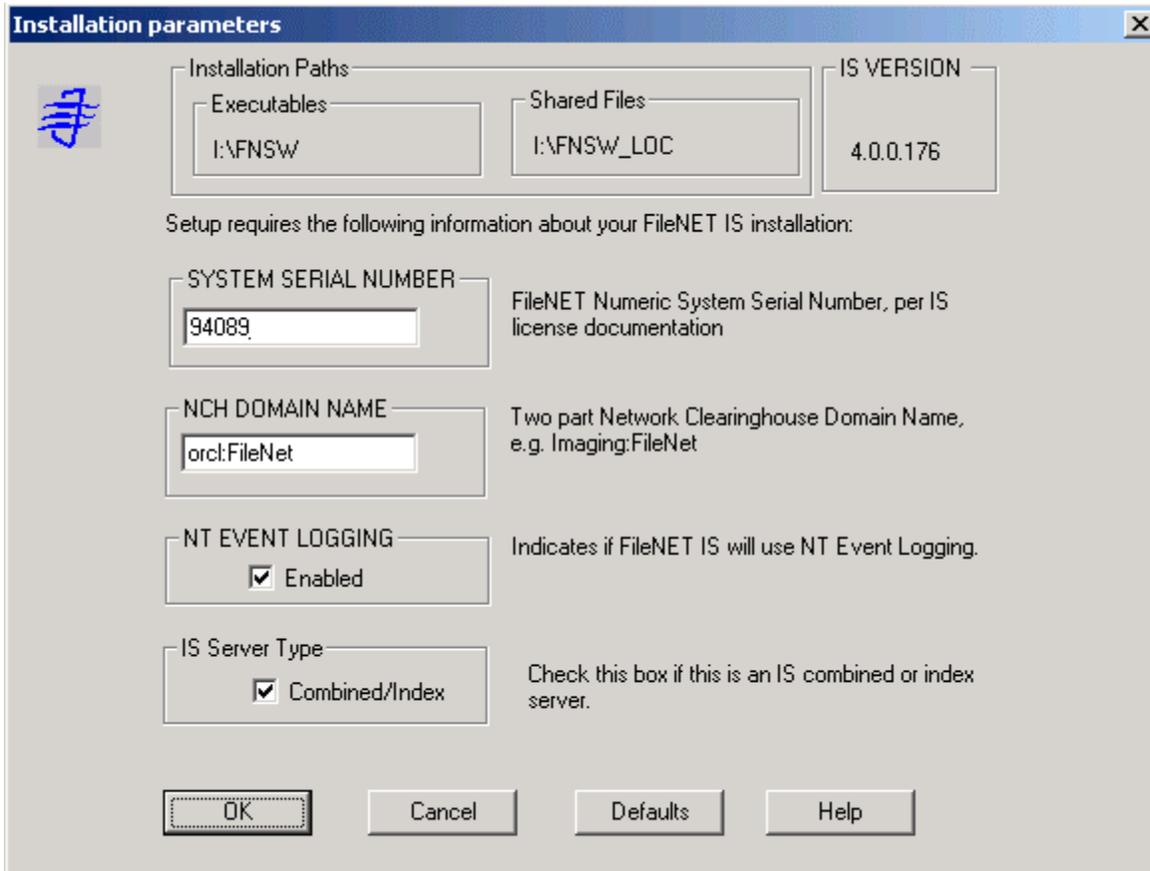


Figure 8-34. FileNet Image Services installation parameters.

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.

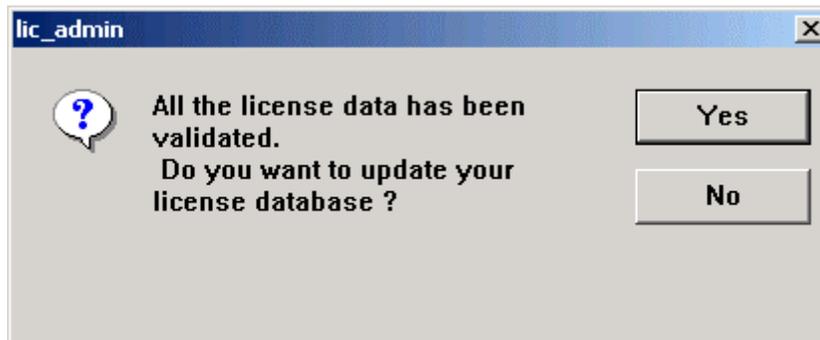


Figure 8-35. FileNet Image Services license administration.

