Novell ZENworks® for Desktops

3.2

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ADMINISTRATION GUIDE

October 10, 2003

Novell®

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ZENworks for Desktops 3.2 Administration Guide
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About This Guide

This Administration guide consists of comprehensive, conceptual information that you can use as you configure and use ZENworks® for Desktops (ZfD) components in your production environment. The sections include:

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- “Workstation Management” on page 21
- “Application Management” on page 27
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Documentation Updates

See the ZENworks for Desktops documentation Web site (http://www.novell.com/documentation/lg/zdfs/docui/index.html) for the most current ZfD administration information.

Documentation Conventions

In Novell® documentation, a greater-than symbol (>) is used to separate actions within a step and items in a cross-reference path.

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Automatic Workstation Import

This section provides information for ZENworks® for Desktops (ZfD) Automatic Workstation Import and Removal:

- Chapter 1, “Workstation Registration Files,” on page 19.

For information on deploying Automatic Workstation Import or Removal, see Upgrading from an Older Version of ZfD in *Deployment*.

1 Workstation Registration Files

Workstation registration in ZfD involves three executable files: WSREG32.EXE, WSREG.DLL, and WSREG32R.DLL.

The following sections provide information on these files:

Registration File Functions

Following are the functions of the registration files:

WSREG32.EXE: If executed, calls WSREG.DLL

WSREG.DLL: Performs workstation registration tasks.

WSREG32R.DLL: Contains strings used by WSREG.DLL. These strings are available for language translation.

Registration File Locations

Following are the locations of the registration files (by machine):

NetWare Server:

\\ *server_name*\SYS\PUBLIC\WSREG32.EXE
\\ *server_name*\SYS\PUBLIC\WSREG.DLL
\\ *server_name*\SYS\PUBLIC\NLS\ENGLISH\WSREG32R.DLL

Windows 95/98 Client Workstation:

drive:\ *Windows_95/98_directory*\SYSTEM\WSREG32.EXE
drive:\ *Windows_95/98_directory*\SYSTEM\WSREG.DLL
drive:\ *Windows_95/98_directory*\SYSTEM\NLS\ENGLISH\WSREG32R.DLL

Windows NT/2000 Client Workstation:

drive:\ *Windows_NT/2000_directory*\SYSTEM32\WSREG32.EXE
drive:\ *Windows_NT/2000_directory*\SYSTEM32\WSREG.DLL
drive:\ *Windows_NT/2000_directory*\SYSTEM32\NLS\ENGLISH\WSREG32R.DLL

WSREG.DLL Usage

In addition to being called by executing WSREG32.EXE, WSREG.DLL can be called by Workstation Manager's Scheduler when when one of the following events occurs:

workstation startup
user login
user logout
registration service shutdown

The sequence of file calls when one of the above events is detected are:

Windows NT/2000: WM.EXE > WMRUNDLL.EXE > WSREG.DLL.

Windows 95/98: WM95.EXE > WM95SAST.EXE > WSREG.DLL.

II Workstation Management

This section provides information about the administration of ZENworks® for Desktops (ZfD) Workstation Management, including:

- Chapter 2, “Reporting,” on page 23
- Chapter 3, “Copying Policy Packages,” on page 25

For more information on Workstation Management, see Workstation Management in *ZENworks for Desktops 3.2 Deployment Guide*, which includes setup steps for all ZfD policies.

2 Reporting

ZENworks® for Desktops (ZfD) provides predefined reports through ConsoleOne® for effective policies and policy package associations.

You can run either report based on a selected container, and you can include its subcontainers.

Report results are automatically displayed in Notepad and are saved as text files in the *Windows_directory*\TEMP directory of the workstation where you are running ConsoleOne.

The following sections provide information on ZfD reporting:

- "The Effective Policies Report" on page 23
- "The Package Associations Report" on page 24

The Effective Policies Report

The effective policies report shows which policies are currently in effect for the listed objects.

The effective policies report provides the following information:

Version
Tree
Container
Object DN
Platform
Effective Policy DN

To run a report on the effective policies:

1. In ConsoleOne, click Tools > ZENworks Utilities > Report Policies and Packages.
2. In the Report From field, browse for a context for the report.
3. To include all subcontainers in that context, enable Include Subcontainers.
4. Click the Effective Policies Report radio button > OK.

The report results are displayed in Notepad and are automatically saved to:

drive:*Windows_directory*\TEMP\EFFECTIVEPOLICIES.TXT

on the workstation where you are running ConsoleOne.

The Package Associations Report

The package associations report shows which policy packages are associated with the listed containers, subcontainers, and objects.

The package associations report provides the following information:

Tree
Container
Package DN
Association

To run a report on policy package associations:

1. In ConsoleOne, click Tools > ZENworks Utilities > Report Policies and Packages.
2. In the Report From field, browse for a context for the report.
3. To include all subcontainers in that context, enable Include Subcontainers.
4. Click the Package Association Report radio button > OK.

The report results are displayed in Notepad and are automatically saved to:

drive:*Windows_directory*\TEMP\PACKAGEASSOCIATIONS.TXT

on the workstation where you are running ConsoleOne.

3 Copying Policy Packages

ZENworks® for Desktops (ZfD) provides a utility to help you copy policy packages from one NDS® container to another. You can run the Copy Policy Packages utility via a ConsoleOne® snap-in or you can use a version of the utility based on Windows*.

Copying policy packages is not the same as migrating policy packages from ZENworks 2 to ZfD. If you are upgrading from ZENworks 2 and have existing policies that you want to migrate to ZfD, see Migrating ZfD 2 Policy Packages to ZfD 3.2 in Upgrading from an Older Version of ZfD in *Deployment*.

The following sections contain step-by-step instructions to help you run the Copy Policy Packages utility:

- "Using the ConsoleOne Copy Policy Packages Utility" on page 25
- "Using the Windows Copy Policy Packages Utility" on page 25

Using the ConsoleOne Copy Policy Packages Utility

The Copy Policy Packages utility can be run via a ConsoleOne snap-in. The snap-in consists of the following files: ZENCOPYPOL.JAR and ZENCOPYPOLREG.JAR.

To run the Copy Policy Packages utility from ConsoleOne:

1. In ConsoleOne, click Tools > ZENworks Utilities > Copy Policy Packages.
2. Browse to a policy package or container that contains policy packages.
3. Browse to a container where you want to copy this policy package.
4. Click Add to add the container to the Selected Container list.

   To copy the policy package or container to multiple containers, repeat Step 3 and Step 4.
5. Click OK.

Using the Windows Copy Policy Packages Utility

The Windows-based Copy Policy Packages utility is found in the *windows_drive*\SYS\PUBLIC\MGMT\CONSOLEONE\1.2\BIN directory.

To run the Copy Policy Packages utility from Windows:

1. Double-click COPYPOL.EXE.
2. Enter the name of a policy package or container that contains policy packages that you want to copy from one NDS container to another.
3. Enter a container name.

4. Click Add to add the container name to the Selected Container list.

   To copy the policy package or container to multiple containers, repeat Step 3 and Step 4.

5. Click OK.

The Windows-based Copy Policy Packages utility can also run from the Windows command line. You can copy a policy package from one NDS container to another or you can copy all of the policy packages from one NDS container to another container.

To copy a policy package from one container to another, use the following syntax:

```
copypol policy_package_DN /d destination_container
```

To copy all of the policy packages from one container to a different container, use the following syntax:

```
copypol container_DN /d destination_container
```

You can use the following command line switches:

/h runs the Copy Policy Packages utility in hidden mode.

/r replaces the policy package in the destination container if a policy package with the same name already exists in that container.

/t specifies the tree to copy the policy packages to.

/v lets you view a log file to verify the results of the copy process.

III Application Management

The following sections provide information on ZENworks® for Desktops (ZfD) Application Management tasks you may need to perform and features you might want to use.

4 Understanding Application Launcher/Explorer

Novell® Application Launcher™ and Application Explorer (Application Launcher/Explorer) run on users' workstations to deliver the applications you've configured in NDS®.

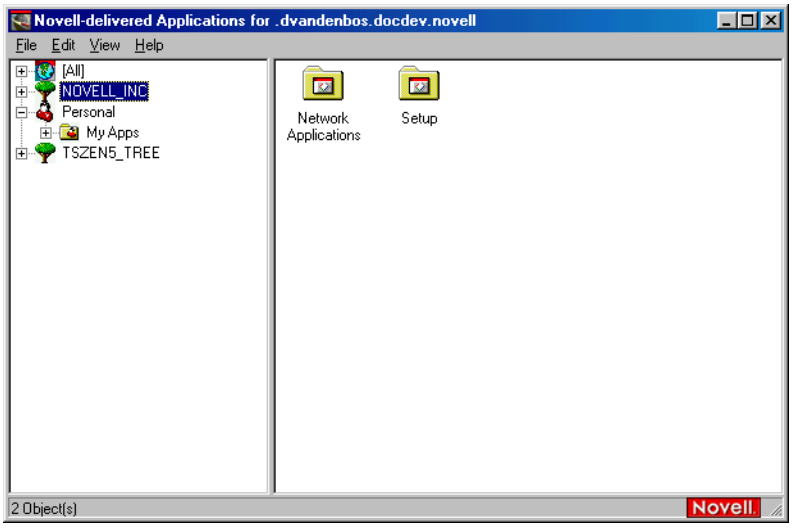
Both Application Launcher and Application Explorer are 32-bit applications that support Windows* 95, Windows 98, Windows NT*, Windows 2000, and Windows XP. When a user starts Application Launcher/Explorer, Application Launcher/Explorer reads NDS to provide access to the applications the user has been given rights to.

NOTE: If the user is not connected to NDS, Application Launcher/Explorer reads the user's local cache to see what applications the user has access to while disconnected from NDS.

Although Application Launcher and Application Explorer perform the same basic functions and both run on Windows 95/98 and Windows NT/2000/XP/XP, Application Launcher is designed to enable greater administrative control of the user's desktop and Application Explorer is designed to enhance and extend the desktop. As administrator, you determine whether users run Application Launcher or Application Explorer. The following sections provide information to help you understand Application Launcher/Explorer.

Application Launcher

Application Launcher, shown below, is a standalone window that can be accessed from the workstation's desktop.



NOTE: You can replace the Windows desktop with the Application Launcher window. For instructions, see "Using Application Launcher as the Windows Shell" on page 45.

Application Launcher Features

By default, the Application Launcher window is divided into two panes, much like Windows Explorer. In the left pane, Application Launcher displays the following:

- [All] folder: Contains all applications that have been distributed to the user. This is an administrator-controlled feature. By default, it is enabled, which means the folder appears. You can disable the feature if desired.
- NDS trees: Each tree contains the applications, located within the tree, that have been distributed to the user or workstation. Application Launcher displays only the trees to which the user is authenticated.
- Personal folder: Provides a location for the user to create personal folders for organizing applications. This is an administrator-controlled feature. By default, it is disabled, which means the folder does not appear.

When the user selects a tree or folder in the left pane, the right pane displays the items (folders or applications) that are contained within the tree or folder.

Using the Application Launcher window, the user can do the following:

- Run an application by double-clicking the application's icon in the right pane. Depending on the application and how it is configured in NDS, before running the application Application Launcher may install files to the workstation, map drives, or change workstation configuration files or settings.
- View the properties of an application. The properties include a description of the application, information about people to contact for help with the application, the times when the application is available for use, and the workstation requirements established for the application.
- Log in to NDS (or to another NDS tree). You can disable this functionality if desired.
- Disconnect Application Launcher from NDS so that the user can work offline. Disconnecting Application Launcher from NDS does not log the user out of NDS. You can disable this functionality if desired

As administrator, you control the availability of certain features that enable users to do the following:

- Uninstall an application.
- Cache an application's installation files to the user's workstation so that the user can install or verify (fix) the application while disconnected from NDS.

For information about configuring Application Launcher, see "Configuring Application Launcher/Explorer" on page 36.

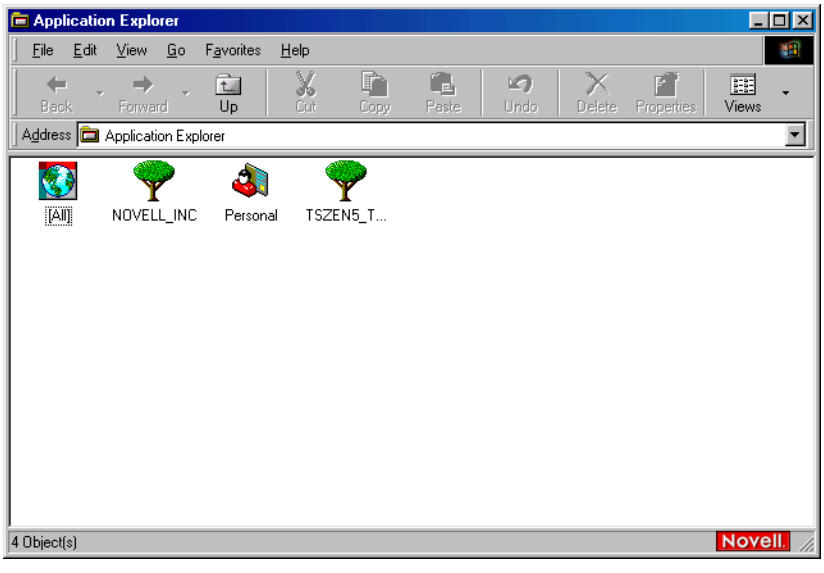
Application Launcher Files

Application Launcher consists of the following files:

- **NAL.EXE:** This is the program file that is used to execute Application Launcher. It is located on a server's SYS:PUBLIC directory. NAL.EXE serves as a "wrapper" file by performing some initialization functions, launching NALSTART.EXE, and then terminating. You can use various command line switches with NAL.EXE to control Application Launcher functionality. For information, see "Application Launcher/Explorer Command Line Switches" on page 46.
- **NALSTART.EXE:** This program updates the Application Launcher files on the user's workstation (if necessary), updates the Application Launcher/Explorer Windows Service (NALNTSRV.EXE) on a Windows NT/2000/XP/XP workstation (if necessary), registers and starts the Workstation Helper (ZENAPPWS.DLL) running under Workstation Manager, and launches NALWIN32.EXE.
- **NALWIN32.EXE:** This program reads NDS to build a list of the folders and applications that have been associated with the user and then displays the folders and applications in the Application Launcher window on the workstation.

Application Explorer

Application Explorer includes a standalone window, shown below, that can be accessed from the Windows desktop. The Application Explorer window is similar to the Application Launcher window.



The greatest benefit of Application Explorer, however, is its integration with the Windows desktop. In addition to being able to display Application objects in the Application Explorer window, you can configure Application objects to display on the Windows desktop, the Start menu, the system tray, and the Quick Launch tool bar.

Application Explorer Features

The Application Explorer window displays the following:

- [All] folder: Contains all applications that have been distributed to the user. This is an administrator-controlled feature. By default, it is enabled, which means the folder appears. You can disable the feature if desired.
- NDS trees: Each tree contains the applications, located within the tree, that have been distributed to the user or workstation. Application Launcher displays only the trees to which the user is authenticated.
- Personal folder: Provides a location for the user to create personal folders for organizing applications. This is an administrator-controlled feature. By default, it is disabled, which means the folder does not appear.

Using Application Explorer (either the window or one of the desktop integrations), the user can do the following:

- Run an application by double-clicking the application's icon. Depending on the application and how it is configured in NDS, before running the application Application Explorer may install files to the workstation, map drives, or change workstation configuration files or settings.
- View the properties of an application. The properties include a description of the application, information about people to contact for help with the application, the times when the application is available for use, and the workstation requirements established for the application.
- Disconnect Application Explorer from NDS so that the user can work offline. Disconnecting Application Launcher from NDS does not log the user out of NDS. You can disable this functionality if desired.

As administrator, you control the availability of certain features that enable users to do the following:

- Uninstall an application.
- Cache an application's installation files to the user's workstation so that the user can install or verify (fix) the application while disconnected from NDS.

For information about configuring Application Explorer, see "Configuring Application Launcher/ Explorer" on page 36.

Application Explorer Files

Application Explorer consists of the following files:

- **NALEXPLD.EXE:** This is the program file that is used to execute Application Launcher. It is located on a server's SYS:PUBLIC directory. NALEXPLD.EXE serves as a "wrapper" file by performing some initialization functions, launching NALSTART.EXE, and then terminating. You can use various command line switches with NALEXPLD.EXE to control

Application Explorer functionality. For information, see "Application Launcher/Explorer Command Line Switches" on page 46.

- **NALSTART.EXE:** This program updates the Application Explorer files on the user's workstation (if necessary), updates the Application Launcher/Explorer Service (NALNTSRV.EXE) on a Windows NT/2000/XP/XP workstation (if necessary), registers and starts the Workstation Helper (ZENAPPWS.DLL) running under Workstation Manager, and launches NALDESK.EXE.
- **NALDESK.EXE:** This program reads NDS to build a list of the folders and applications that have been associated with the user and then displays the folders and applications in the designated locations (Application Explorer windows, desktop, system tray, and so forth) on the workstation.

Application Launcher/Explorer Service for Windows NT/2000/XP/XP

On Windows NT/2000/XP/XP, Application Launcher/Explorer includes a service (NALNTSRV.EXE) that does the following:

- **Distribution:** Ensures that applications can be distributed to the workstation regardless of the logged-in user's Windows system credentials. For example, if a user logged in to a Windows 2000 workstation is a member of the Users group, he or she does not have the file system and registry rights required to install an application to the workstation. The Application Launcher/Explorer Service, running in the system space, ensures that the application can be installed.
- **Launching:** Enables you to configure applications to launch and run under the System user's credentials rather the logged-in user's credentials. This gives an application full rights to the file system and the registry, regardless of the logged-in user's rights.

  You can choose from two security modes when running the application under the System user: secure System user mode and unsecure System user mode.

  Secure System user mode can be used if the user does not need to interact with the application (for example, you are apply a Service Pack); no interface will be displayed to the user.

  Unsecure System user mode can be used if the user requires interaction with the program (for example, a word processor); the normal interface is displayed to the user.

The Application Launcher/Explorer Service must be installed to the workstation by someone who has Administrator rights. By default, the service is installed with the Novell Client™, which also requires Administrator rights to install. During startup, Application Launcher/Explorer (through NALSTART.EXE) will also try to install and start the service if necessary; this will only be successful if the logged-in user has Administrator rights.

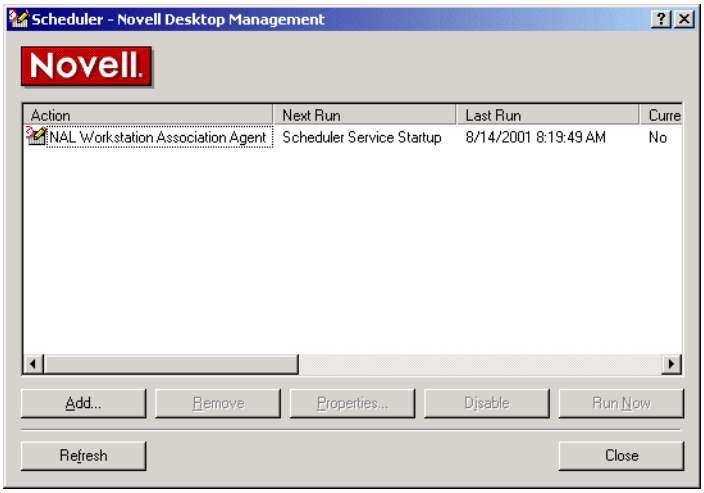
Application Launcher/Explorer Workstation Helper

In addition to associating Application objects with users, you can associate Application objects with workstations. This requires that the workstations be included in NDS as Workstation objects and that Workstation Manager be running on the workstations (see Automatic Workstation Import and Removal in *ZENworks for Desktops 3.2 Deployment Guide*).