With the validation of SLAC, FileNet Image Services software installation is completed. Since the release of IS 4.0 software, FileNet has addressed several issues, added additional features, such as support for IS connector for SnapLock (ISCS), and released a service pack called IS 4.0 sp01. FileNet requires users to upgrade to the latest release level. Even though Image Services 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 Image Services.

8.4. Upgrading FileNet Image Services to a New Hot Fix Pack

To upgrade to IS 4.0 SP01, obtain the necessary software by visiting the FileNet [Customer Services Web site](#). Before upgrading Image Services, stop the image services and stop the related ISControlService.

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

```
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\Documents and Settings\Administrator.DBLAB>initfnsw stop
Are you sure you want to stop software on server 'Beavis'? (y/n)[n]: y
Termination of FileNET software completed.

C:\Documents and Settings\Administrator.DBLAB>killfnsw -SAD
Are you sure you want to run killfnsw? [y] y
ipc_daemon 2468
killfnsw: All FileNET processes have terminated.

C:\Documents and Settings\Administrator.DBLAB>
```

Figure 8-41. 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, following output was shown.

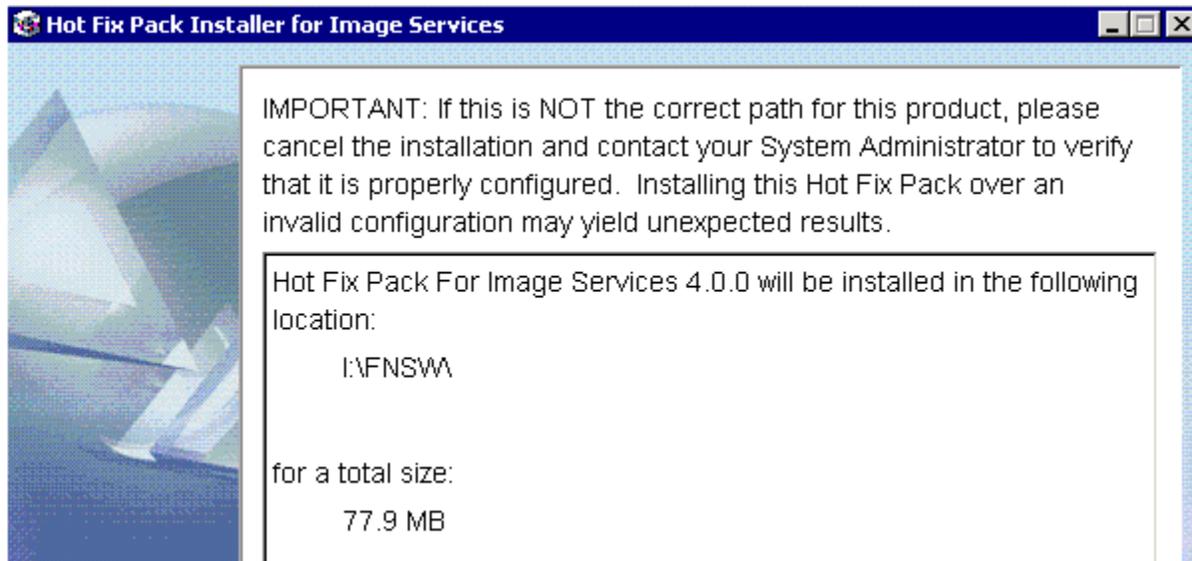


Figure 8-42. Location for the FileNet Image Services Hot Fix Pack.

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 Image Services to the 4.0 SP01 release.

8.5. 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 Image Services 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 the database template. On our system, this information is shown below.

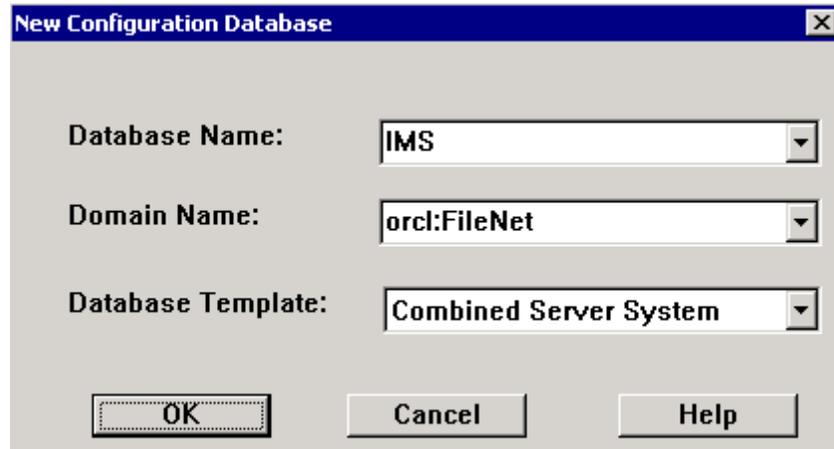


Figure 8-51. New Database Configuration Details.

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 the relevant database server type must be configured. On Windows 2000, FileNet Image Services 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, as shown in Figure 8-52.

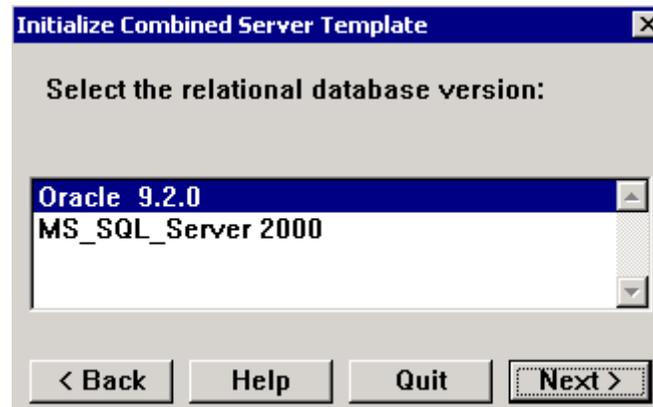


Figure 8-52. Relational database version.

If the tape and printer configurations must be configured, add the appropriate services. With these entries, the customized settings for Image Services 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.

8.6. 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.

8.6.1. Using the `fn_build` Utility

Now 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.

```
fn_build -a
I:\FNSW\dev\1>fn_build -a
fn_build: START, options = -a
fn_build: creating temporary files:
  I:\FNSW_LOC\ssn.new
  I:\FNSW_LOC\sd\nch_dbinit.new
  I:\FNSW_LOC\sd\inx_conf.new
  I:\FNSW_LOC\sd\print_config.new
  I:\FNSW_LOC\sd\snmp.conf.new
  I:\FNSW_LOC\sd\as_conf.g.new
  I:\FNSW_LOC\sd\1\as_conf.s.new
  I:\FNSW_LOC\sd\1\tapeconfig.new
  I:\FNSW_LOC\sd\1\nch.ddl.new
  I:\FNSW_LOC\sd\1\permanent.ddl.new
2004/07/08 11:07:22.687 <Administrator> fn_build -a (2108.2232 0x83c.8b8) ...
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.
2004/07/08 11:07:22.703 <Administrator> fn_build -a (2108.2232 0x83c.8b8) ...
INFO ONLY - fn_build,ddl: Using Large MKF for Permanent Database.

      Updating I:\FNSW_LOC\sd\1\permanent.ddl
  I:\FNSW_LOC\sd\1\sec.ddl.new
  I:\FNSW_LOC\sd\1\ttransient.ddl.new
2004/07/08 11:07:22.750 <Administrator> fn_build -a (2108.2232 0x83c.8b8) ...
INFO ONLY - fn_build,ddl: Using Large MKF for Transient Database.
  I:\FNSW_LOC\sd\serverGroup.new
  I:\FNSW_LOC\sd\rdb.init.new
  I:\FNSW_LOC\sd\OracleHome.glob.new
  I:\FNSW_LOC\sd\1\FNSHMSEGSZ.new

fn_build: DONE
```

8.6.2. Initialize the Datasets Using the `fn_util` 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.

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 the following command initializes all the configured datasets. Note that the FileNet Image Services 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:

```
I:\FNSW\dev\1>fn_util init
I:\FNSW\dev\1>fn_util init
fn_util: running 'initfnsw -y stop'
Termination of FileNET software completed.
```

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 I:\FNSW\dev\1\transient_db*
Could Not Find I:\FNSW\dev\1\transient_db*
fn_util: creating trans database with I:\FNSW_LOC\sd\1\transient.ddl.
fn_util: successfully created trans database.
fn_util: initializing cache
fn_util: del I:\FNSW\dev\1\cache0
fn_util: del I:\FNSW\dev\1\permanent_db*
fn_util: creating perm database with I:\FNSW_LOC\sd\1\permanent.ddl.
fn_util: successfully created perm database.
fn_util: del I:\FNSW\dev\1\sec_db*
fn_util: creating sec database with I:\FNSW_LOC\sd\1\sec.ddl.
fn_util: successfully created sec database.
fn_util: starting RDBMS initialization
fn_util: starting Oracle initialization.
fn_util: successful RDBMS initialization
fn_util: done
```

8.6.3. Granting Oracle 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. Execute the script file called `FileNet_Site.sql`. A sample command and output are shown below:

```
I:\FNSW\dev\1>
@filenet_site.sql
I:\FNSW\oracle>sqlplus "/as sysdba"
SQL*Plus: Release 9.2.0.5.0 - Production on Thu Jul 8 11:14:29 2004
Copyright (c) 1982, 2002, Oracle Corporation. All rights reserved.
Connected to:
Oracle9i Enterprise Edition Release 9.2.0.5.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.5.0 - Production
SQL> @filenet_site.sql
Grant succeeded.
```

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```
Grant succeeded.
Grant succeeded.
SQL>
```

8.6.4. Running the fn_Oraupgrade_sp.sql Filer

Run the `fn_oraupgrade_sp.sql` script to grant necessary permissions. A part of the output is shown below, as displayed on our test system:

```
@fn_oraupgrade_sp
SQL> GRANT EXECUTE ON fn_error          TO PUBLIC;
Grant succeeded.
SQL> GRANT EXECUTE ON fn_errortxt      TO PUBLIC;
Grant succeeded.
SQL> GRANT EXECUTE ON fn_oraversion    TO PUBLIC;

Grant succeeded.
SQL> GRANT EXECUTE ON fn_oraversiontxt TO PUBLIC;
Grant succeeded.
SQL> rem stamp 0G^AXNR5LcFs@l?Q4KbE\?VLP;JsU]>W>O2P'CZ=W<N1HbSZ<X=M0\^AX;Z5LcF]
F]=d4KbE\?V9b3JaE]EU?e2I'Gl=T7T1H_WYDS<b0GaAX;RJLcF]@XLX:ObE
SQL>
SQL> EXIT
Disconnected from Oracle9i Enterprise Edition Release 9.2.0.5.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.5.0 - Production
I:\FNSW\oracle>
```

8.6.5. Reset the Password for f_sw user

Now reset the password of `f_sw` user by running the following command. This command runs very quickly and does not produce any output.

```
I:\FNSW\oracle>fndba -s f_sw
I:\FNSW\oracle>
```

8.6.6. Initialize the Database Using fn_util

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`; partial output of `fn_util.log` is shown below.

```
I:\FNSW\oracle>fn_util init
.
.
.

I:\FNSW\oracle>
```

Now check the `fn_util.log` file to see the successful initialization of databases. On our test setup, `fn_util.log` had the following instruction.

```
fn_oracle: setting user default tablespaces

Please run the following sql script:
'I:\FNSW_LOC\oracle\ora_users.sql'. Site-controlled Oracle.
Cannot be stopped by IS
2004/07/08 11:21:29.578 101,0,1 <Administrator> fn_oracle init
(3144.876 0xc48.36c) ... [INFO]
fn_oracle: Pleae run the following sql script:
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```

```
'I:\FNSW_LOC\oracle\ora_users.sql'.
```

8.6.7. Creating Oracle Users

After running the `fn_util init` command successfully, we need to run the `ora_users.sql` scripts. This requirement is specified in the `fn_util.log` file, as shown in the previous section. On our system, we ran this script, and the output is shown below. On our system, this file is located in the `I:\fnsw_loc\oracle` directory.