When Application Launcher/Explorer starts, a Workstation Helper (ZENAPPWS.DLL) is loaded by Workstation Manager. The Workstation Helper accesses NDS through the Workstation object and passes Application Launcher/Explorer the list of applications associated with the Workstation

object. Application Launcher/Explorer then displays the workstation-associated applications just as it does the user-associated applications.

The Workstation Helper (ZENAPPWS.DLL) is installed on the workstation by Application Launcher/Explorer (through NALSTART.EXE) and is registered with Workstation Manager. As a result, Workstation Manager Scheduler, which is running on the workstation, adds an action called NAL Workstation Association Agent. You can view this scheduled action and others by double-clicking the Scheduler icon in the workstation's System tray.



In some cases, as in the above example, the Currently Running status may display as No. You should ignore this. As long as the NAL Workstation Association Agent is displayed in the list of actions, the Workstation Helper is running.

The Workstation Helper will refresh (reread NDS for changes to Application objects associated with the workstation) when 1) Application Launcher/Explorer is started, 2) Application Launcher/Explorer is manually refreshed, or 3) the Workstation Helper's scheduled refresh time occurs (see "Setting Configuration Options" on page 37).

5 Setting Up Application Launcher/Explorer

The following sections provide information to help you set up Novell® Application Launcher™/ Explorer. For information about the differences between the two applications, see Chapter 4, "Understanding Application Launcher/Explorer," on page 29.

Starting Application Launcher/Explorer

The following sections explain how to manually start Application Launcher and Application Explorer and how to automate the starting of the applications:

Rights for Windows NT/2000/XP/XP Users

Application Launcher/Explorer needs to be able to copy files to the workstation, write to the Windows registry, and so forth.

On Windows NT, users need to be members of the Users group to receive all the required rights

On Windows 2000, users need to be members of the Power Users group.

Manually Starting Application Launcher or Application Explorer

You can run either Application Launcher or Application Explorer on a workstation. Do not run both on the same workstation.

To manually start Application Launcher or Application Explorer on a workstation:

1. Make sure that the Novell Client™ for Windows 95/98 (version 3.3 with SP4 or later) or the Novell Client for Windows NT/2000/XP/XP (version 4.8 with SP4 or later) is installed on the workstation.
2. To start Application Launcher, run NAL.EXE from the SYS:\PUBLIC directory on a server where you installed Application Management.

NAL.EXE copies Application Launcher files to the workstation and starts Application Launcher. For details about Application Launcher files, see Chapter 5, "Setting Up Application Launcher/Explorer," on page 35.

3 To start Application Explorer, Run NALEXPLD.EXE from the SYS:\PUBLIC directory on a server where you installed Application Management.

NALEXPLD.EXE copies Application Explorer files to the workstation and starts Application Explorer. For details about Application Explorer files, see Chapter 5, "Setting Up Application Launcher/Explorer," on page 35.

Automating Application Launcher or Application Explorer Startup

You can run either Application Launcher or Application Explorer on a workstation. Do not run both on the same workstation.

To automatically start Application Launcher each time a user logs in to NDS:

1 Make sure that the Novell Client for Windows 95/98 (version 3.3 with SP4 or later) or the Novell Client for Windows NT/2000/XP/XP (version 4.8 with SP4 or later) is installed on the workstation.

2 To use Application Launcher, enter the following line in the user's login script:

```
@\\servername\sys\public\nal.exe
```

where *servername* is the actual name of your network server.

You can enter this line in a container, profile, or user login script. If the login script also contains an entry for the Automatic Client Upgrade (ACU), make sure the NAL.EXE entry is listed before the ACU entry.

3 To use Application Explorer, enter the following line in the user's login script:

```
@\\servername\sys\public\nalexpld.exe
```

where *servername* is the actual name of your network server.

You can enter this line in a container, profile, or user login script. If the login script also contains an entry for the Automatic Client Upgrade (ACU), make sure the NALEXPLD.EXE entry is listed before the ACU entry.

You can also add Application Launcher or Application Explorer to the Windows Startup folder. This enables Application Launcher/Explorer to start when the workstation is disconnected from NDS. You configure this option in ConsoleOne® and can have it apply to a single user, a group of users, or all users in a container. To do so, right-click a User, Group, or container object > click Properties > click the Application Launcher tab. On the Application Launcher page, click Edit > click the User tab > scroll to select the Auto-Start NAL When Disconnected option > set the option to Yes.

Configuring Application Launcher/Explorer

Application Launcher/Explorer includes configuration options you can use to determine how Application Launcher/Explorer works and the functionality that Application Launcher/Explorer exposes to users.

You use ConsoleOne to set configuration options at the container level, user level, or workstation level. When Application Launcher/Explorer searches the NDS tree for a user's (or workstation's) Application Launcher/Explorer settings, it starts with the User (or Workstation) object. If the

option has not been set for the User (or Workstation) object, Application Launcher/Explorer looks at the object's parent container to see if the option has been set at that level. If not, Application Launcher/Explorer continues up the NDS tree searching for the option's setting until it reaches a container object that has been designated as the top of the configuration tree. If it doesn't find any settings, then the setting is considered "unset" and the default setting is applied. Every configuration option has a default setting.

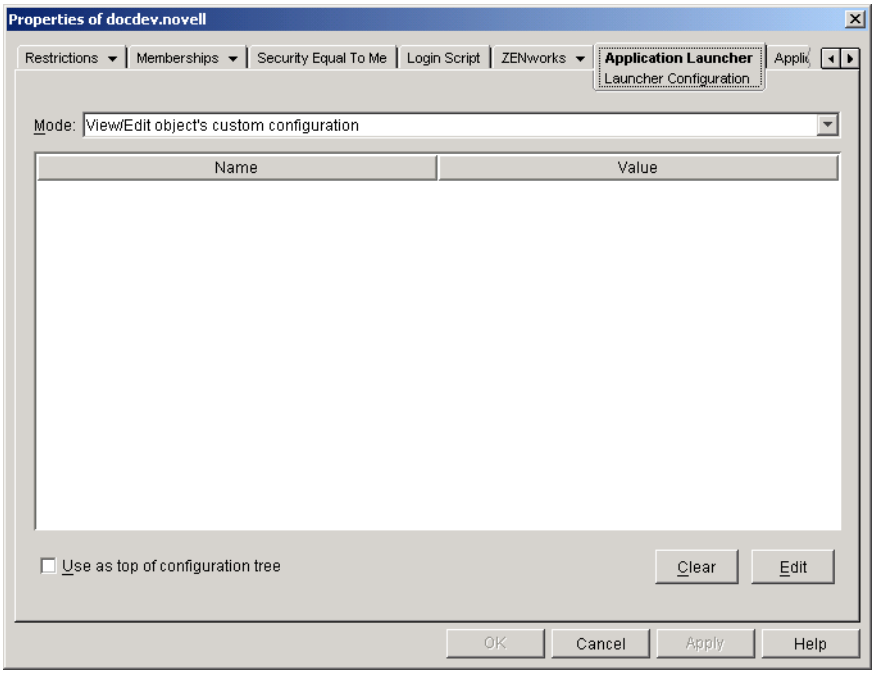
The following sections explain how to set configuration options and how to designate an object as the top of a configuration tree.

- "Setting Configuration Options" on page 37
- "Designating the Top of a Configuration Tree" on page 44

Setting Configuration Options

To set configuration options:

1. In ConsoleOne, right-click the User, Workstation, or container object to which you want to apply new settings > click Properties.
2. Click the Application Launcher tab to display the Launcher Configuration page.



The Launcher Configuration page provides three modes you can use to view the configuration settings for the current object. By default, the View/Edit Object's Custom Configuration mode is selected.

3. Make sure the View/Edit Object's Custom Configuration mode is selected. This is the mode that lets you set configuration options for the object. All three modes are described below.

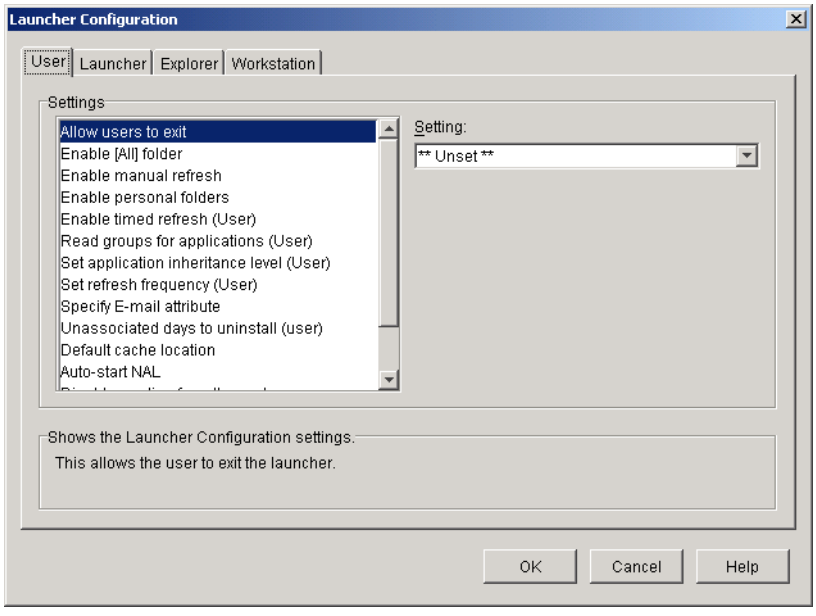
   View/Edit Object's Custom Configuration (Default Mode): In this mode, the window lists all configuration options that have been set, or "customized," and lists the settings values. Options that are unset, meaning they receive their settings from their parent container (or higher), are not displayed.

This is the mode you must use to set a configuration option.

View Object's Effective Settings: In this mode, the window lists all configuration options with their effective settings. Effective settings may be from custom settings applied directly to the object, from settings inherited from a parent container, or from settings determined by the default settings values. This mode is useful when you want to see all settings that are being applied to the object.

View Configuration Tree: In this mode, the window displays the portion of the NDS tree that is being used to determine the configuration settings for the option. Only configuration options that are using a custom setting (either from the current object or from its parent container) are displayed. This mode is useful when you want to see what object a setting is being inherited from.

4 Click Edit to display the Launcher Configuration dialog box.



The Launcher Configuration dialog box has three or four tabs, depending on the type of object you are setting configuration options for: User, Launcher, Explorer, and Workstation.

User: Includes options that apply to both Application Launcher and Application Explorer.

Launcher: Includes options that apply to Application Launcher only.

Explorer: Includes options that apply to Application Explorer only.

Workstation: Includes options that apply to both Application Launcher and Application Explorer, but only when the user's workstation has been imported into NDS as a Workstation object and Workstation Manager is running on the workstation.

5 Click User > set the following options:

Allow Users to Exit: Specify whether or not to allow the user to exit Application Launcher/Explorer. If you allow the user to exit, you should let him or her know how to start Application Launcher/Explorer again.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable [All] Folder: Specify whether or not the user can see the [All] applications folder in Application Launcher/Explorer. The [All] applications folder displays all applications the user has access to, regardless of the application's NDS tree or folder.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable Manual Refresh: Specify whether or not the user can refresh Application Launcher/Explorer to distribute any changes since the last refresh. The Enable Manual Refresh and Enable Timed Refresh options are not connected in any way except that they both control refresh. One option does not need to be selected for the other to work.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable Personal Folders: Specify whether or not the user can create Application Launcher/Explorer folders and move the icons in them as he or she sees fit. Only Application object icons (or associated application icons or shortcuts) can be moved into personal folders. Use caution when offering the option if you want to exert more control and thus reduce support calls.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Enable Timed Refresh: Specify whether or not Application Launcher/Explorer will automatically refresh the application so the user doesn't have to manually refresh icons.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Read Group Objects for Applications: Specify whether or not you want Application Launcher/Explorer to read Group objects to see if the user has been associated with any applications through membership in a group. Although groups are a convenient way of indirectly associating the user with applications, requiring Application Launcher/Explorer to read Group objects can also decrease performance.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Set Application Inheritance Level: Specify how many parent containers Application Launcher/Explorer should search for applications associated with the user.

The setting values are -1, 1 through 999, and Unset. Entering -1 instructs Application Launcher/Explorer to search to the root of the NDS tree. The default value (1) is used if you select Unset and no parent container includes a customized setting.

Set Refresh Frequency: Specify how often you want Application Launcher/Explorer to search NDS for new or changed Application objects associated with the user. A short timed refresh interval is very useful in situations where you want changes to refresh quickly. However, a short timed refresh interval can cause higher network traffic.

The setting values are 0 through 999,999,999 (seconds) and Unset. The default value (3600) is used if you select Unset and no parent container includes a customized setting.

Specify E-Mail Attribute: Specify the NDS attribute you want to use to display e-mail names on the Help Contacts tab of the Application object's Properties dialog box. If the user has problems with applications, he or she can contact people by e-mail to get help. The e-mail name that appears is pulled from the NDS attribute you specify here. Users must have the NDS rights required to read the selected attribute for all users defined as contacts.

The setting values include all the NDS attributes and Unset. The default value (Mailbox ID) is used if you select Unset and no parent container includes a customized setting

Unassociated Days to Uninstall: Specify the number of days after which you want Application Launcher/Explorer to uninstall an application when the user has been unassociated with the application.

The setting values are 0 through 730 and Unset. Specify 0 if you want the application to be uninstalled as soon as the user is no longer associated with it. The default value (0) is used if you select Unset and no parent container includes a customized setting.

NOTE: This option requires you to have enabled the application to be uninstalled. For information, see Chapter 7, “Uninstalling Applications,” on page 67.

Default Cache Location: Select the drive where Application Launcher/Explorer should create the cache directory. The cache directory contains 1) the information required to uninstall the applications and 2) the files needed to install or repair the application when the workstation is disconnected from NDS (for example, a laptop).

The setting values are drives A through Z and the Windows Drive. The default is the Windows Drive.

Auto-Start NAL: Typically, Application Launcher/Explorer is started via a login script when a user logs in to NDS. Specify whether or not you want Application Launcher/Explorer to be included in the user's Startup folder so that it will be automatically started even when the user does not log in to NDS. This option will not cause Application Launcher/Explorer to run twice (from the login script and the Startup folder) when the user logs in to NDS.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Disable Reading from the Cache: Specify whether or not you want to disable Application Launcher/Explorer's ability to read information from the cache directory (either local or on a removable media such as a CD, Jaz*, or Zip* drive). The main purpose of this option is to increase security by disabling a user's ability to launch or install applications from a removable media. With this option set to Yes, the Application Launcher/Explorer's Work Offline feature is also disabled, which means the user will not be able to work in disconnected mode.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Always Evaluate Referrals: The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

The setting values are Yes, No, and Unset. The default value (No) forces all NDS calls to the same replica and is used if you select Unset and no parent container includes a customized setting.

Enable Manage Applications Dialog: Specify whether or not you want to enable Application Launcher/Explorer's Manage Applications dialog box. This dialog box lets the user decide which disconnectable applications to include in the local cache and which cached applications to install or uninstall.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable Automatic Icon Cleanup: Specify whether or not you want Application Launcher/Explorer, when exited, to remove application icons from the user's workstation. In general, you should set this option to Yes to have Application Launcher/Explorer clean up. However,

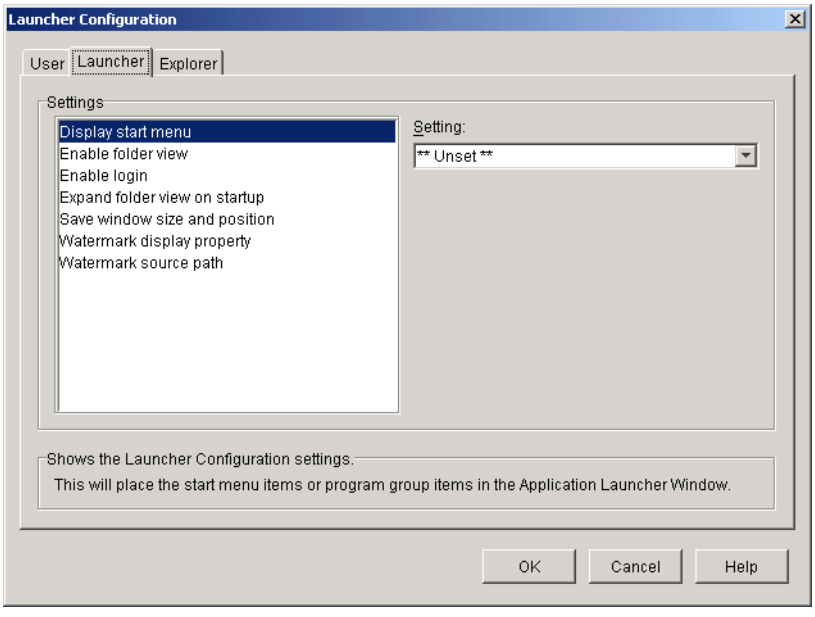
if the application is being run via a terminal server and multiple users log in with the same NDS username, you should disable this option. Otherwise, when one user exits Application Launcher/Explorer, the application icon's will disappear from all users' workstations.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting

OnDemand UsageServer: This setting applies only to ZENworks® OnDemand Services users. Specify the IP address or DNS hostname of the UsageServer to which the user's UsageClient will connect when Application Launcher/Explorer launches a usage-based application.

The setting values are Unset and Custom. To specify the UsageServer's address, select Custom > enter the UsageServer's IP address or DNS host name.

6 Click Launcher > set the following options:



Display Start Menu: Specify if and when you want Application Launcher to display the current Windows 95/98 or Windows NT/2000/XP/XP Start menu organization (including Programs and above) in the Application Launcher window.

The setting values are Show When Not Authenticated, Show When Authenticated, Show Always, Never Show, and Unset. The default value (Show When Not Authenticated) is used if you select Unset and no parent container includes a customized setting.

Enable Folder View: Specify whether or not Application Launcher displays folders in the Application Launcher window.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable Log In: Specify whether or not you want to activate the Log In option found on the File menu in the Application Launcher window so the user can run the Novell Client to log in to NDS. Before you enable the Log In option, ensure that Application Launcher can find the login program (LOGINW32.EXE) on the user's workstation. Put the login program in the startup directory, working directory, or path.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Expand Folder View on Startup: Specify whether or not you want Application Launcher to expand the entire folder tree when it starts.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Save Window Size and Position: Specify whether or not you want Application Launcher to save its window size and position settings on a local drive.