```
SQL> @ora_users
```

```
User altered.
```

```
Disconnected from Oracle9i Enterprise Edition Release 9.2.0.5.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.5.0 - Production
SQL>
```

9. Complete 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.

9.1. Configure Cross-Committal

A cross-committal system will have a source Image Services system and a target Image Services system. In this configuration, the source Image Services system commits images to the target Image Services 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.

9.2. Configure Multicommittal Systems

A multicommittal System (MSS) commits images both to its own storage library and to the storage library of another independent FileNet Image Services system. MSS may or may not be compatible systems with nonoverlapping document IDs. If they are noncompatible, new doc IDs are assigned on the target system, which may be a minor performance consideration.

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

Start the FileNet Software

Before starting Image Services, check that IS ControlService has been started and that the property is set to automatic in the Services Control Panel. Also check that Oracle services have

been started and that database server is up and running. Use the Task Manager on the FileNet Image Services panel and check the status of Image Services. On our test setup, the Task Manager displayed as shown below.

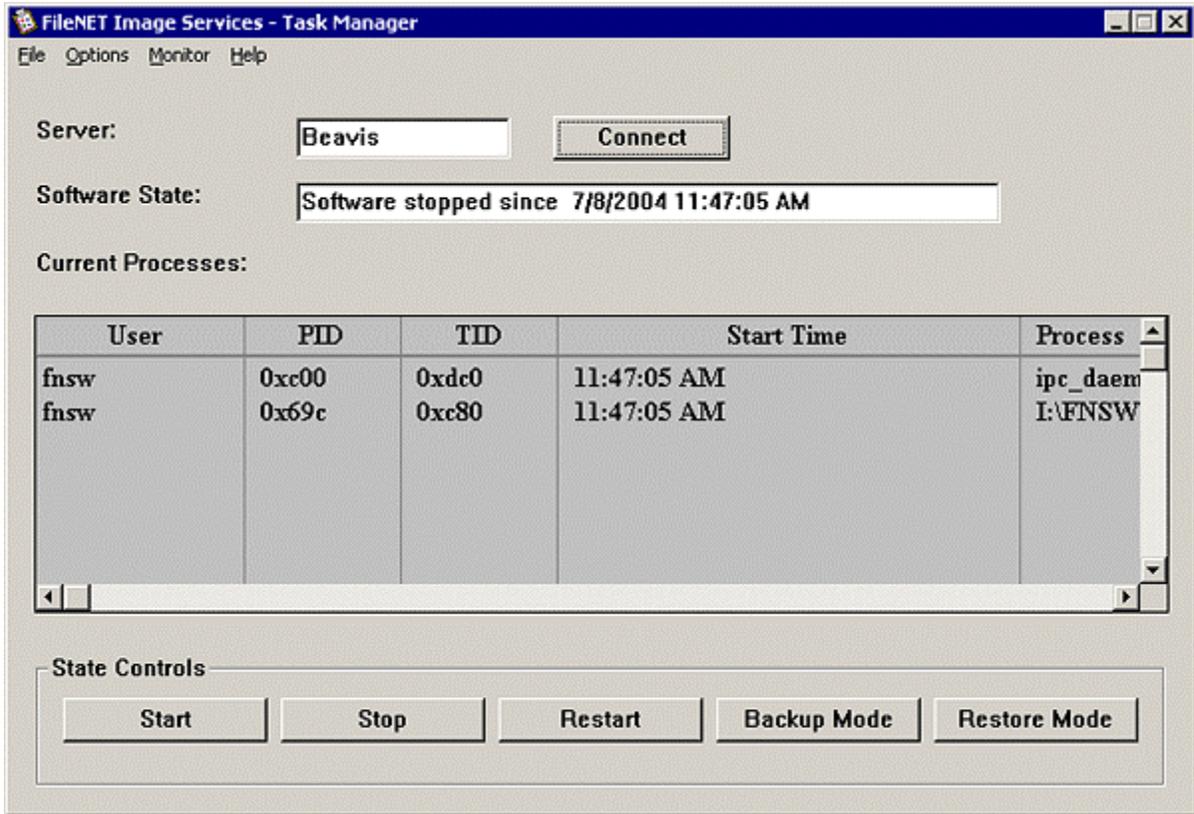


Figure 9-0. FileNet Image Services—Task Manager status when the services are stopped.

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

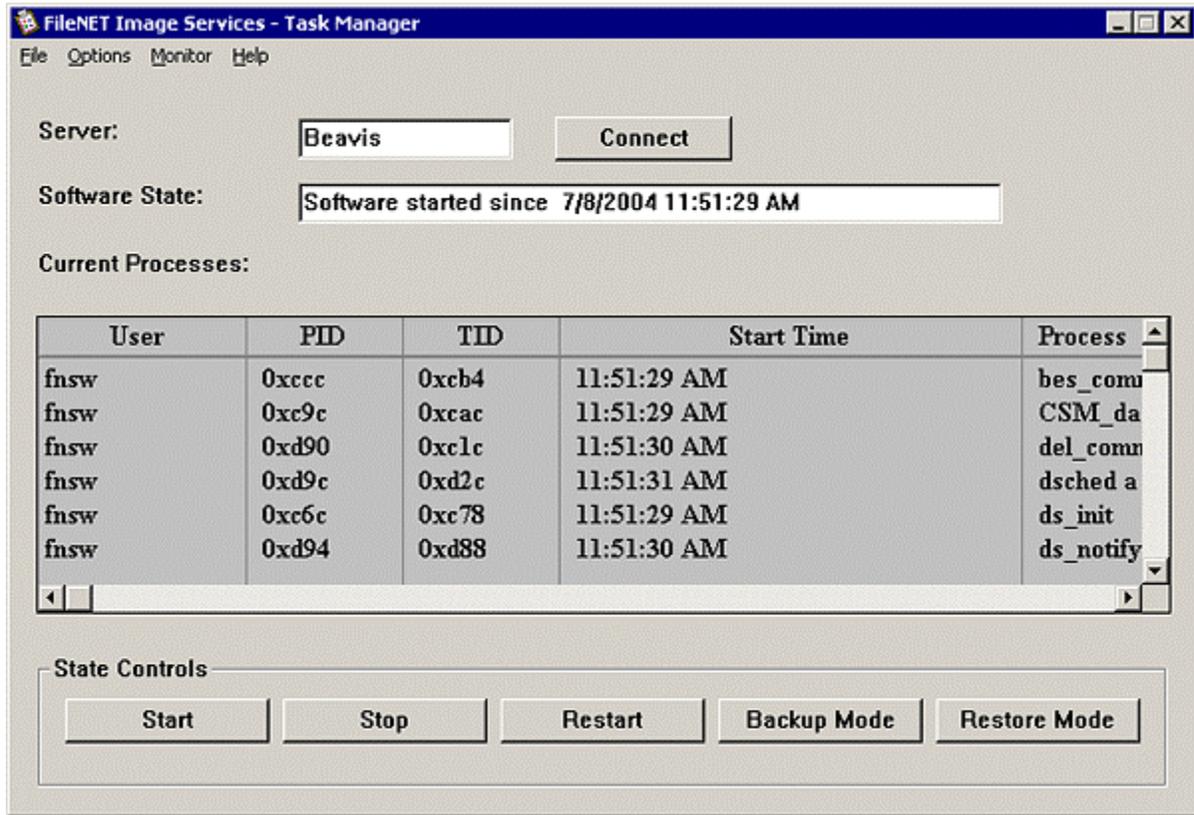


Figure 9-1. FileNet Image Services—Task Manager status after the startup.

10. 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 its Image Services Release 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 its advantages, many IS customers are replacing optical media with MSAR. Some of the benefits of using MSAR rather than optical media are listed below:

- 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.

10.1. Upgrading to IS 3.6 ESE from IS 3.6 Information

Both IS 3.6 SP2 and IS 3.6 ESE were independent releases. IS 3.6.xx was the non-MSAR IS field release. It's important not to confuse these releases. The following diagram, duplicated from FileNet documents, shows the progression of the service pack release for IS 3.6 in relation IS 3.6 ESE.

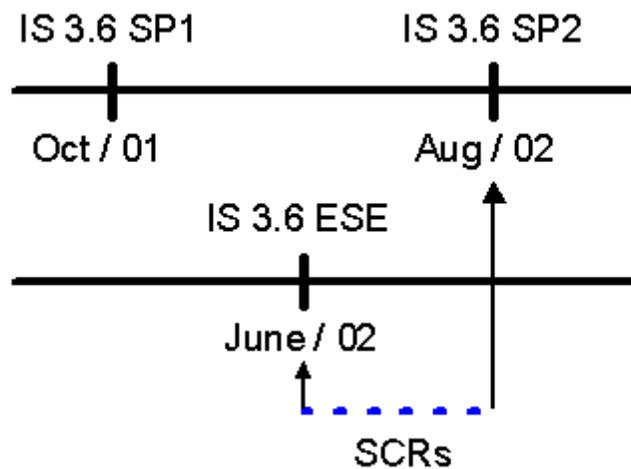


Figure 10-1. FileNet IS Releases in Relation to IS 3.6 ESE.

1. If IS 3.6 ESE is installed on a system that has already been upgraded to IS 3.6 SP2, the system will essentially revert back to an older release. If that happens, all the patches will be removed and will have to be reinstalled. The required SCRs are listed in Section 16.2.
2. To bring an MSAR system with IS 3.6 ESE up to the latest SCR level similar to IS 3.6 SP2, all the required SCRs must be manually installed. The required SCRs are listed in Section 16.2
3. The IS 4.0 release has to be upgraded to IS 4.0 sp01 or later release to take advantage of native retrieval.

The SCRs will have new functionality as included in the IS 3.6 ESE release and the patches released with IS 3.6 ESE and IS 3.6 SP2. After installing all the required SCRs to the IS 3.6 ESE, install the additional patches released after the IS 3.6 ESE release date.

10.2. 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. Migrating them 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.

10.2.1. Configuring the MSAR Surface

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 that the number of disks for favoring writes can be ignored and set to zero as shown in Figure 10-2.

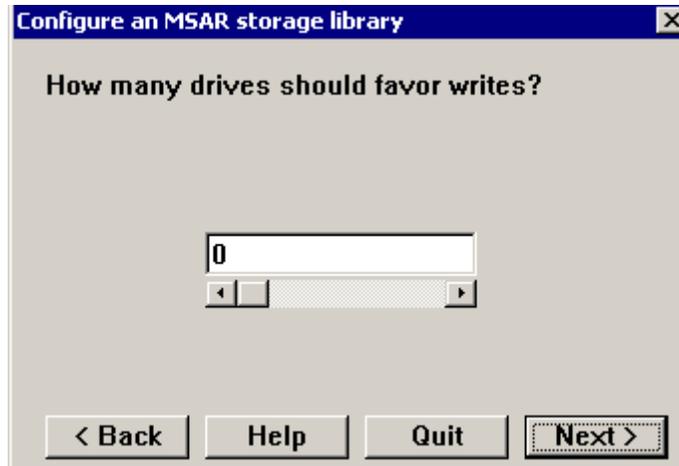


Figure 10-2. Configuring the MSAR surface library—drives favor writes.

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

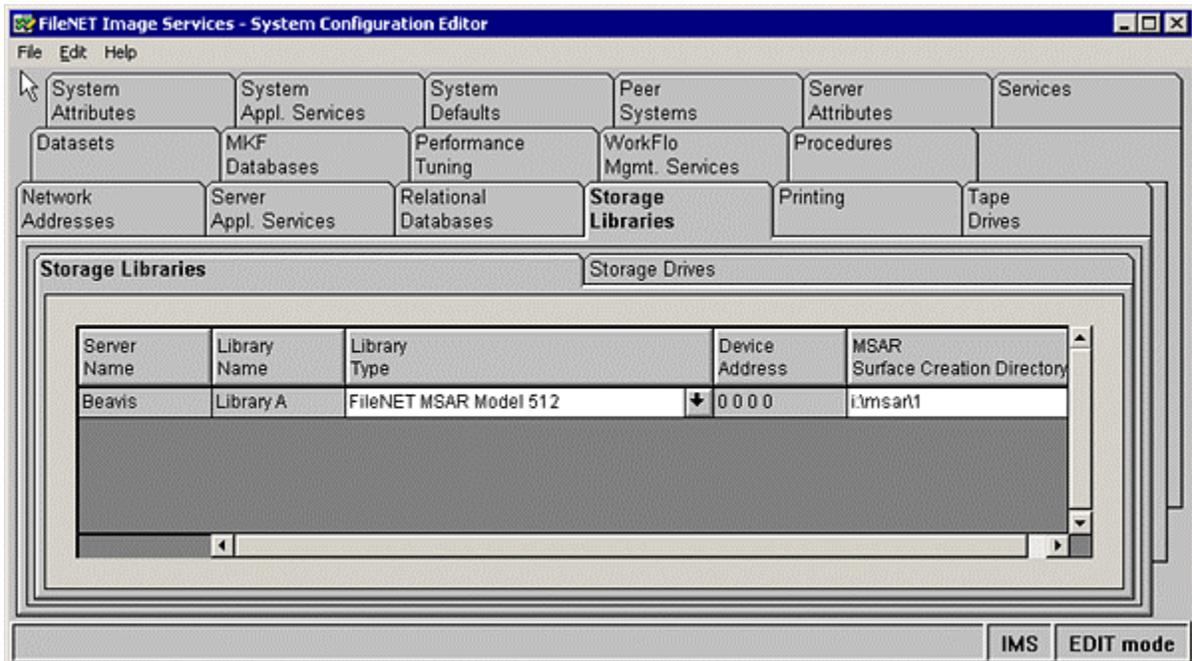


Figure 10.3. FileNet Image Services configuration editor.

11. Useful Information

This section provides some information to help the reader to manage Image Services data efficiently.

11.1. Useful Information Regarding the Oracle Database Server

This section presents some database tips to help you to manage the Oracle database server. This paper recommends replicating some database-related files, such as `init.ora` and control files to a location other than their source path. In a nonclustered failover configuration, modify the `init.ora` file with new control file information, shut it down, and restart the Oracle server to make the changes effective.

Create mirrored sets of online redo log files. Using SyncMirror®, you can create a synchronous copy of the online redo log files. This can also be done using VERITAS Volume Manager.