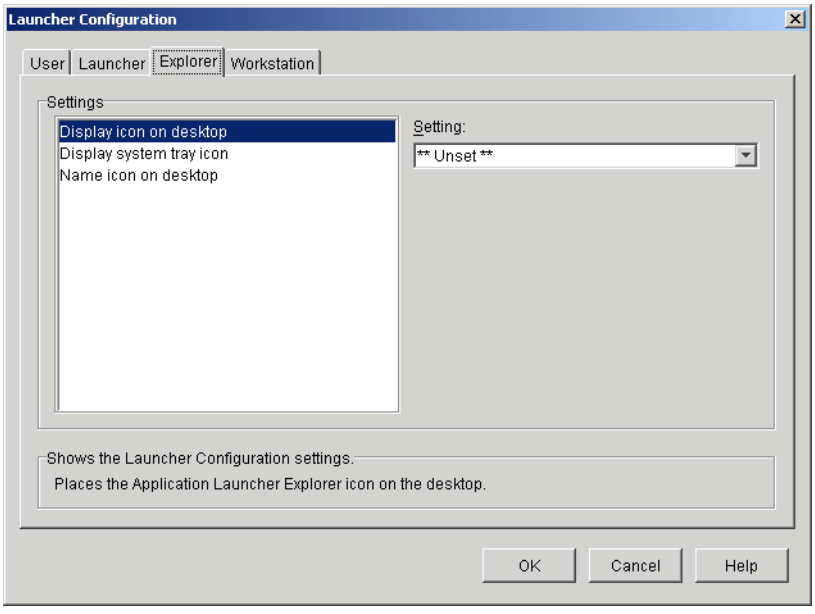
The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Watermark Display Property: This setting applies only if you've specified a watermark (Watermark Source Path setting). Select Default to have the watermark placed in the upper left corner in the Application Launcher window. Select Tile to have the watermark repeated to cover the entire window. The default setting is Default.

Watermark Source Path: Specify the location of the graphic file you want to use as the background wallpaper in the Application Launcher window. You can use any valid file path convention (for example, URL, mapped drive, or UNC path) and wallpaper graphic type (for example, .bmp, .gif, or .jpeg).

The setting values are Unset and Custom. The default value (Unset) causes the setting to be inherited from the user's container. To override this setting, select Custom and then specify the appropriate file path.

7 Click Explorer > set the following options:



Display Icon on Desktop: Specify whether or not you want the Application Explorer icon displayed on the user's desktop. The Application Explorer icon lets users open the Application Explorer window to access the applications that have been distributed to them.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

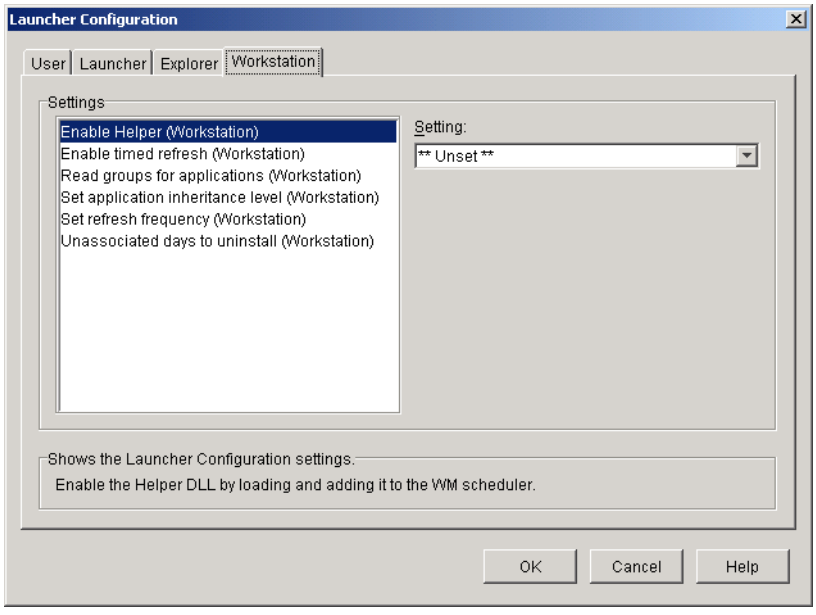
Display System Tray Icon: Specify whether or not you want the Application Explorer icon displayed in the Windows system tray. The Application Explorer icon lets users open the Application Explorer window to access the applications that have been distributed to them.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Name Icon on Desktop: Use this setting to change the name of Application Explorer's desktop icon. The default name is Application Explorer.

The setting values are Custom and Unset. The default value (Application Explorer) is used if you select Unset and no parent container includes a customized setting. To use a different name, select Custom and enter the icon title.

8 Click Workstation > set the following options:



Enable Helper: Specify whether or not you want to have the Workstation Helper installed and run by the Workstation Manager. The Workstation Helper must be running on a workstation in order to distribute workstation-associated applications to the workstation.

The setting values are Yes, No, and Unset. The default value (Yes) is used if you select Unset and no parent container includes a customized setting.

Enable Timed Refresh: Specify whether or not you want the Workstation Helper to periodically refresh its information (from NDS) for any workstation-associated applications. This ensures that the most recent changes to the workstation-associated applications are reflected on the workstation. If timed refresh is not enabled, Workstation Helper will only read NDS when it starts or when Application Launcher/Explorer is manually refreshed.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Read Group Objects for Applications: Specify whether or not you want Workstation Helper to read Group objects to see if the workstation has been associated with any applications through membership in a group. Although groups are a convenient way of indirectly associating workstations with applications, reading Group objects can also decrease performance.

The setting values are Yes, No, and Unset. The default value (No) is used if you select Unset and no parent container includes a customized setting.

Set Application Inheritance Level: Specify how many parent containers you want Workstation Helper to search for applications associated with the workstation.

The setting values are 1 through 999 and Unset. The default value (1) is used if you select Unset and no parent container includes a customized setting.

Set Refresh Frequency: Applies only if the Enable Timed Refresh option is turned on. Specify how often you want Workstation Helper to read NDS for new or changed workstation-associated application information. A short timed refresh interval is very useful in situations where you want changes to refresh quickly. However, a short timed refresh interval can cause higher network traffic.

The setting values are 0 through 999,999,999 (seconds) and Unset. The default value (3600) is used if you select Unset and no parent container includes a customized setting.

9. Click OK to return to the Launcher Configuration page > click OK to save the changes.

Designating the Top of a Configuration Tree

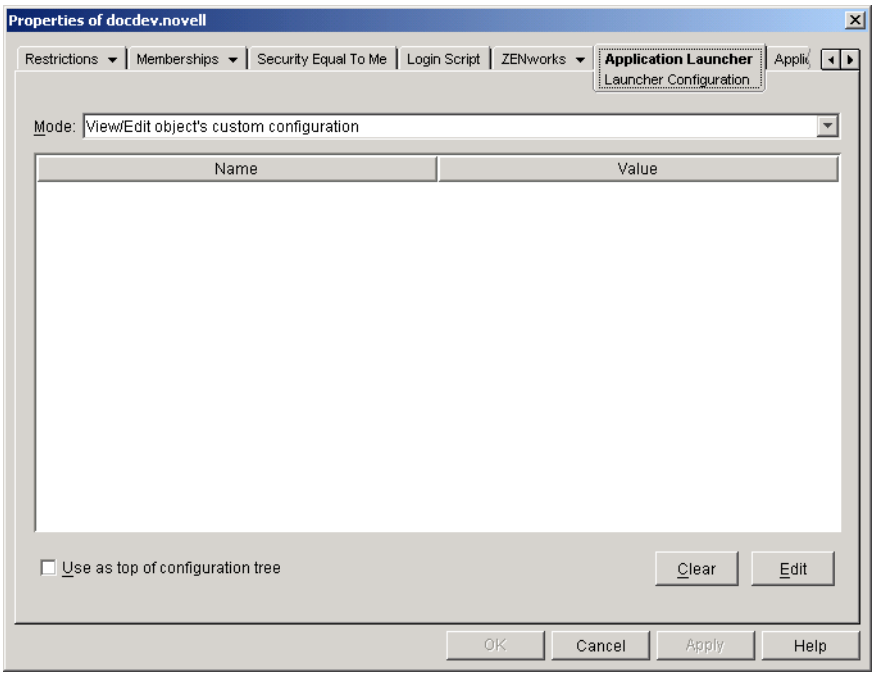
When Application Launcher/Explorer searches the NDS tree for a user's (or workstation's) Application Launcher/Explorer settings, it starts with the User (or Workstation) object. If the option has not been set for the User (or Workstation) object, Application Launcher/Explorer looks at the object's parent container to see if the option has been set at that level. If not, Application Launcher/Explorer continues up the NDS tree searching for the option's setting until it reaches an object that has been designated as the top of the tree.

You can designate User, Workstation, or container objects as the top of a configuration tree. For example, if you want Application Launcher/Explorer to read only the user's object for its configuration settings, you would designate the User object as the top of the configuration tree. Or, if you want Application Launcher/Explorer to read the user's object and its parent container object for its configuration settings, you would designate the parent container object as the top of the configuration tree.

Not all users and workstations must use the same top for the configuration tree. For example, for one user you may want Application Launcher/Explorer to read the user's configuration settings only, but you want to use the parent container as the top of the configuration tree for all other users in the container. In this case, you would specify the User object as the top of the configuration tree for the one user, and specify the parent container as the top of the configuration tree for the other users.

To designate an object as the top of the configuration tree:

1. In ConsoleOne, right-click the User, Workstation, or container object you want to designate as the top of a configuration tree > click Properties.
2. Click the Application Launcher tab to display the Launcher Configuration page.



3 Check the Use as Top of Configuration Tree box to designate this object as the top of a configuration tree.

4 Click OK.

Using Application Launcher as the Windows Shell

You can use Application Launcher in place of Windows Explorer (the default Windows shell) to further restrict user access to applications on Windows 95/98 or Windows NT/2000/XP/XP workstations.

- "Setting Up Application Launcher as the Shell on Windows 95/98" on page 45
- "Setting Up Application Launcher as the Shell on Windows NT/2000/XP/XP" on page 46

Setting Up Application Launcher as the Shell on Windows 95/98

1 Copy the following files to the locations specified.

File	Copy From	Copy To
NALWIN32.EXE	Z:\PUBLIC	C:\NOVELL\CLIENT32
NALRES32.DLL	Z:\PUBLIC\NLS\ENGLISH	C:\NOVELL\CLIENT32\NLS\ENGLISH
NALBMP32.DLL	Z:\PUBLIC\NLS\ENGLISH	C:\NOVELL\CLIENT32\NLS\ENGLISH
NALEXP32.HLP	Z:\PUBLIC\NLS\ENGLISH	C:\NOVELL\CLIENT32\NLS\ENGLISH
NALEXP32.CNT	Z:\PUBLIC\NLS\ENGLISH	C:\NOVELL\CLIENT32\NLS\ENGLISH
NWAPP32.DLL	Z:\PUBLIC	C:\NOVELL\CLIENT32

2 Open the workstation's SYSTEM.INI file (typically, C:\WINDOWS\SYSTEM.INI) with a text editor.

3 Replace the SHELL=EXPLORER.EXE line with the following line:

```
SHELL=C:\NOVELL\CLIENT32\NALWIN32.EXE
```

4 Save and close the SYSTEM.INI file.

5 Restart Windows.

Setting Up Application Launcher as the Shell on Windows NT/2000/XP/XP

1 Copy the following files to the locations specified.

File	Copy From	Copy To
NALWIN32.EXE	*Z*:\PUBLIC	C:\WINNT\SYSTEM32
NALRES32.DLL	*Z*:\PUBLIC\NLS\ENGLISH	C:\WINNT\SYSTEM32\NLS\ENGLISH
NALBMP32.DLL	*Z*:\PUBLIC\NLS\ENGLISH	C:\WINNT\SYSTEM32\NLS\ENGLISH
NALEXP32.HLP	*Z*:\PUBLIC\NLS\ENGLISH	C:\WINNT\SYSTEM32\NLS\ENGLISH
NALEXP32.CNT	*Z*:\PUBLIC\NLS\ENGLISH	C:\WINNT\SYSTEM32\NLS\ENGLISH
NWAPP32.DLL	*Z*:\PUBLIC	C:\WINNT\SYSTEM32

2 Run REGEDIT.EXE and locate the following setting:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon
```

3 Modify the SHELL value as follows:

```
SHELL=C:\WINNT\SYSTEM32\NALWIN32.EXE
```

4 Close REGEDIT.EXE.

5 Restart Windows.

Application Launcher/Explorer Command Line Switches

The following command line switches can be used when running Application Launcher (NAL.EXE) or Application Explorer (NALEXPLD.EXE).

Switch	Description
SYNTAX: : APPLICATION LAUNCHER EXAMPLE: nal :	This switch is valid for Application Launcher only. The /ns switch provides the same functionality for Application Explorer. Skips the initial splash screen.

Switch	Description
SYNTAX: /a="*.application_object*" or /a="*tree*:*.application_object*" APPLICATION LAUNCHER EXAMPLES: nal /a=".snapshot.apps" or nal /a="novell:.snapshot.apps" APPLICATION EXPLORER EXAMPLES: nalexpld /a=".snapshot.apps" or nalexpld /a="novell:.snapshot.apps"	Distributes and launches the specified application object. *Application_object* is the full object name of the application to run. *Tree* is the name of the tree in which the object exists. The default tree is assumed if no tree name is specified. **NOTE:** The quotation marks are required only if a space is used in the tree name or Application object name.
SYNTAX: /c="*window_title*" APPLICATION LAUNCHER EXAMPLE: nal /c="Marketing Applications for %CN%" APPLICATION EXPLORER EXAMPLE: nalexpld /c="Marketing Applications for %CN%"	Uses the specified text as the title for the Application Launcher/Explorer window. The default window title is "Novell-delivered Applications for *User*," where *User* is the distinguished name of the user. The text specified can contain macros (variables) to display NDS information. The example, /c="Marketing Applications for %CN%" will display "Marketing Applications for JSmith" for a user logged in as JSmith. For information about macros, see Chapter 15, “Macros,” on page 189.
SYNTAX: /dm APPLICATION LAUNCHER EXAMPLE: nal /dm APPLICATION EXPLORER EXAMPLE: nalexpld /dm	Displays the installation progress of Microsoft* Windows Installer if the Windows Installer is not already installed on the workstation.
SYNTAX: /f APPLICATION LAUNCHER EXAMPLE: nal /f APPLICATION EXPLORER EXAMPLE: nalexpld /f	Instructs Application Launcher/Explorer not to read NDS to get the list of applications that have been associated with the logged-in user or the workstation. This is useful when using the /a, /v, or /l switches to simply distribute, verify, or uninstall a specific application. This switch also requires you to use the /h switch.

Switch	Description
SYNTAX: /h APPLICATION LAUNCHER EXAMPLE: nal /h APPLICATION EXPLORER EXAMPLE: nalexpld /h	Instructs Application Launcher/Explorer to hide its window from view when loaded. This switch is required when using the /f switch and is useful with the /i, /l, and /v switches.
SYNTAX: /i APPLICATION LAUNCHER EXAMPLE: nal /i APPLICATION EXPLORER EXAMPLE: nalexpld /i	Installs or updates the Application Launcher/Explorer files on the local hard drive, but does not start Application Launcher/Explorer. This switch can be used on a secured NT workstation on which the SYSTEM32 directory is set to "read only" access for the user.
SYNTAX: /l=".*application_object*" or /l="*tree*:.*application_object*" APPLICATION LAUNCHER EXAMPLES: nal /l=".snapshot.apps" or nal /l="novell:.snapshot.apps" APPLICATION EXPLORER EXAMPLES: nalexpld /l=".snapshot.apps" or nalexpld /l="novell:.snapshot.apps"	Uninstalls the specified application object. *Application_object* is the full object name of the application to run. *Tree* is the name of the tree in which the object exists. The default tree is assumed if no tree name is specified. **NOTE:** The quotation marks are required only if a space is used in the tree name or Application object name.
SYNTAX: /max APPLICATION LAUNCHER EXAMPLE: nal /max APPLICATION EXPLORER EXAMPLE: nalexpld /max	Displays the Application Launcher/Explorer window maximized when first loaded, overriding the window state from the previous running of Application Launcher.

Switch	Description
SYNTAX: /min APPLICATION LAUNCHER EXAMPLE: nal /min APPLICATION EXPLORER EXAMPLE: nalexpld /min	Displays the Application Launcher/Explorer window minimized when first loaded, overriding the window state from the previous running of Application Launcher/Explorer.
SYNTAX: /n APPLICATION LAUNCHER EXAMPLE: nal /n APPLICATION EXPLORER EXAMPLE: nalexpld /n	Displays the Application Launcher/Explorer window in its normal state (neither maximized nor minimized) when first loaded, overriding the window state from the previous running of Application Launcher/Explorer.
SYNTAX: /nbc APPLICATION LAUNCHER EXAMPLE: nal /nbc APPLICATION EXPLORER EXAMPLE: nalexpld /nbc	Stands for No Boot Choice. When updating Application Launcher/Explorer files, replaces the Yes/No buttons with an OK button when prompting the user to restart his or her workstation to update files in use.
SYNTAX: /nd APPLICATION LAUNCHER EXAMPLE: nal /nd APPLICATION EXPLORER EXAMPLE: nalexpld /nd	Suppresses the warning that a dial-up connection is present.
SYNTAX: /nodialup APPLICATION LAUNCHER EXAMPLE: nal /nodialup APPLICATION EXPLORER EXAMPLE: nalexpld /nodialup	Exits if a dial-up connection is present. Application Launcher/Explorer will not update any files nor run any other EXE if a dial-up connection is present.

Switch	Description
SYNTAX: /noupdate APPLICATION LAUNCHER EXAMPLE: nal /noupdate APPLICATION EXPLORER EXAMPLE: nalexpld /noupdate	Does not update any Application Launcher/Explorer files on the workstation. Application Launcher/Explorer will be run from the current directory, usually SYS:PUBLIC.
SYNTAX: /nows APPLICATION LAUNCHER EXAMPLE: nal /nows APPLICATION EXPLORER EXAMPLE: nalexpld /nows	Instructs Application Launcher/Explorer to not register the workstation helper (ZENAPPWS.DLL) and to remove the registration if it exists. This switch should only be used for temporary troubleshooting purposes. If you want to permanently disable the workstation helper, you should disable the Enable Helper configuration option (see “Setting Configuration Options” on page 37).
SYNTAX: /ns EXAMPLE: nalexpld /ns	This switch is valid for Application Explorer only. The: switch provides the same functionality for Application Launcher. Skips the initial splash screen.
SYNTAX: /p="*parameters*" APPLICATION LAUNCHER EXAMPLE: nal /a=.snapshot.apps /p="/a /q" APPLICATION EXPLORER EXAMPLE: nalexpld /a=.snapshot.apps /p="/a /q"	Instructs Application Launcher/Explorer to pass the specified parameters to the application being launched. It is only effective when used with /a or /v.
SYNTAX: /s EXAMPLE: nal /s	This switch is valid for Application Launcher only. Instructs Application Launcher to act like the Windows shell. In the Application Launcher window, the Exit the Application Launcher option on the File menu changes to Shutdown Windows and gives the user the standard Windows shutdown options. **NOTE:** Application Launcher does not replace the Windows shell. If users minimize the Application Launcher window, they will have access to their normal desktop. If you want Application Launcher to replace the Windows shell, see “Using Application Launcher as the Windows Shell” on page 45.

Switch	Description
SYNTAX: /time=*seconds* APPLICATION LAUNCHER EXAMPLE: nal /time=10 APPLICATION EXPLORER EXAMPLE: nalexpld /time=10	Instructs Application Launcher/Explorer to pause the specified number of seconds before continuing to load. The default wait time is 3 seconds. Use this switch only if you want Application Launcher/Explorer to wait extra time before continuing to load. For example, if several other programs are starting from the login script and they all display splash screens, you might not want all of them being displayed at the same time and overlapping each other.
SYNTAX: /u APPLICATION LAUNCHER EXAMPLE: nal /u APPLICATION EXPLORER EXAMPLE: nalexpld /u	Unloads Application Launcher/Explorer from memory after all applications have terminated.
SYNTAX: /v="*application_object*" or /v="*tree*:.*application_object*" APPLICATION LAUNCHER EXAMPLE: nal /v=".snapshot.apps" or nal /v="novell:.snapshot.apps" APPLICATION EXPLORER EXAMPLE: nalexpld /v=".snapshot.apps" or nalexpld /v="novell:.snapshot.apps"	Verifies and launches the specified application. *Application_object* is the full object name of the application to run. *Tree* is the name of the tree in which the object exists. The default tree is assumed if no tree name is specified. **NOTE:** The quotation marks are required only if a space is used in the tree name or Application object name.

6 Distributing Applications

ZENworks® for Desktops (ZfD) Application Management lets you distribute applications to Windows* 95/98 and Windows NT*/2000/XP workstations. Because of the flexibility provided, you can also distribute individual files and software patches, or simply make changes to a workstation's Windows registry or configuration files.

The following sections provide information to help you understand the Application Management software components involved in distributing (and launching) applications, the NDS® and file system rights required by these software components, and the basic process of distributing an application. The final section references you to other places in the documentation that provide additional information about configuration settings you can use to control the distribution and launching of applications.

- "Understanding the Components, NDS Rights, and File System Rights Used When Distributing and Launching Applications" on page 53
- "Distributing an Application" on page 56
- "Other Things You Can Do To Control the Distribution and Launching of Applications" on page 66

Understanding the Components, NDS Rights, and File System Rights Used When Distributing and Launching Applications

Distribution of an application to a workstation, and the subsequent launching of the application on the workstation, can be handled by three different components: Application Launcher/Explorer, Application Launcher/Explorer Service for Windows NT/2000/XP/XP (NAL Service), or Application Launcher/Explorer Workstation Helper. For a description of each of these components, see Chapter 4, "Understanding Application Launcher/Explorer," on page 29.

Which components handle the distribution and launching depends on the following:

- The workstation's Windows version (95/98 or NT/2000)
- Whether the application is associated with the workstation or with a user logged into the workstation
- Whether the application is configured to run as the logged-in user or as the System user (Windows NT/2000/XP/XP only)

The tables in the following two sections describe which components are used to distribute and launch user-associated applications and workstation-associated applications.

- "Distribution and Launching of User-Associated Applications" on page 54
- "Distribution and Launching of Workstation-Associated Applications" on page 55

Because these components require NDS rights and file system rights to distribute and launch applications, and these rights can come from various sources, the table also lists which sources provide these rights. Knowing whose NDS and file system rights are providing access for the components can help you avoid distribution and launching problems caused by insufficient or incorrect rights.

Distribution and Launching of User-Associated Applications

Event	Windows 95/98	Windows NT/2000/XP/XP
Distribution	◆ Distributed by Application Launcher/ Explorer ◆ Access to NDS provided by the logged-in NDS user ◆ Access to the workstation's file system provided by default	◆ Distributed by NAL Service (Application Launcher/ Explorer Service for Windows NT/2000/XP/XP) ◆ Access to NDS provided by the logged-in NDS user ◆ Access to the workstation's file system provided by the Windows System user
Launching (normal)	◆ Launched by Application Launcher/ Explorer ◆ Access to NDS provided by the logged-in NDS user ◆ Access to the workstation's file system provided by default	Run as logged-in user: ◆ Launched by Application Launcher/Explorer ◆ Access to NDS provided by the logged-in NDS user ◆ Access to the workstation's file system provided by the logged-in Windows user Run as secure/unsecure System user**: ◆ Launched by NAL Service ◆ Access to NDS provided by the logged-in NDS workstation (through Workstation object) ◆ Access to the workstation's file system provided by the Windows System user
Launching (Force Run*)	Same as normal launch	Same as normal launch

* The Force Run setting causes the application to automatically run after being distributed. For information about configuring an application as Force Run, see "Associating the Application Object with Users" on page 62.

** The Secure System User and Unsecure System User settings apply to applications running on Windows NT/2000/XP only. These settings cause the application to run in the "system" space as the Windows System user rather than in the "user" space as the logged-in user. These settings are intended to ensure that users can run locally-installed applications even if they have limited file system rights on the workstation. If an application (running as a secure or uunsecure System user) will be executed from a network location or will require access to a network location, the

workstation must also be logged in to NDS, which requires that the workstation have a Workstation object in NDS. For information about adding Workstation objects to NDS, see Automatic Workstation Import and Removal in the *ZENworks for Desktops 3.2 Deployment Guide* guide. For more about running an application as a secure or unsecure System user, see "Environment Page" on page 143.

Distribution and Launching of Workstation-Associated Applications

Event	Windows 95/98	Windows NT/2000/XP
Distribution	• Distributed by Workstation Helper • Access to NDS provided by the logged-in NDS workstation (through the Workstation object) • Access to the workstation's file system provided by default	• Distributed by NAL Service via the Workstation Helper • Access to NDS provided by the logged-in NDS workstation (through Workstation object) • Access to the workstation's file system provided by the Windows System user
Launching (normal)	• Launched by Application Launcher/Explorer • Access to NDS provided by the logged-in NDS workstation (through the Workstation object) • Access to the workstation's file system by default	Run as logged-in user: • Launched by Application Launcher/ Explorer • Access to NDS provided by the logged-in NDS user • Access to the workstation's file system provided by the logged-in Windows user Run as secure/unsecure System user**: • Launched by NAL Service • Access to NDS provided by the logged-in NDS workstation • Access to the workstation's file system provided by the Windows System user

Event	Windows 95/98	Windows NT/2000/XP
Launching (Force Run*)	Launched by Workstation Helper Access to NDS provided by the logged-in NDS workstation (through the Workstation object) Access to the workstation's file system provided by default	Run as logged-in user: ◆ Launched by NAL Service ◆ Access to NDS provided by the logged-in NDS workstation (through the Workstation object) ◆ Access to the workstation's file system provided by the Windows System user Run as secure/unsecure System user: ◆ Launched by NAL Service ◆ Access to NDS provided by the logged-in NDS workstation ◆ Access to the workstation's file system provided by the Windows System user

* The Force Run setting causes the application to automatically run after being distributed. For information about configuring an application as Force Run, see "Application Launcher Features" on page 30.

** The Secure System User and Unsecure System User settings apply to applications running on Windows NT/2000/XP only. These settings cause the application to run in the "system" space as the Windows System user rather than in the "user" space as the logged-in user. These settings are intended to ensure that users can run the application even if they have limited file system rights on the workstation. For more information, see "Environment Page" on page 143.

Distributing an Application

The process of distributing an application consists of four main tasks:

1. Create the application's installation package and copy it to a network location.
2. Create an Application object in NDS using the installation package.
3. Define the system requirements that a workstation must meet before Novell® Application Launcher™/Explorer will distribute the application to it.
4. Associate the Application object with the users or workstations you want to distribute the application to.

This process assumes that you have already set up Application Launcher/Explorer on users' workstations. Application Launcher/Explorer displays, installs, and configures the application on the workstation after you complete the tasks listed above. If you have not installed Application Launcher/Explorer, see Chapter 5, "Setting Up Application Launcher/Explorer," on page 35.

The following sections provide instructions for completing the tasks listed above:

- "Creating an Application's Installation Package" on page 57
- "Creating an Application Object" on page 58
- "Defining the Application's System Requirements" on page 61

- “Associating the Application Object with Users or Workstations” on page 62

HINT: After you create an Application object, there are many different Application object property settings you can configure to better manage the application. The above tasks provide information about the basic settings you must configure in order to distribute the application. For information about additional settings you can configure, see Chapter 14, “Application Object Settings,” on page 115.

Creating an Application’s Installation Package

An installation package consists of the files and information needed to install the application on a workstation. The following sections explain the options available to you to help you create an application’s installation package:

- “Manually Creating an Installation Package” on page 57
- “Creating a snAppShot Installation Package” on page 57
- “Creating a Microsoft Windows Installer Package” on page 58

Manually Creating an Installation Package

Some applications require few files to be copied to the workstation and few (or no) changes to the workstations configuration (registry, INI files, environment variables, and so forth). The installation package for these applications may very well consist of only one or two files. In this case, you can copy the files to a network directory. After creating the NDS object for the application, you can configure the Application object to instruct Application Launcher/Explorer to simply run the application from the network directory or to first copy the files to the workstation and then run the application locally. You can also configure the Application object to modify any workstation settings required by the application.

To manually create an installation package:

1. Create a network directory for the application’s files.
2. Copy the files to the network directory.

Creating a snAppShot Installation Package