Keep online and archive redo logs in separate volumes. Keeping them in separate volumes provides some advantages, such as added data protection and more flexible database recovery.

Placing the redo logs in a separate volume also simplifies the management of these files. This is especially useful in a backup and recovery process.

To increase the Oracle 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 [NetApp Web site](#) offers many technical papers that cover deployment of Oracle on NetApp storage. In addition, NetApp offers a special service in conjunction with Oracle for deploying Oracle on NetApp using best practices.

12. Integration of Image Services Connector for SnapLock

To take advantage of WORM capability on magnetic media, FileNet has announced support for NetApp SnapLock via Image Services Connector for SnapLock (ISCS). ISCS works with both IS 3.6 ESE and IS 4.0 servers. In order to take advantages of native retrieval, this paper recommends to upgrading to IS 4.0 SP01 software.

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.

13. 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 and/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

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fast, scalable, reliable, and flexible enough to store any kind of FileNet data, including database, MKF, cache, and images with MSAR. On Windows 2000t, 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.

14. 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 that 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.

15. 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.

1. [Image Services Installation and Configuration Procedures for Windows, Release 4.0 from FileNet Inc.](#)
2. [MSAR Procedures and Guidelines for Image Services from FileNet Inc.](#)
3. [Data ONTAP 6.5.1 System Administrator's Guide](#)
4. [Oracle 9i for UNIX Integrating with a NetApp filer in a SAN Environment](#)
5. Required SCRs information [available](#) at FileNet

16. Appendix

This section lists the FileNet SCRs required to help you to upgrade to IS 3.6 ESE from IS 3.6 SP2.

16.1. Start FileNet Image Services

Start the Task Manager application and click the Start button to start the IS services if the services have been stopped. You will get the status output on a separate X window. Check the events log to verify that the Image Services system has started successfully. Now you're ready to use the FileNet Image Services.

16.2. FileNet Required SCRs (Relevant Only to the IS 3.6 ESE Release)

All Platforms 154817, 156582, 156591, 156921, 156925, 156928, 156929, 156939, 156951, 156952, 156961, 156963, 156964, 157568, 157574, 157577, 157580, 157582, 157591, 157926, 158288, 158297, 158645
AIXOS 156576
AIXOS - Localization 156930, 157556, 157589, 157933, 158630

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HP-UX None
HP-UX - Localization 156931, 157557, 157593, 157936, 158634
SOLARIS 156576, 156958
SOLARIS - Localization 156932, 157559, 157594, 157937, 158642
WINDOWS 2000 157598, 157965, 158302
WINDOWS 2000 - Localization 156933, 157560, 157595, 157943, 158644, 158644

Figure 16-1. FileNet required SCRs information for IS 3.6.

17. Glossary

AIX	IBM AIX 5.1 operating system
CFO	Cluster fail-over
CHAP	Challenge Handshake Authentication Protocol
CIFS	Common Internet File System
Data ONTAP	Network Appliance operating system (microkernel)
DB2	IBM DB2 Database
DBCA	Oracle Database Configuration Assistant
ESE	Extended Storage Edition
FAS	Fabric-attached storage
FC	Fibre Channel
FCP	Fibre Channel Protocol
FC-SAN	Fibre Channel-Storage Area Network
FileNet	FileNet Inc.
Gb	Gigabit
GigE	Gigabit Ethernet
HAK	Host Attached Kit
HFP	Hot Fix Pack
HP/UX	HP/UX 11i Operating System
IP	Internet Protocol
IS	FileNet Image Services Software
iSCSI	Internet Protocol Small Computer System Interface
ISCS	Image Services Connector for SnapLock
LUN	Logical unit number
MSAR	Magnetic Storage and Retrieval
MSS	FileNet Image Services Multi-Committal System
NAS	Network attached storage
NCH	Network Clearing House

Network Appliance Inc.

NetApp	Network Appliance Inc.
Oracle	Oracle Inc.
ORACLE_HOME	Oracle Database Installation Home Directory
ORACLE_SID	Oracle Database System Identifier
OS	Operating System
OSAR	Optical Storage and Retrieval
SAN	Storage Attached Network
SCR	Special contingency risks
Solaris	Solaris 2.8 operating system
SP01a	FileNet Image Software Service Pack 01a
SP3	Microsoft Operating System Service Pack 3
SQL Server 2000	Microsoft SQL Server 2000
SSN	System serial number
Tablespace	Oracle database tablespace
TB	Terabytes
VERITAS	Veritas Inc.
WORM	Write once, read many
WWPN	Worldwide port number