Some applications require many files to be installed and many changes to be made to the workstation. This can require a complex installation package.

ZENworks® for Desktops (ZfD) Application Management includes the snAppShot™ utility to automate the process of creating complex installation packages. You run snAppShot on a workstation that has never had the application installed to it. SnAppShot records the workstation’s state (files and configuration) before you install the application and after you install the application. From this information, snAppShot creates an installation package consisting of an Application object template file (.AOT or .AXT file) and the application’s files (.FIL files). This installation package is saved to a network directory you specify. When you create the NDS object for the application, the .AOT file is used. When Application Launcher/Explorer distributes the application to a workstation, it uses the .FIL files as well as the configuration information (registry changes, INI file changes, and so forth) stored in the Application object.

To use snAppShot to create an installation package:

1. Set up a "clean" workstation. This needs to be a workstation where the application has never been installed.
2. Run snAppShot (SNAPSHOT.EXE) from the SYS:\PUBLIC\SNAPSHOT directory.

3 Follow the on-screen prompts to create the installation package. For more detailed information about snAppShot, see Chapter 13, “SnAppShot,” on page 111.

Creating a Microsoft Windows Installer Package

Microsoft* Windows* 2000 (and patched versions of Windows 95/98 and Windows NT* 4.0) include an installation and configuration service referred to as Microsoft Windows Installer. Microsoft Windows Installer, similar to Application Launcher/Explorer, installs applications to a workstation from an installation package consisting of a .MSI file and various support files.

ZfD Application Management enables you to distribute applications that are installed through Windows Installer. Rather than using a snAppShot .AOT/.AXT file when creating the Application object, you simply use the application’s .MSI file. Distributing .MSI applications through Application Launcher/Explorer enables you to control who has access to the application while still gaining the benefits associated with the Windows Installer (such as on-demand installation, transforms, and source resiliency).

To use a Windows Installer package:

1 Create the installation package in a network location by running the application’s setup program using the administrative option. For more information, see you application’s installation documentation.

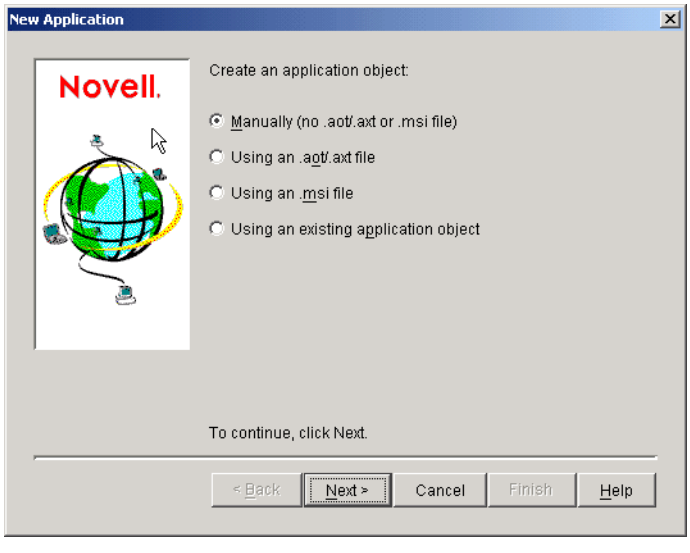
or

Copying the application’s preconfigured .MSI files and supporting files to a network location (if this method is supported by the application).

Creating an Application Object

1 In ConsoleOne®, right-click the container where you want to create the Application object > click New > click Object to display the New Object dialog box.

2 Click App:Application > OK to display the New Application dialog box.



3 Select the option you want to use to create the Application object:

Manually (No .AOT/.AXT File or .MSI File): Lets you enter a path to the application's executable file. After the Application object is created, you can modify additional properties if necessary. Skip to "Manually Creating an Application Object" on page 59.

Using an .AOT/.AXT File: Lets you specify an .AOT or .AXT file you've created with snAppShot. The .AOT or .AXT file is used to populate the Application object's property fields. Skip to "Using an .AOT/AXT File to Create an Application Object" on page 60.

Using an .MSI File: Lets you specify an .MSI file. The .MSI file is used to populate the Application object's property fields. Skip to "Using an .MSI File to Create an Application Object" on page 60.

Using an Existing Application Object: Lets you make a copy of an existing Application object. Skip to "Using an Existing Application Object to Create a New Application Object" on page 60.

Manually Creating an Application Object

1. In the New Application dialog box, select Manually (No .AOT/.AXT File or .MSI File) > click Next.
2. In the Object Name box, type a name for the Application object.
3. In the Path to Executable box, enter the path to the location from which the application's executable file will be run. Include the executable file in the path.

   IMPORTANT: If you plan for users to run the application from the network or the file is already located on the users' workstations, the path should be to the actual executable file on the network or the workstation. If you plan to have Application Launcher/Explorer copy the file to a target directory on the workstation, the path must be to the executable file in the target directory.
4. Click Finish to create the Application object.
5. If Application Launcher/Explorer will need to copy files to the workstation, right-click the Application object > click Properties > complete the remaining steps.

   or

   If the application will be run from the network or is already located on the workstation, skip the remain steps and continue with "Defining the Application's System Requirements" on page 61.
6. Click the Distribution Options tab > Application Files.

   You need to add the files to the Application Files list in order for Application Launcher/Explorer to copy them to the workstation.
7. Click Add > File > fill in the following fields.

   Source File: Select the file you want copied to the workstation (for example, J:\PUBLIC\NOTEPAD\NOTEPAD.EXE).

   Target File: Enter the full path, including the file name, of where you want the file copied (for example, C:\NOTEPAD\NOTEPAD.EXE).
8. Click OK to add the file to the list.
9. Repeat Step 7 and Step 8 for each file to be copied.
10. When finished adding files, click OK to save the Application object information.
11. Continue with "Defining the Application's System Requirements" on page 61 to define the application's system requirements.

Using an .AOT/AXT File to Create an Application Object

1. In the New Application dialog box, select Using an .AOT/AXT File > click Next.
2. Enter the path to the .AOT or .AXT file > click Next.

   HINT: The file should be in the network location you saved it to when creating it with snAppShot.
3. If necessary, modify the following fields to customize the Application object.

   Object Name: This field defaults to the Application object name that was specified when running snAppShot to create the installation package. You can change the name if you want. If another Application object in the same container has the same name, you need to select a different name. No two objects in the same container can have the same name.

   SOURCE_PATH: This field defaults to the location where the application's installation files (.FIL) files where stored when running snAppShot to create the installation package. You should verify that the path is correct.

   TARGET_PATH: This field defaults to the location where the application was installed when running snAppShot to create the installation package. You should verify that this is the workstation directory where you want the application installed.
4. Click Next.
5. Review the Application object settings > click Finish to create the Application object.
6. Continue with "Defining the Application's System Requirements" on page 61 to define the application's system requirements.

Using an .MSI File to Create an Application Object

1. In the New Application dialog box, select Using an .MSI File > click Next.
2. Enter the path to the .MSI file > click Next.

   HINT: The file should be in the network location where you installed or copied the application.
3. If necessary, modify the following fields to customize the Application object.

   Object Name: This field defaults to the Application object name that was specified when running snAppShot to create the installation package. You can change the name if you want. If another Application object in the same container has the same name, you need to select a different name. No two objects in the same container can have the same name.

   SOURCE_PATH: This field defaults to the administrative installation location defined in the .MSI file. You should verify that the path is correct.
4. Click Next.
5. Review the Application object settings > click Finish to create the Application object.
6. Continue with "Defining the Application's System Requirements" on page 61 to define the application's system requirements.

Using an Existing Application Object to Create a New Application Object

1. In the New Application dialog box, select Using an Existing Application Object > click Next.
2. Browse for and select the Application object you are duplicating > click Next.
3. Fill in the following fields to customize the new Application object.

   Object Name: Specify a name for the new Application object.

SOURCE_PATH: Specify the network location where the application's installation files are located.

TARGET_PATH: Specify the workstation location where you want to install the application.

4 Click Next.

5 Review the Application object settings > click Finish to create the Application object.

6 Continue with "Defining the Application's System Requirements" on page 61 to define the application's system requirements.

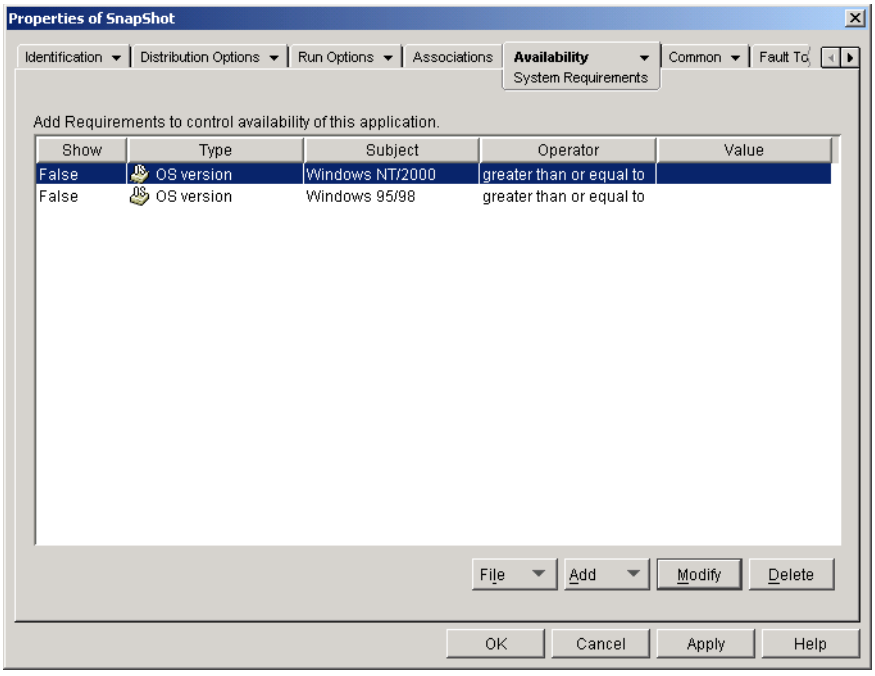
Defining the Application's System Requirements

To ensure that Application Launcher/Explorer does not distribute the application on a workstation that cannot support the application, you need to define the application's system requirements. An application will not even be displayed on users' workstations until you do so.

For example, the application may run on Windows 95/98 but not on Windows NT/2000/XP. In this case, you would want to set one of the system requirements to be Windows 95/98. Or, the application may require 100 MB of free disk space, in which case you could establish that as a system requirement.

1 In ConsoleOne, right-click the Application object > click Properties.

2 Click the Availability tab > System Requirements to display the System Requirements page.



3 Verify that the list contains an OS Version requirement (Windows NT/2000/XP or Windows 95/98) for the workstation you want to distribute the application to. If the correct OS version is not listed, click Add > Operating System > enter the requirements for the operating system > click OK to add it to the list.

IMPORTANT: An OS Version requirement must be defined before an application will be distributed.

4 Define any additional requirements you want.

For information about each requirement type, see "System Requirements Page" on page 151.

5 Click OK to save the changes.

Associating the Application Object with Users or Workstations

For Application Launcher/Explorer to display the application on a workstation, you must associate the Application object with the user logged in at the workstation or with the workstation itself.

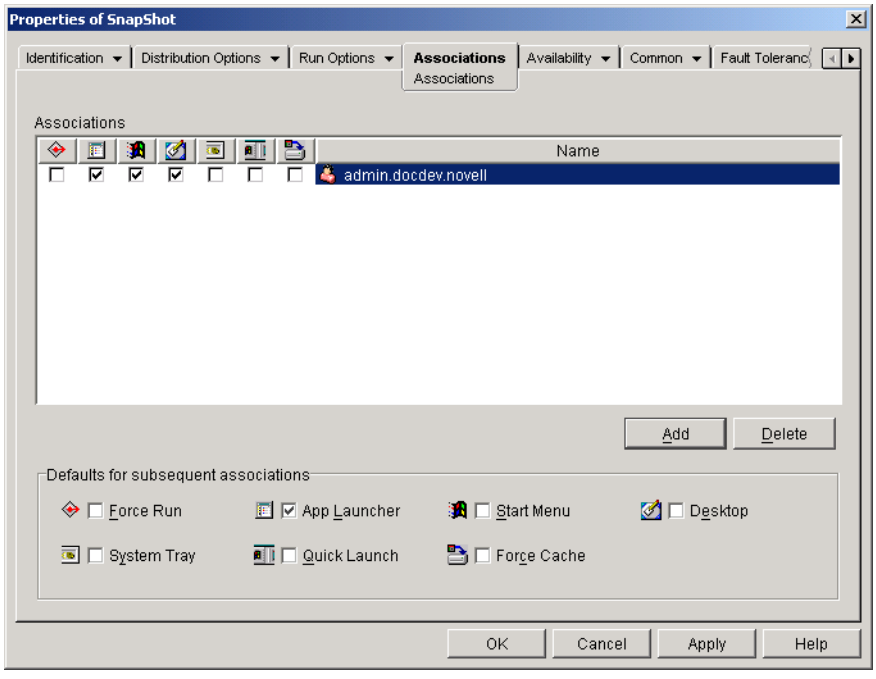
- "Associating the Application Object with Users" on page 62
- "Associating the Application Object with Workstations" on page 63

Associating the Application Object with Users

You associate the application with a user by adding the User object, a Group object to which the user belongs, or a container object (Organizational Unit, Organization, or Country) in which the user resides to the Application object's association list.

1 In ConsoleOne, right-click the Application object > click Properties.

2 Click the Associations tab to display the Associations page.



3 Click Add > browse and select a User object, Group object, or container object > click OK to add the user, group, or container to the Associations list.

4 Select the options you want applied to the Application object. By default, the App Launcher option is already checked, which causes the Application object to be displayed in the Application Launcher/Explorer window.

Force Run: Automatically runs the application. With a user-associated application, the application runs immediately after Application Launcher/Explorer starts.

You can use the Force Run option in conjunction with several other settings to achieve unique behaviors. For example, if you use the Force Run option with the Run Application Once option (Run Options tab > Applications page), as soon as the Application object is distributed

it will be run one time and then removed from the workstation. Or, suppose that you want to run the Application object immediately one time at a pre-determined time. If so, select Force Run, select the Run Application Once option on the Application page (Run Options tab), and define a schedule using the Schedule page (Availability tab).

If you want to force run several applications in a specific order, mark each of them as Force Run. Then give each Application object a numeric order by using the Order Icon Display option on the Icon page (Identification tab).

IMPORTANT: When associating an Application object with a workstation, Force Run will not work if the Application object uses a Microsoft Windows Installer (.MSI) package. This is true only when the Application object is associated with a workstation. Force Run works with .MSI Application objects associated with users.

App Launcher: Adds the Application object's icon to the Application Launcher/Explorer window.

Start Menu: If the workstation is running Application Explorer, this option adds the Application object to the Windows Start menu. The Application object will be added to the top of the Start menu, unless you assign the Application object to a folder and use the folder structure on the Start menu. See the Application object's Folders page (Identification tab).

Desktop: If the workstation is running Application Explorer, this option displays the Application object's icon on the Windows desktop.

System Tray: If the workstation is running Application Explorer, this option displays the Application object's icon in the Windows system tray.

Quick Launch: Displays the Application object's icon on the Windows Quick Launch toolbar.

Force Cache: Forces the application source files and other files required for installation to be copied to the workstation's cache directory. The user can then install or repair the application while disconnected from NDS. The files are compressed to save space on the workstation's local drive. For more information about caching applications, see Chapter 8, “Running in Disconnected Mode,” on page 73.

IMPORTANT: This option is required only if you want to ensure that the user can install or repair the application while disconnected from NDS. Without this option selected, the user will still be able to launch the application in disconnected mode, provided the application has already been distributed (installed) to the workstation.

5 Click OK to save the Application object information.

Associating the Application Object with Workstations

To associate an Application object with a workstation and have it successfully distributed and run on the workstation, you need to complete the following tasks:

- “Importing Workstations into NDS” on page 63
- “Associating the Application Object with Workstations” on page 64
- “Assigning Users as Trustees of the Application Object” on page 65
- “Giving Workstations File System Rights to the Application” on page 65

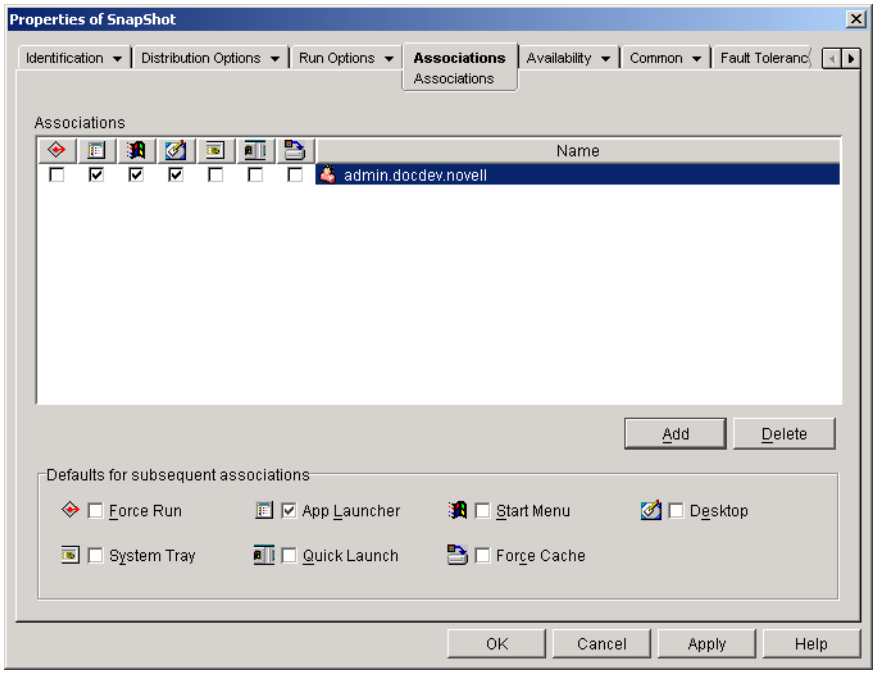
Importing Workstations into NDS

Each workstation that will be associated with applications must first be imported into NDS as a Workstation object. For details about importing workstations, see Automatic Workstation Import and Removal in *ZENworks for Desktops 3.2 Deployment Guide*.

Associating the Application Object with Workstations

You associate the application with a workstation by adding the Workstation object, a Workstation Group object to which the workstation belongs, or a container object (Organizational Unit, Organization, or Country) in which the workstation resides to the Application object's associations list.

1. In ConsoleOne, right-click the Application object > click Properties.
2. Click the Associations tab to display the Associations page.



3. Click Add > browse and select a Workstation object, Workstation Group object, or container object > click OK to add the workstation, group, or container to the Associations list.
4. Select the options you want applied to the Application object. By default, the App Launcher option is already checked, which causes the Application object to be displayed in the Application Launcher/Explorer window.

   Force Run: Automatically runs the application. With a workstation-associated application, the application runs whenever the workstation starts up (initial startup or reboot).

   You can use the Force Run option in conjunction with several other settings to achieve unique behaviors. For example, if you use the Force Run option with the Run Application Once option (Run Options tab > Applications page), as soon as the Application object is distributed it will be run one time and then removed from the workstation. Or, suppose that you want to run the Application object immediately one time at a pre-determined time. If so, select Force Run, select the Run Application Once option on the Application page (Run Options tab), and define a schedule using the Schedule page (Availability tab).

   If you want to force run several applications in a specific order, mark each of them as Force Run. Then give each Application object a numeric order by using the Order Icon Display option on the Icon page (Identification tab).

   IMPORTANT: When associating an Application object with a workstation, Force Run will not work if the Application object uses a Microsoft Windows Installer (.MSI) package. This is true only when the

Application object is associated with a workstation. Force Run works with .MSI Application objects associated with users.

App Launcher: Adds the Application object's icon to the Application Launcher/Explorer window.

Start Menu: If the workstation is running Application Explorer, this option adds the Application object to the Windows Start menu. The Application object will be added to the top of the Start menu, unless you assign the Application object to a folder and use the folder structure on the Start menu. See the Application object's Folders page (Identification tab).

Desktop: If the workstation is running Application Explorer, this option displays the Application object's icon on the Windows desktop.

System Tray: If the workstation is running Application Explorer, this option displays the Application object's icon in the Windows system tray.

Quick Launch: Displays the Application object's icon on the Windows Quick Launch toolbar.

Force Cache: Forces the application source files and other files required for installation to be copied to the workstation's cache directory. The user can then install or repair the application while disconnected from NDS. The files are compressed to save space on the workstation's local drive. For more information about caching applications, see Chapter 8, "Running in Disconnected Mode," on page 73.

IMPORTANT: This option is required only if you want to ensure that the user can install or repair the application while disconnected from NDS. Without this option selected, the user will still be able to launch the application in disconnected mode, provided the application has already been distributed (installed) to the workstation.

5 Click Apply to save the changes > continue with the next section, "Assigning Users as Trustees of the Application Object" on page 65

Assigning Users as Trustees of the Application Object

Associating the Application object with the workstation enables Application Launcher/Explorer to display the object on the workstation. In addition, any users who will run the application on the workstation must be trustees of the Application object. Trustee rights are not granted automatically; you must manually give default trustee rights to each user.

1 On the Application objects properties page > click the NDS Rights tab > Trustees of This Object.

2 Click Add Trustee > select the user you want to add as a trustee > click OK to add the user to the trustee list. Repeat this step for all users you need to add.

3 Click Apply to save the changes > continue with the next section, "Giving Workstations File System Rights to the Application" on page 65

Giving Workstations File System Rights to the Application

With workstation-associated applications that are run on Windows NT/2000/XP, the Application Launcher/Explorer Service for Windows NT/2000/XP launches and runs the applications. You need to ensure that the Application Launcher/Explorer Service has the appropriate file system rights to run the application.

If the application's executable resides on the workstation's local drive, the Application Launcher/Explorer Service automatically has the required file system rights. You don't need to do anything additional.

If the application's executable resides in a network location, you need to assign the appropriate file system rights for that location to the Workstation object. The Application Launcher/Explorer Service receives its network file system rights through the Workstation object.

Other Things You Can Do To Control the Distribution and Launching of Applications

To better manage the application you've distributed, you can configure the Application object to:

- Automatically cache the application's installation files to the local workstation. This enables users to install or fix problems with the application when they are disconnected from NDS and your network. See Chapter 8, "Running in Disconnected Mode," on page 73.
- Add the Application object to a folder in the Application Launcher/Explorer window or on the Windows Start menu. See Chapter 10, "Organizing Applications into Folders," on page 89.
- Report on the success or failure of events such as distributing, caching, and uninstalling the application on workstations. See Chapter 11, "Reporting on Application Management Events," on page 95.
- Track the number of licenses being used for the application. See Chapter 12, "Metering Software Licenses," on page 109.
- Determine the schedule of when the application will be available to users. See "Schedule Page" on page 162.
- Set up backup copies of the application source files to enable fault tolerance. See "Fault Tolerance Page" on page 183.
- Define multiple Application objects for the same application and enable load balancing. See "Load Balancing Page" on page 184.
- Set up site lists to enable users who travel from site to site to continue to have access to their applications. See "Site List Page" on page 186.
- Define many additional Application object properties to control the behavior of the application. For information about all Application object properties, see Chapter 14, "Application Object Settings," on page 115.

7 Uninstalling Applications

Any application (including MSI-based applications) distributed through ZENworks® for Desktops (ZfD) Application Management can be uninstalled. You can choose whether or not to uninstall all files, shortcuts, INI entries, and registry entries that were installed or modified with the application.

Each user's workstation contains a local cache that contains information about applications installed on the workstation. When you uninstall an application, this cache is used to ensure that the appropriate files and settings are removed from the workstation. If the application's source files have been copied to the workstation's local cache, the source files are also removed. For more information about the local cache, see Chapter 8, "Running in Disconnected Mode," on page 73.

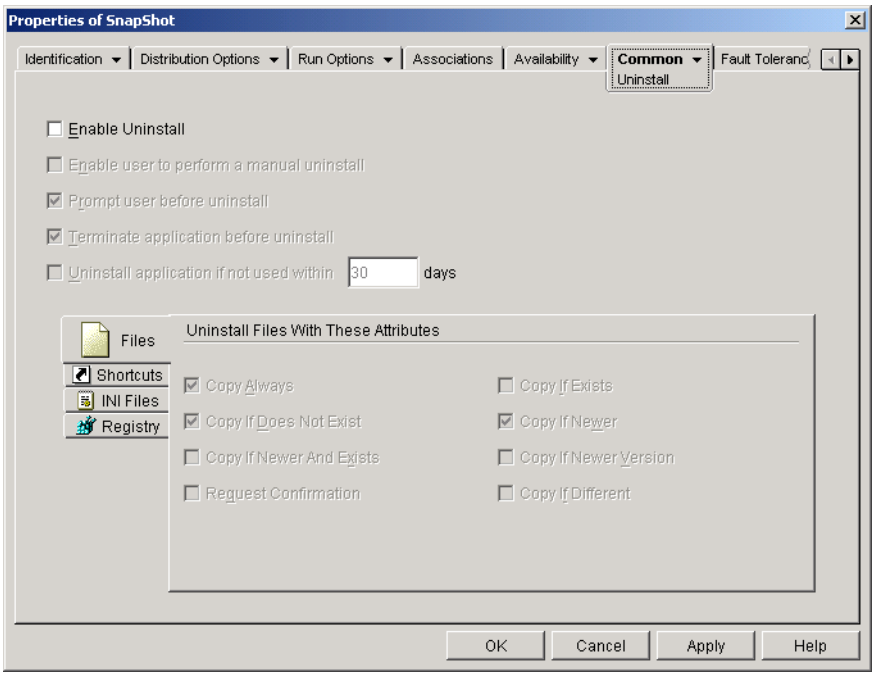
By default, the ability to uninstall an application is disabled. You must first enable an application to be uninstalled. After that, you can uninstall an application by disassociating it with users or workstations, you can configure an application to be uninstalled after a certain period of unuse, or your users can use Novell® Application Launcher™/Explorer to uninstall an application (provided you've enabled this functionality). See the following sections for information:

Enabling an Application to be Uninstalled

Uninstalling an application requires careful configuration of the Application object to ensure that no critical files are accidentally removed from the workstation. For this reason, the ability to uninstall an application is disabled by default.

To enable an application to be uninstalled:

1. In ConsoleOne®, right-click the Application object > click Properties.
2. Click the Common tab > Uninstall to display the Uninstall page.



3 Click the Enable Uninstall box to turn on the option.

4 If you want users to be able to uninstall the application themselves, click the Enable User to Perform a Manual Uninstall to turn on the option.

For information about how users can uninstall the application, see "Using Application Launcher/Explorer to Uninstall an Application" on page 71.

5 Set the other Uninstall options as appropriate:

Prompt User Before Uninstall: Select this option to prompt users before removing the application from their workstations. If users answer "No" to the prompt, the application will not be removed.

Terminate Application Before Uninstall: Select this option to ensure that Application Launcher/Explorer terminates the application (if the application is running) before it begins uninstalling the application files.

Uninstall Application If Not Used Within *XX* Days: Select this option to automatically remove the application if the user has not run it within the specified number of days (the default is 30). For more information, see "Uninstalling Unused Applications" on page 70.

6 Select the attributes you want used when determining whether or not to uninstall files, shortcuts, INI settings, and registry settings.

Files: Click Files > check the attributes you want to use to determine whether or not an application file is removed. The attributes correspond to the attributes listed on the Application Files page (Distribution Options tab). By default, the options are configured (Copy Always, Copy if Does Not Exist, Copy if Newer) to ensure that a file is removed only if it was installed when the application was installed and not at an earlier time by another application that also needs the file.

Shortcuts: Click Shortcuts > check the attributes you want to use to determine whether or not the application's shortcuts are removed. The attributes correspond to the attributes listed on the Shortcuts/Icons page (Distribution Options tab).

INI Files: Click INI Files > check the attributes you want to use to determine whether or not an INI setting is removed. The attributes correspond to the attributes listed on the INI Settings page (Distribution Options tab). By default, the options are configured (Create Always, Create if Exists, Create or Add to Existing Section) to ensure that a setting is removed only if it was created when the application was installed and not at an earlier time by another application that also needs the setting.

Registry: Click Registry > check the attributes you want to use to determine whether or not a registry setting is removed. The attributes correspond to the attributes listed on the Registry Settings page (Distribution Options tab). By default, the options are configured (Create Always, Create if Exists) to ensure that a setting is removed only if it was created when the application was installed and not at an earlier time by another application that still needs the setting.

The Uninstall Keys/Values From These Registry Hives option allows you to select two specific registry hives, HKEY_LOCAL_MACHINE and HKEY_CURRENT_USER, to include or exclude when removing the registry settings that were added by Application Launcher/Explorer during distribution of the application to the workstation. The default settings cause Application Launcher/Explorer to remove settings from the HKEY_CURRENT_USER hive but not from the HKEY_LOCAL_MACHINE hive.

The purpose of this option is to help you ensure that no Windows* system settings are removed during the uninstall. This is particularly important if you used snAppShot™ to capture the application's installation. When snAppShot captures an application's installation, it includes all settings that are changed during the installation. If the application's installation program causes the workstation to reboot during the installation process, these changes can include not only settings that apply to the application but also settings that apply to the Windows system. Removing Windows system settings may cause the workstation to encounter problems when starting up. It is strongly recommended that you remove these settings only if you are positive that they will not affect the workstation's ability to function properly.

NOTE: If you want to use this option, you should examine the registry settings that will be removed from the HKEY_LOCAL_MACHINE and HKEY_CURRENT_USER hives and delete any settings that apply to anything other than the application. The registry settings are displayed on the Registry Settings page (Distribution Options tab).

7 Click OK to save the changes.

Uninstalling Applications by Disassociating Users or Workstations

You can force an application to be uninstalled by disassociating it from the user or workstation, provided you have enabled the application to be uninstalled (see "Enabling an Application to be Uninstalled" on page 67). If you disassociate an application that has not been configured as uninstallable, the application's files, shortcuts, INI settings, and registry settings will not be removed from the workstation.

1 In ConsoleOne, right-click the Application object > click Properties.

2 Click the Associations tab.

3 Select the user or workstation you want to disassociate from the application > click Delete.

4 Click OK.

The next time Application Launcher/Explorer refreshes, it will uninstall the application from the user's workstation. In addition, the Application object will no longer be displayed on the user's workstation.

HINT: You can use the Unassociated Days to Uninstall option to specify a longer grace period for the user. To do so, right-click the user's object in ConsoleOne > click Properties > click the Application Launcher tab > click Edit > modify the Unassociated Days to Uninstall option. For additional information, see "Configuring Application Launcher/Explorer" on page 36.

Uninstalling Unused Applications

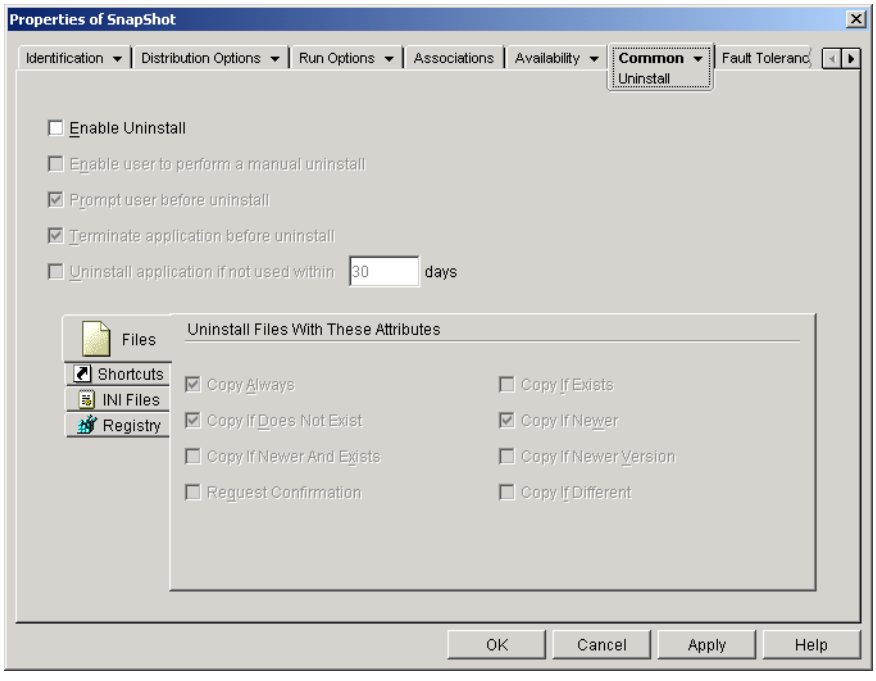
Users may install some applications, run them a few times, and then not use them again for a long period of time. These applications can unnecessarily take up valuable workstation disk space.

To free up disk space, you can have Application Launcher/Explorer uninstall an application that has not been run for a period of time. You can determine the time period; the default is 30 days. For example, you may want one application removed after 15 days of unuse, but you may not want to remove another application until it has not been run for 90 days.

Unless the user or workstation is disassociated from the Application object, Application Launcher/Explorer will continue to display the Application object icon on the workstation after the application is uninstalled. If the user double-clicks the icon, the application will be installed again.

To configure an unused application to be removed after a period of time:

1. In ConsoleOne, right-click the Application object > click Properties.
2. Click the Common tab > Uninstall to display the Uninstall page.



3. If the Enable Uninstall option is not turned on, click the box to turn it on.
4. Click the Uninstall Application If Not Used Within *XX* Days box to turn on the option > select the number of days you want.
5. If you have not selected the attributes you want to use to determine whether or not the application's files, shortcuts, INI settings, and registry settings are removed, do so now. For information about each option, see "Enabling an Application to be Uninstalled" on page 67.
6. Click OK to save the changes.

Using Application Launcher/Explorer to Uninstall an Application

By default, users are not allowed to uninstall applications that you've distributed to them. However, if you've enabled users to uninstall applications (see "Enabling an Application to be Uninstalled" on page 67), they can do so through Application Launcher/Explorer.

1. On the user's workstation, right-click the Application object > click Uninstall.

When Application Launcher/Explorer uninstalls an application, it removes all application files and settings from the workstation. However, if the Application object is still associated with the user, the Application object's icon will remain on the workstation. This enables the user to reinstall the application at a later time.

8 Running in Disconnected Mode

Novell® Application Launcher™/Explorer enables users to install, run, verify (fix), and uninstall applications while disconnected from NDS® and the network. This enables users to run the same applications when connected to or disconnected from NDS.

The following sections provide information and instructions to help you understand the Application Launcher/Explorer disconnected mode and to support disconnected users:

Disconnectable Applications

When you create an Application object, the application is automatically configured as being disconnectable. After a disconnectable application is distributed (installed) to a workstation, Application Launcher/Explorer will continue to display the Application object icon even after the workstation has disconnected from NDS and will attempt to launch the application when the user double-clicks the Application object icon.

Only applications that can run locally on a disconnected workstation should be configured as disconnectable. Applications that rely on network resources should not be configured as disconnectable. This includes:

- Applications that access a network database
- Client/server applications
- Applications that depend on network drive mappings or print captures
- Applications that use NDS macros (other than %CN%) in any of the Application object property fields
- Applications that require a persistent connection to the network

Workstation Cache

To support disconnected mode, Application Launcher/Explorer creates a cache directory on the workstation's Windows* drive (the drive containing the SYSTEM32 directory). This directory, called NALCACHE, is created as a hidden directory at the root of the drive. If necessary, the location can be changed (see "Configuring Application Launcher/Explorer" on page 36).

The NALCACHE directory contains subdirectories for each application associated with the user. Each application's folder contains the following two types of cache:

- "Launch Cache" on page 74
- "Install Cache" on page 75

Launch Cache

Application Launcher/Explorer automatically creates an application's launch cache when the application is distributed to a user or workstation. The launch cache contains all the NDS information Application Launcher/Explorer needs to launch and run an application while disconnected. This cache also contains the information needed to uninstall the application.

The launch cache files are stored in the NALCACHE*NDS_TREE**APP_OBJECT* directory, where *APP_OBJECT* is the NDS context of the Application object and *NDS_TREE* is the tree where the Application object resides. By default, all files except those containing application files, INI settings, shortcut icons, and registry settings are refreshed each time Application Launcher/Explorer performs a timed or manual refresh. These files remain the same until the Version Number (Application object > Distribution Options tab > Options page) is changed so that the application can be successfully uninstalled.

The following table explains the files that may reside in the launch cache. An asterisk next to a file name indicates that Application Launcher/Explorer does not update that file when it refreshes.

File	Description
DSATTR.BIN	Contains all of the Application object's NDS attributes.
FOLDERS.BIN	Contains the list of folders where the Application object will be displayed in the Application Launcher/Explorer window and the Start menu.
COMPLETE.BIN	Contains the Application object's complete NDS name. If this file does not exist, Application Launcher/Explorer assumes that the cache is bad and recreates the cache.
STRM1.BIN	Contains the Application object's icon.
STRM2.BIN	Contains all text file modifications.
STRM3.BIN*	Contains all files to be copied to the workstation.
STRM4.BIN*	Contains registry modifications that will be made during initial distribution.
STRM5.BIN*	Contains INI modifications that will be made during initial distribution.
STRM6.BIN*	Contains shortcut modifications that will be made during initial distribution.

File	Description
STRM7.BIN	Contains macro information.
STRM8.BIN	Contains schedule information.
STRM9.BIN	Contains system requirements information.
STRM10.BIN	Contains Administrator notes.
STRM11.BIN	Contains the shutdown script.
STRM12.BIN	Contains the startup script.
STRM13.BIN*	Contains registry modifications to be made each time the application is launched.
STRM14.BIN*	Contains INI modifications to be made each time the application is launched.
STRM15.BIN*	Contains files to be copied to the workstation each time the application is launched.
STRM16.BIN	Contains text file modifications to be made each time the application is launched.
STRM17.BIN*	Contains icons to be modified each time the application is launched.
STRM18.BIN	Contains environment variable settings to be made.
STRM19.BIN	Contains the pre-distribution script.
STRM20.BIN	Contains the post-distribution script.
STRM21.BIN	Contains the pre-install schedule information.

Install Cache

Application Launcher/Explorer creates an application's install cache only if you select the Force Cache option when associating the Application object with users or workstations, or if individual users use Application Launcher/Explorer's Application Management feature to cache the application. The install cache contains the application source files needed to install or verify an application while disconnected. Although the files are compressed, they can still require a large amount of disk space on the workstation local drive, so an application should only be cached if users will need to install the application or verify (fix) the already installed application while disconnected.

IMPORTANT: An application can still be run in disconnected mode without being cached to the install cache. To run in disconnected mode, an application needs only to have been distributed (installed) on the workstation. Caching an application to the install cache only enables the application to be installed while in disconnected mode, or to be verified (fixed) if a problem occurs.

Configuring Application Launcher/Explorer to Start Automatically

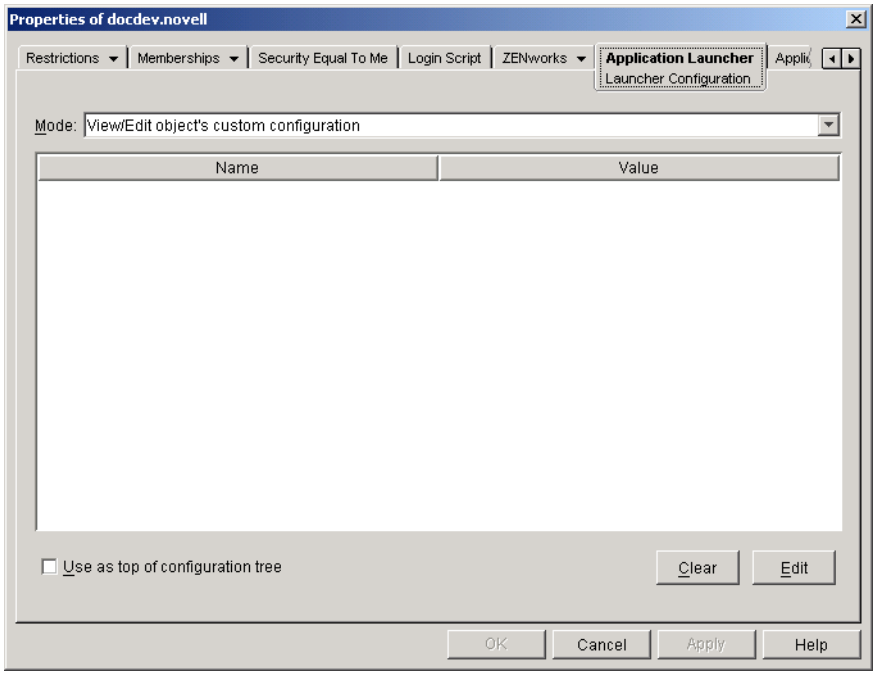
Typically, when connected to the network, Application Launcher/Explorer is started through a command in the user's login script. To automatically start Application Launcher/Explorer in disconnected mode, you can add Application Launcher or Application Explorer to the Windows Startup folder by using the Launcher Configuration settings in NDS.

Depending on which program is running at the time, either an Application Launcher (NALWIN32.EXE) shortcut or an Application Explorer (NALDESK.EXE) shortcut is added to the Startup folder.

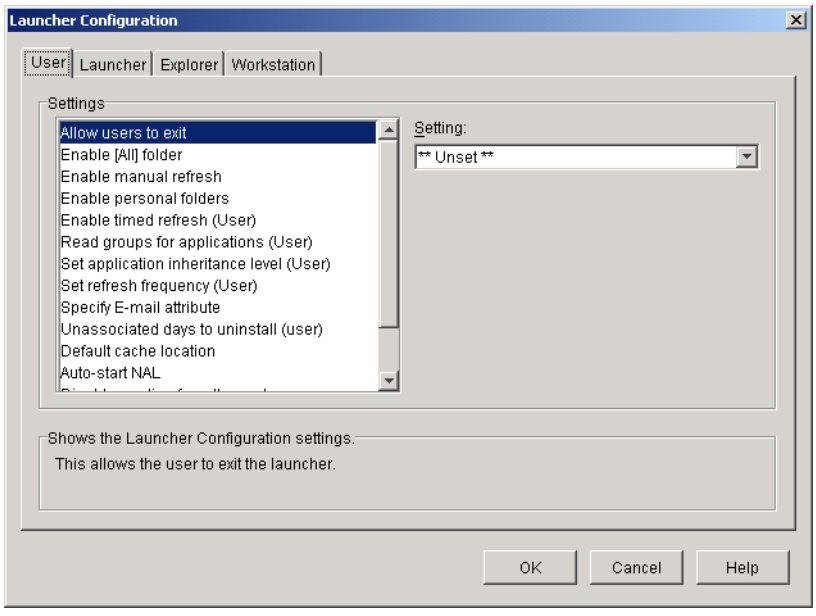
If Application Launcher or Application Explorer attempts to start twice, once through the user's login script and once through the Startup folder, only one instance of the program will be launched.

To add Application Launcher or Application Explorer to the Startup folder:

1. In ConsoleOne®, right-click the User, Group, or container object for the users whose Application Launcher/Explorer you want to configure > click Properties.
2. Click the Application Launcher tab to display the Launcher Configuration page.



3. Click Edit to display the Launcher Configuration dialog box.



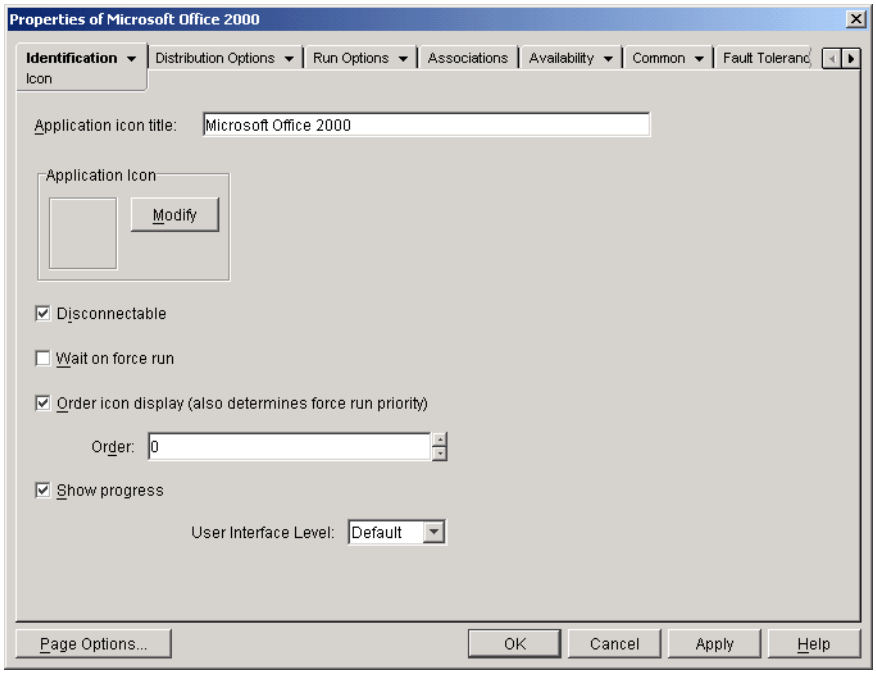
4 In the Settings list (User tab), select Auto-Start NAL > set the option to Yes.

5 Click OK > OK to save the changes.

Configuring Applications as Disconnectable

By default, when you create an Application object the application is marked as being disconnectable. To verify this setting or mark the application as not being disconnectable:

1 In ConsoleOne, right-click the Application object > click Properties to display the Icon page.



2 Select the Disconnectable option to make the application disconnectable.

or

Deselect the option to make the application not disconnectable.

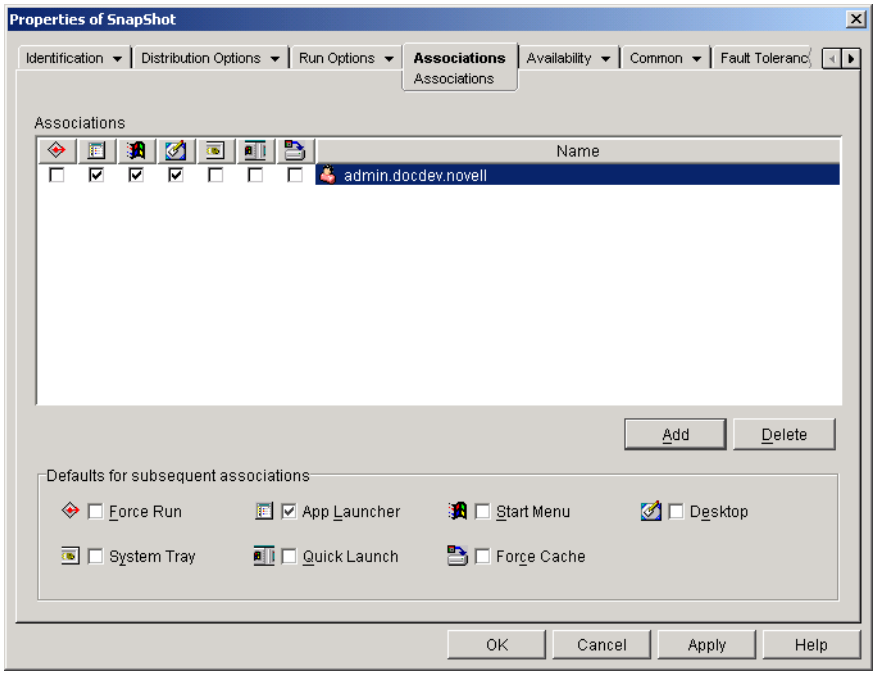
3 Click OK to save the changes.

Forcing an Application to be Cached

If you want to ensure that a user has an application cached to his or her local drive so that he or she can install or verify the application while disconnected, you can force cache the application. For information about enabling users to cache applications themselves, see "Enabling Users to Manage Applications" on page 81.

1 In ConsoleOne, right-click the Application object > click Properties.

2 Click the Associations tab to display the Associations page.



3 In the Associations list, select the Force Cache box for the user whose workstation you want to cache the application to.

4 Click OK to save the changes.

HINT: The same task can be accomplished through the Applications tab on a User, Workstation, Group, Workstation Group, or container object.

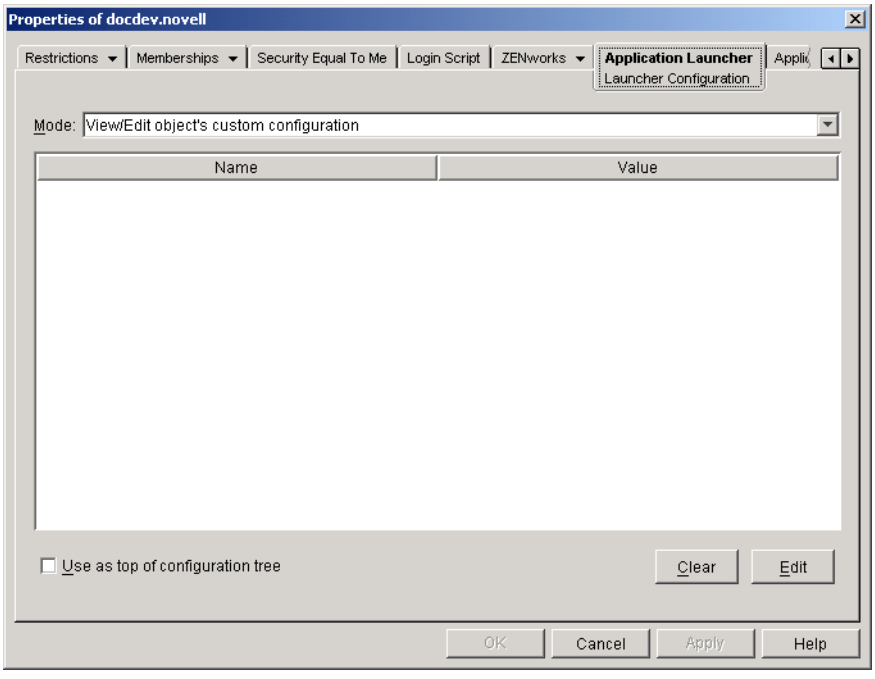
Changing the Default Cache Location

As mentioned in "Workstation Cache" on page 74, the default cache (NALCACHE) is created as a hidden directory on the root of the workstation's Windows drive.

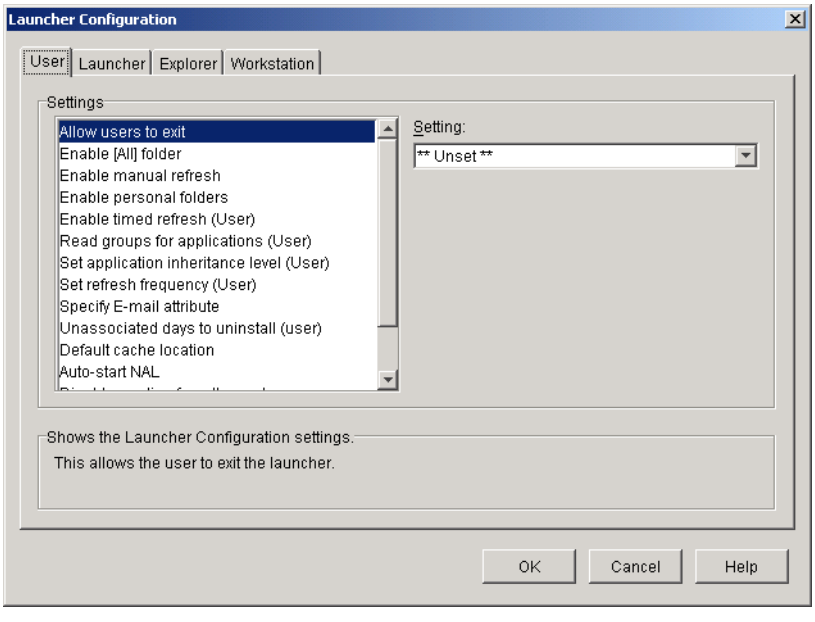
You can change the location by specify a different drive letter. The next time Application Launcher/Explorer refreshes (either a timed refresh or a manual refresh), the NALCACHE directory will be recreated at the root of the location that the workstation's drive letter is mapped to. The old NALCACHE directory is not removed automatically.

To change the location of the cache directory:

1. In ConsoleOne, right-click the User, Group, or container object for the users whose cache location you want to change > click Properties.
2. Click the Application Launcher tab to display the Launcher Configuration page.



3. Click Edit to display the Launcher Configuration dialog box.



4. In the Settings list (User tab), select Default Cache Location > select the drive letter you want to use.
5. Click OK > OK to save the changes.

Distributing Applications to Disconnected Workstations

As long as a disconnected workstation has Application Launcher/Explorer installed and running, you can distribute applications to the workstation through the use of removable media such as a CD, JAZ* disk, or ZIP* disk. The removable media functions as a second workstation cache, containing the Application object settings and application source files required to install and run the application.

For example, you have a mobile user who seldom connects to the network but needs an application that you've distributed to other users. You burn a CD with the application and then send it to the user. The user inserts the CD into his or her workstation's drive, Application Launcher/Explorer reads the CD and displays the Application object's icon in the places you've configured (Application Launcher/Explorer window, Start menu, desktop, and so forth). The user then launches the application, which is distributed to the workstation according to the Application object's configuration.

NOTE: The removable media includes an AUTORUN.INF file that causes Application Launcher/Explorer to refresh and display the Application object. If the user's workstation is not configured to autorun CDs, or you use another media type, the user may have to manually refresh Application Launcher/Explorer. This is done by right-clicking the Application Launcher/Explorer icon and clicking Refresh.

To create a cache on a removable media:

1. In ConsoleOne, click the Tools menu > click Application Launcher Tools > click Create Virtual CD to start the Create CD Wizard.
2. Click Add > browse for and select the Application object for the application you want to distribute. Repeat this step to add additional applications.
3. For each application you added to the list, select the locations where you want the Application object's icon to appear and select whether or not you want to force run and force cache the application. For information about each of these options, see "Associations Page" on page 148.
4. After you've finished adding applications, click Next.
5. In the Select Directory for Virtual CD, select the location where you want to create the cache for the applications.

   IMPORTANT: Make sure the location you select has sufficient disk space for the application cache. If enough disk space does not exist, you'll receive a message stating that an error has occurred.
6. If you want to restrict the amount of time the user can continue to use the application (or applications) after the media has been removed from the workstation, select the When CD Is Removed Disassociation Will Occur After option > select the number of days after which the disassociation will occur.

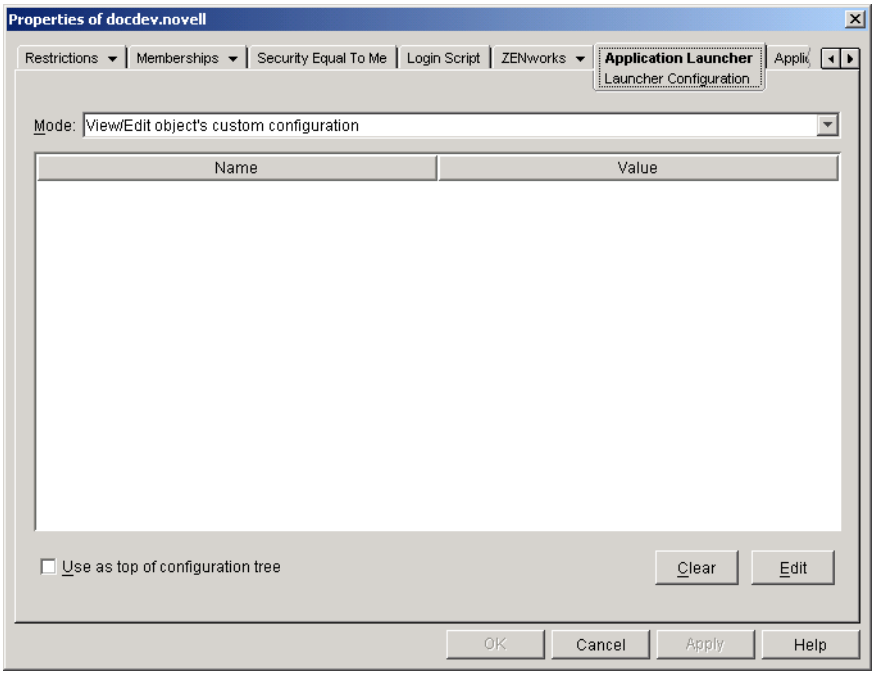
   The time is measured from when the CD (or removable media) is removed from the user's workstation. The default time is 30 days. The valid range is 0 to 65535 days.
7. Click Next > review the settings > click Finish to create the cache.
8. If necessary, copy the cache to the removable media (for example, burn the CD).

Enabling Users to Manage Applications

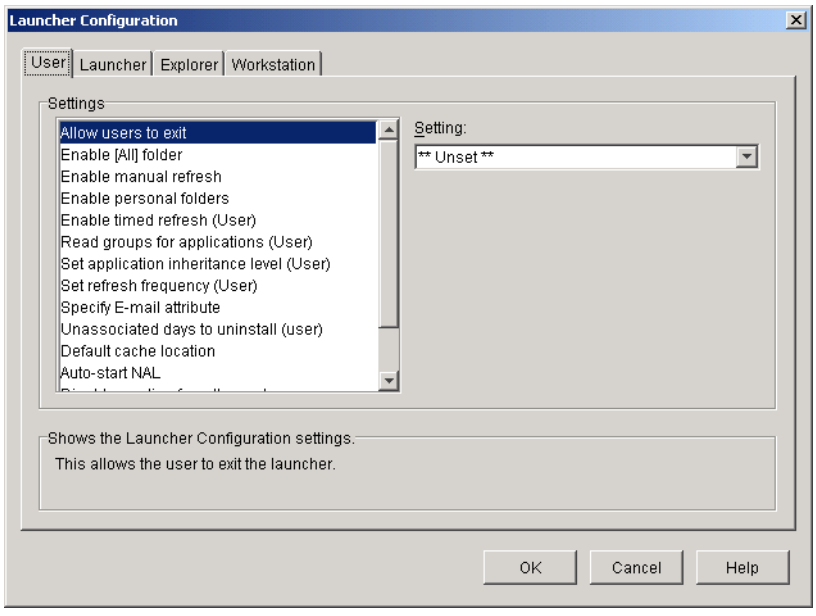
Application Launcher/Explorer includes a Manage Applications feature that enables users to cache applications, remove applications from the cache, install applications from the cache, and uninstall applications. By default, this feature is disabled to maintain administrative control over these processes. However, you may find it necessary or desirable to enable this feature for some users:

To enable users to manage their applications:

1. In ConsoleOne, right-click the User, Group, or container object for the users whom you want to enable the Manage Applications feature > click Properties.
2. Click the Application Launcher tab to display the Launcher Configuration page.



3. Click Edit to display the Launcher Configuration dialog box.



4 In the Settings list (User tab), select Enable Manage Applications Dialog > set the option to Yes.

5 Click OK > OK to save the changes.

6 To use the feature, at a user's workstation, right-click the Application Launcher/Explorer icon > click Manage Applications.

For information about using the Manage Applications features, click Help in the Application Launcher/Explorer window.

9 Configuring Application Fault Tolerance and Load Balancing

Novell® ZENworks® for Desktops (ZfD) Application Management provides a variety of methods to help you make sure that users always have access to their critical applications. These methods are discussed in the following sections:

- "Setting Up Fault Tolerance" on page 83
- "Setting Up Load Balancing" on page 85
- "Setting Up Site Lists" on page 87

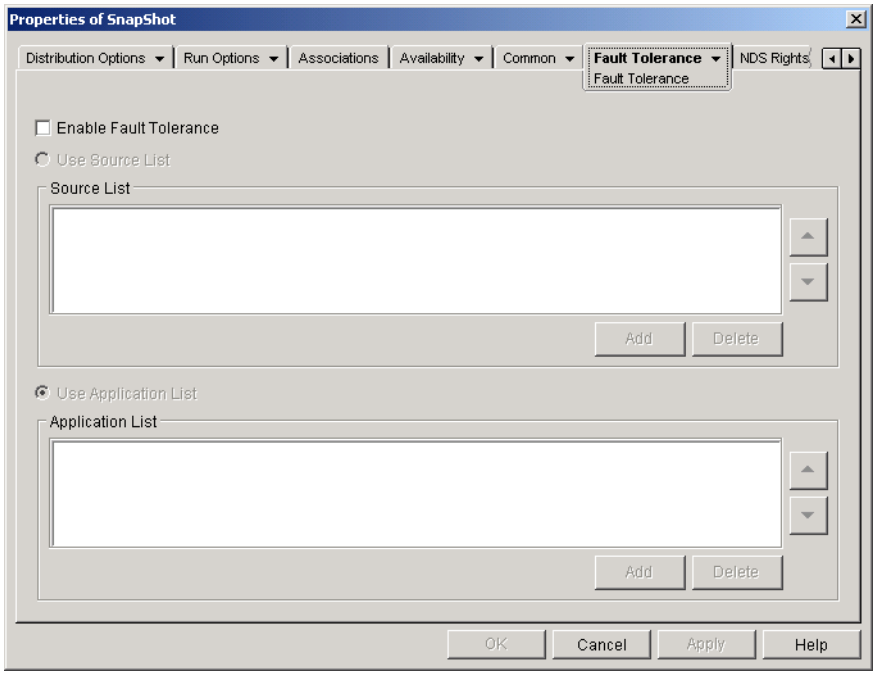
Setting Up Fault Tolerance

Network problems can make Application objects or their file packages unavailable. You can establish fault tolerance for an application by specifying backup Application objects and file packages. When an Application object or its file package is unavailable, Novell Application Launcher™/Explorer will use the backup Application objects or file packages.

We recommend you use fault tolerance, rather than load balancing (see "Setting Up Load Balancing" on page 85) when servers are located at various sites throughout a large wide area network. However, the servers must reside in the same Novell eDirectory™ tree. You can implement both methods if necessary. Application Launcher/Explorer will try load balancing first, then fault tolerance.

To set up fault tolerance for an application:

1. In ConsoleOne®, right-click the Application object for which you want to establish fault tolerance > click Properties to display the Application object's property pages.
2. Click the Fault Tolerance tab > Fault Tolerance to display the Fault Tolerance page.



The Fault Tolerance page specifies the installation package sources or Application objects that Application Launcher/Explorer will use as backups if the Application object becomes unavailable. Application Launcher/Explorer tries the package sources or Application objects in the order shown in the Source List or Application List, from top to bottom.

IMPORTANT: The Fault Tolerance page does not apply to Application objects that use Microsoft Windows Installer (.MSI) packages. For a .MSI Application object, you can provide source resiliency (fault tolerance) through the use of additional source locations for the installation package (Common > Sources page).

3 Fill in the following fields:

Enable Fault Tolerance: Select this option to enable fault tolerance. The other fault tolerance options are available only if this option is enabled.

Use Source List: Select this option to have Application Launcher/Explorer use a list of Package sources as the backup. You must have already created at least one installation package source (Common tab > Sources page).

This option is not available on Application objects for terminal server applications or Web applications.

To add a package source, click Add > browse to and select the package source > click OK to add it to the Source List.

To delete a package source, select the package source from the Source List > click Delete to remove it.

Application Launcher/Explorer tries the sources in the order they are listed, from top to bottom. To change the order the package sources, select a package source from the Source List > click the up-arrow to move the source up in the list or click the down-arrow to move it down in the list.

Use Application List: Select this option to have Application Launcher/Explorer use a list of Application objects as the backup. You must have already created additional Application objects for the application, with the application files being stored on a different server or

volume than this application. If the application is too busy or is not available, then Application Launcher/Explorer tries each Application object in the specified order.

Only one-level-deep fault tolerance is supported. If Application Launcher/Explorer fails over to one of the backup Application objects in the list and the backup Application object fails, the distribution will fail even if fault tolerance has been enabled for the backup Application object.

NOTE: If Application Launcher/Explorer has detected a remote connection and is running in remote mode, it will not use the Application List for fault tolerance. Application Launcher/Explorer will only use the Source List.

To add an Application object to the list, click Add > browse to and select the Application object > click OK to add it.

To remove an Application object from the list, select the Application object > click Delete to remove it.

Application Launcher/Explorer tries the Application objects in the order they are listed, from top to bottom. To change the order of the list, select an Application object from the Application List > click the up-arrow to move the Application object up in the list or click the down-arrow to move it down in the list.

4 Click OK to save your changes.

Setting Up Load Balancing

Many users accessing the same Application object and its file package can cause delays with the application's distribution. You can use load balancing to spread access to an application among multiple Application objects and file packages.

With load balancing, you create multiple copies of the Application object and file package for the same application, storing the file packages on separate network servers. When a user launches the application, Application Launcher/Explorer can use the Application object and file package associated with that application, or it can be redirected to another copy of the Application object or file package.

We recommend you use load balancing when all the servers for the Application objects are located at a single site. If the servers are located at various sites throughout a large wide area network, we recommend you use fault tolerance (see "Setting Up Fault Tolerance" on page 83). You can implement both methods if necessary. Application Launcher/Explorer will try load balancing first, then fault tolerance.

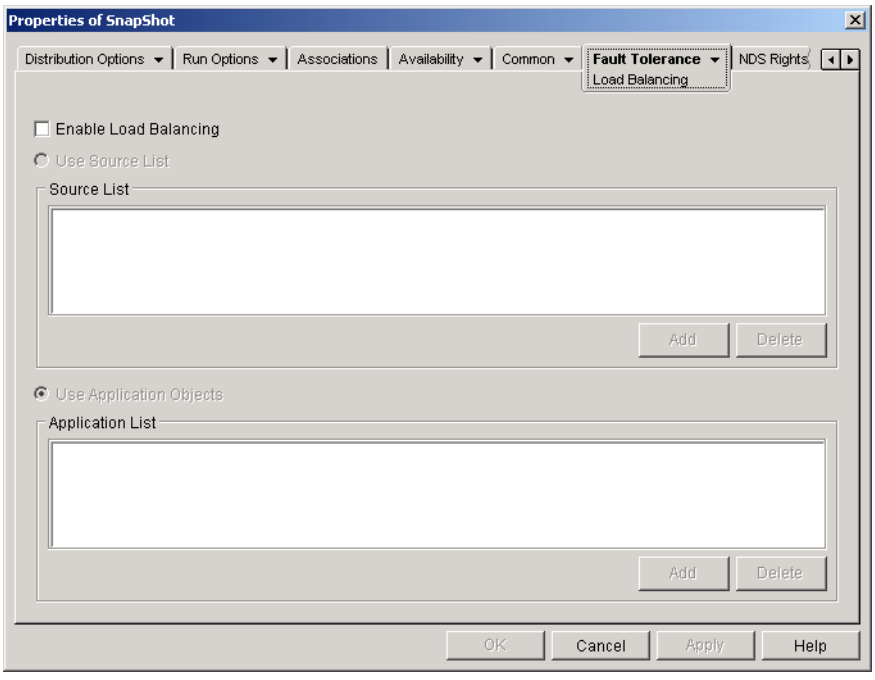
To set up load balancing for an application:

1 Make sure that you've created multiple installation package sources or Application objects for the application, with the application source files located on different servers.

When a user launches the application, Application Launcher/Explorer selects one of the package sources or Application objects to use. If the package source or Application object is unavailable, Application Launcher/Explorer selects another one.

2 In ConsoleOne, right-click the Application object for which you want to establish load balancing > click Properties to display the Application object's property pages.

3 Click Fault Tolerance > Load Balancing to display the Load Balancing page.



4 Fill in the following fields:

Enable Load Balancing: Select this option to enable load balancing. The other load balancing options are available only if this option is enabled.

For Application objects that use Microsoft Windows Installer (.MSI) packages, the Enable Load Balancing option is the only option that is enabled on this page; the Use Source List and Use Application List options are disabled. To enable load balancing for a .MSI Application object, check this option and then use the Application object's Sources page (Common tab) to define the list of source locations where you've created additional installation packages for the application. Application Launcher/Explorer will randomly select source locations from the list to balance the workload.

Use Source List: Select this option to have Application Launcher/Explorer use a list of package sources for load balancing. You must have already created at least one package source (Common tab > Sources page).

This option is not available on Application objects for terminal server applications or Web applications.

To add a package source to the list, click Add > browse to and select the package source > click OK.

To remove a package source from the list, elect the package source > click Delete.

Use Application List: Select this option to have Application Launcher/Explorer use a list of Application objects for load balancing. You must have already created additional Application objects for the application, with the application files being stored on a different server or volume than this application.

To add an Application object to the list, click Add > browse to and select the Application object > click OK.

To remove an Application object from the list, select the Application object > click Delete.

Setting Up Site Lists

Site lists let you link an application at one site (Site A) to an application at another site (Site B). When a user at Site A launches the application, the Site A application is used. However, if the user travels to Site B and launches the application, the application from Site B is used. This ensures that users who travel from site to site continue to have fast access to their applications while reducing WAN traffic and associated costs.

For example, users at two different sites run a spreadsheet application from servers that are local to their sites. Different Application objects are used to distribute and launch the spreadsheet application from the two servers. If you link the two Application objects, any Site1 users who travel to Site2 will be able to run the application from the Site2 server the same way they would run it from their own Site1 server. The same would be true for Site2 users who travel to Site1.

You can link to one other Application object only. However, when you do so, the first Application object is automatically linked to any other Application objects that the second Application object is linked to. For example, you have three identical Application objects (App1, App2, and App3) at three different sites. You link App1 to App2, which creates the following site lists for each of the Application objects:

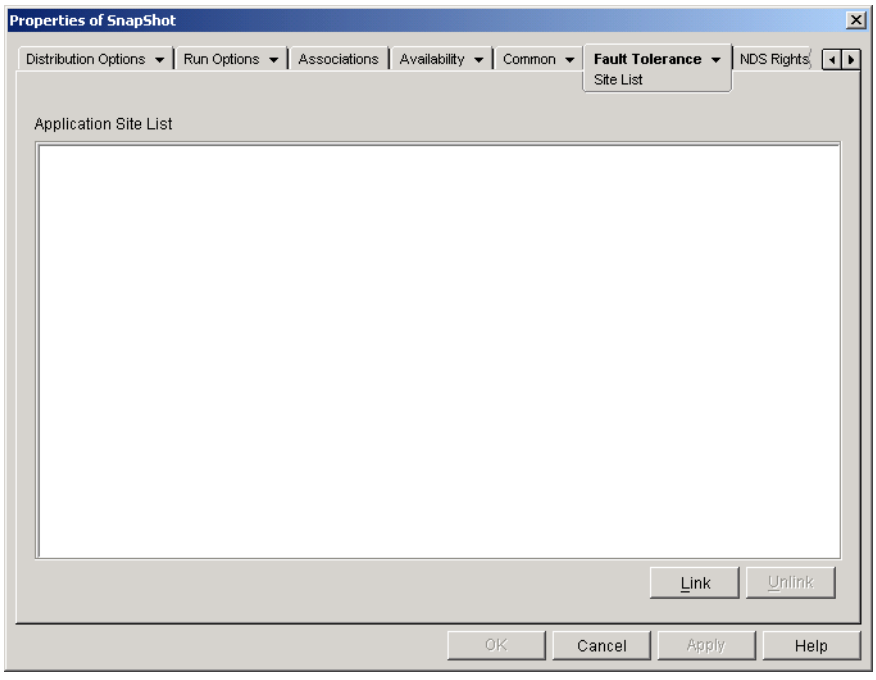
```
App1 linked to: App2
App2 linked to: App1
App3 linked to: (nothing)
```

Because you can link an Application object to only one other Application object, you now need to link App3 to either App1 or App2. Doing so creates the following site list for each of the Application objects:

```
App1 linked to: App2, App3
App2 linked to: App1, App3
App3 linked to: App1, App2
```

To establish a site list for an Application object:

1. In ConsoleOne, right-click the Application object for which you want to establish a site list > click Properties to display the Application object's property pages.
2. Click Fault Tolerance > Site List to display the Site List page.



3 Click Link > browse for and select the Application object you want to link to > click OK to add it to the Application Site List.

   If the Application object you added is also linked to other Application objects, those Application objects will also be added to the list

4 Repeat the previous step to link to additional Application objects.

5 Click OK when you are finished.

10 Organizing Applications into Folders

ZENworks® for Desktops Application Management enables you to organize Application objects into folders. Folders show up in the Novell® Application Launcher™/Explorer window and on the Windows* Start menu. Four types of folders are supported:

- **Application Folder (Administrator Created):** An application folder is created as an NDS® object. A single Application Folder object can consist of one folder or multiple folders (a multi-level folder structure). After you create an Application Folder object, you can add any number of Application objects to the folder (or folders). Application Folder objects are the recommended folder type if you want to maintain consistent folders from user to user.
- **Custom Folder (Administrator Created):** A custom folder is created specifically for a single Application object in NDS. No other Application objects can be included in the folder. Custom folders support folders within folders, which means that you can create a custom folder structure. For example, although you could not have Calculator and Notepad in the same custom folder, you could create two subfolders within the same custom folder and place the two programs in the two subfolders (in other words, WINAPPS\CALCULATOR\CALC.EXE and WINAPPS\ NOTEPAD\NOTEPAD.EXE).
- **Personal Folder (User Created):** A personal folder is created in Application Launcher/Explorer by individual users. Users can move Application objects from other folders into the personal folder. By default, the ability to create personal folders in disabled. For information about enabling this feature, see "Configuring Application Launcher/Explorer" on page 36.
- **System Folder (System Created):** A system folder is automatically created by Application Launcher/Explorer to store an Application object if the object has not been added to an application folder or a custom folder.

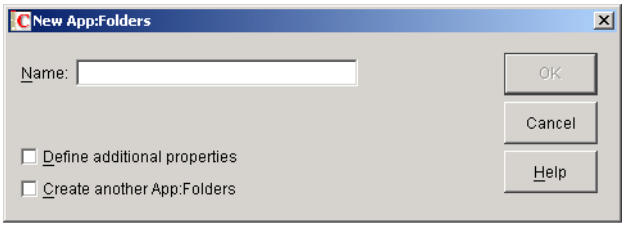
  If the Application object is associated with a user, the Application object's system folder is given the name specified in the User object's Full Name field (for example, John Smith). If the Application object is associated with another NDS object (Group, Workstation, container, and so forth), the system folder is given the name specified in the object's Description field (for example, System Test Group). If nothing is specified in the Full Name or Description field, the system folder is given the object's fully distinguished name. For example, an Application object associated with a user through his or her User object would be placed in a system folder that has the user's fully distinguished name, but an Application object associated with a user through a group would be placed in a folder that has the group's fully distinguished name.

The following sections provide instructions about creating an Application Folder object and adding Application objects to application folders or custom folders:

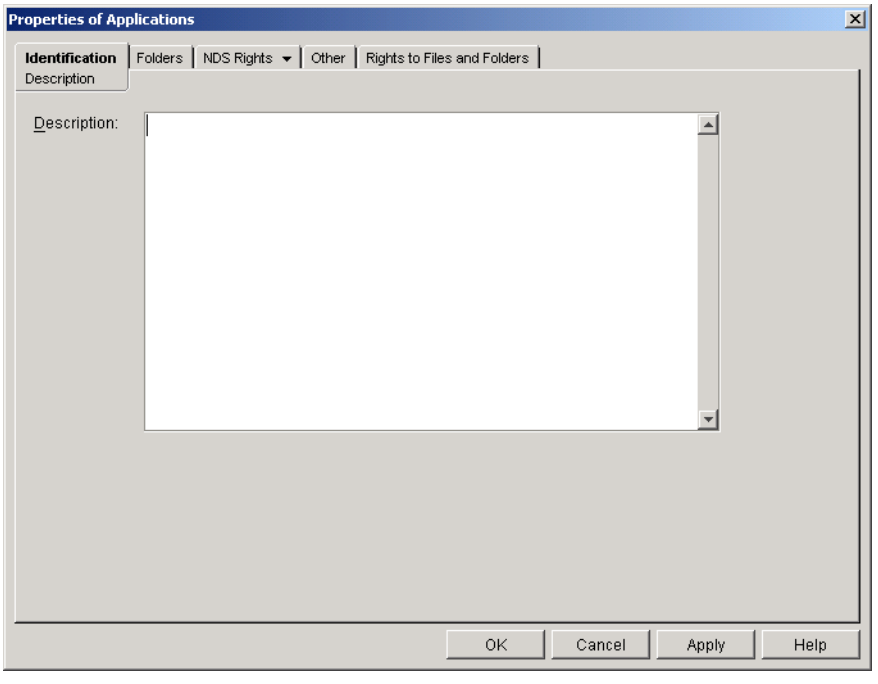
- "Creating Application Folder Objects" on page 90
- "Adding Applications to Application Folders" on page 91
- "Adding Applications to Custom Folders" on page 93

Creating Application Folder Objects

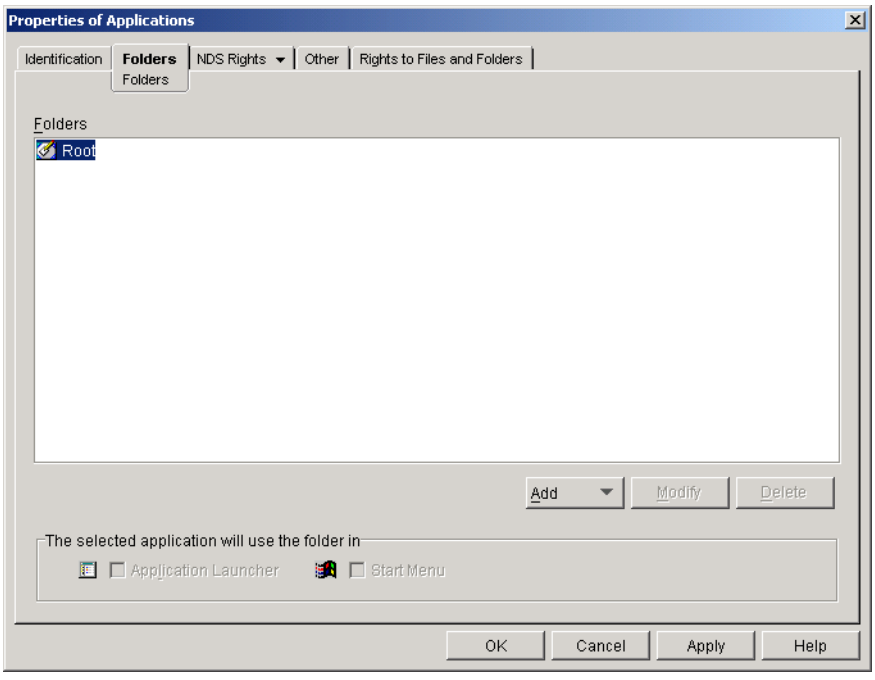
1. In ConsoleOne™, right-click the container where you want to create the Application Folder object > click New > click Object to display the New Object dialog box.
2. Click App:Folders > OK to display the New App:Folders dialog box.



3. In the Name field, enter a name for the object. The name is displayed only in NDS and does not need to be the same name as the one you want to appear in the Application Launcher/ Explorer window and on the Start menu on the users' workstations.
4. Check the Define Additional Properties box > click OK to display the Application Folder object's Description page.



5. If desired, enter a description in the Description box.
6. Click the Folders tab to display the Folders page.



The Folders tree contains one entry called Root. Root represents the Windows Start menu and the Application Launcher/Explorer window.

7 Use the Add, Modify, and Delete options to create the folder structure you want.

Add: To add a folder, select the folder (or Root) where you want to create a new folder > click Add > click Folder > type the name for the new folder > press Enter.

Modify: To change the name of a folder, select the folder in the Folders tree > click Modify > type the new folder name > press Enter.

Delete: To remove a folder, select the folder in the Folders tree > click Delete.

8 Click OK when you are finished creating the folder structure.

Adding Applications to Application Folders

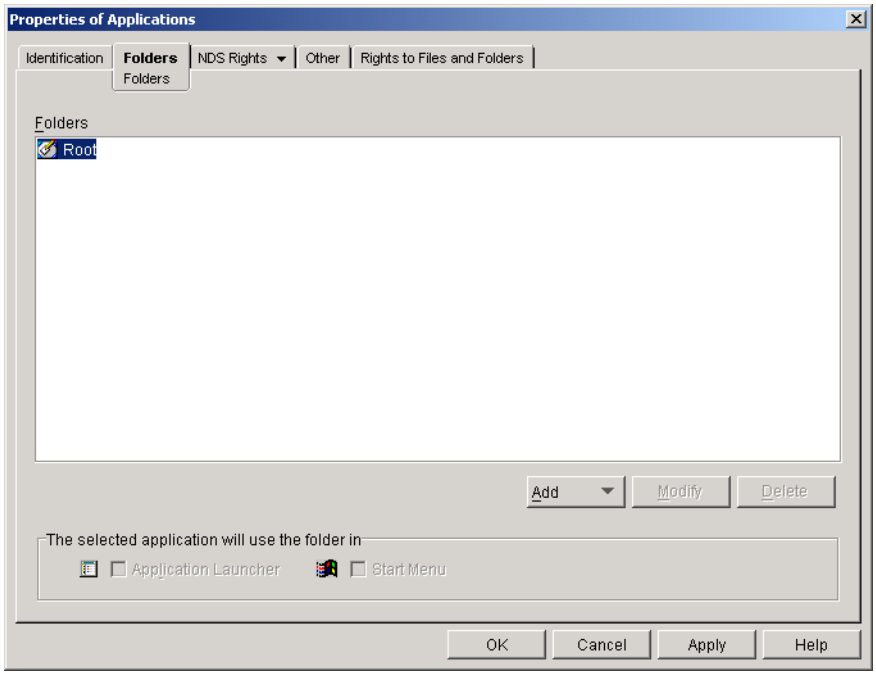
There are two ways you can add Application objects to application folders. You can add Application objects through the Folders page on the Application Folder object, or you can link individual Application objects through the Folders page on the Application object. Using the Application Folder object enables you to add multiple Application objects to the application folder at one time. Using the Application object enables you to add the single Application object only.

- "Using the Application Folder Object to Add Applications" on page 91
- "Using the Application Object to Add the Application to a Folder" on page 92

Using the Application Folder Object to Add Applications

1 In ConsoleOne, right-click the Application Folder object you want to add the Application object to > click Properties.

2 Click the Folders tab to display the Folders page.



3 In the Folders tree, select the folder where you want to add the Application object.

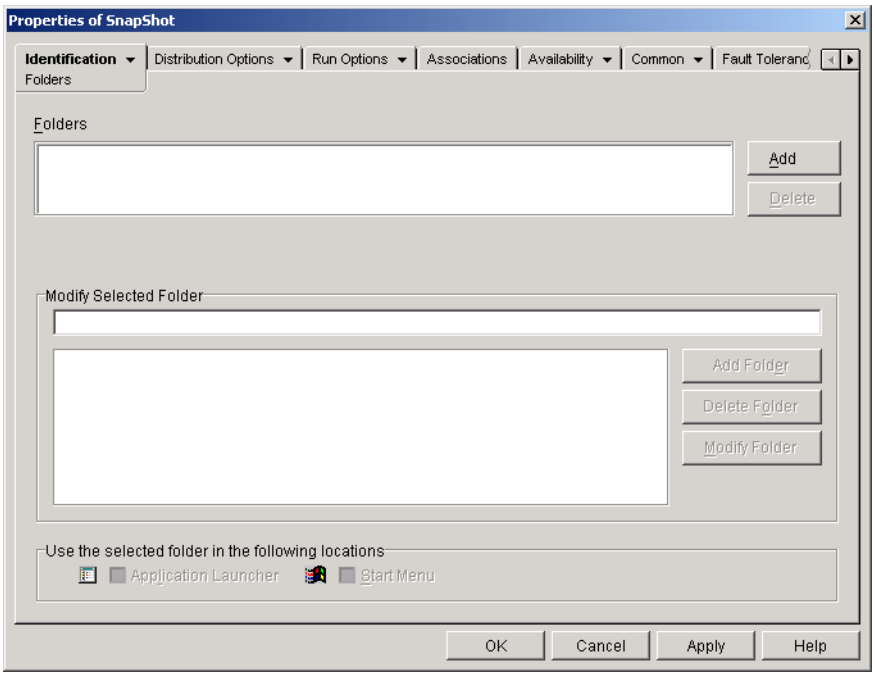
4 Click Add > click Application > browse for and select the desired Application object > click OK to add it to the folder in the folders list.

5 When finished adding Application objects > click OK to save your changes.

Using the Application Object to Add the Application to a Folder

1 In ConsoleOne, right-click the Application object you want to add to a folder > click Properties.

2 Click the Identification tab > Folders to display the Folders page.



3 Click the Add button > Linked Folder to display the Select Object dialog box.

4 Browse for and select the Application Folder object you want to add the Application object to > click OK to display the Folder Object Structure dialog box.

5 Select the folder you want to add the Application object to > click OK to add it to the Folders list.

HINT: If you select the Root folder, the Application object will be displayed directly on the Start menu and at the root of the Application Launcher/Explorer window.

By default, the Application object will be displayed in the selected folder on the Start menu and the Application Launcher/Explorer window.

6 In the Use the Selected Folder in the Following Locations box, deselect Application Launcher if you don't want the Application object included in that folder in the Application Launcher/Explorer window and deselect Start Menu if you don't want the Application object included in that folder on the Windows Start menu.

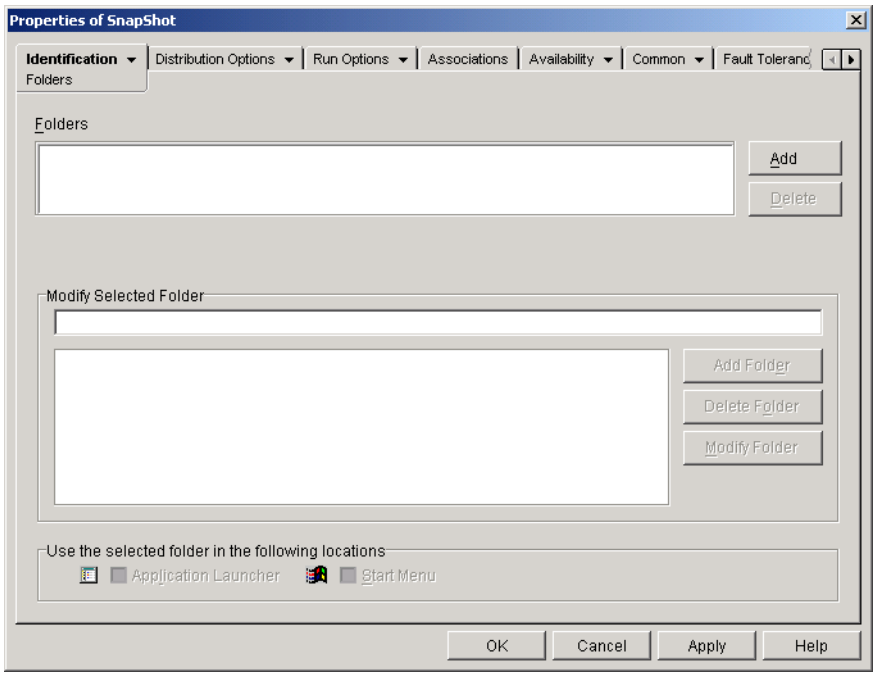
NOTE: A folder only displays in the Application Launcher/Explorer window and on the Start menu if it contains an Application object. If no Application objects have been linked to the folder, it is not displayed.

7 Click OK to save the changes.

Adding Applications to Custom Folders

1 In ConsoleOne, right-click the Application object you want to add to a folder > click Properties.

2 Click the Identification tab > Folders to display the Folders page.



3. Click the Add button > Custom Folder to add a New Folder entry to the Folders list.
4. In the Modify Selected Folder list, select the New Folder entry > click Modify Folder > type a name for the folder > press Enter.
5. If you want to add subfolders, select the folder > click Add Folder > type a name for the subfolder > press Enter.

   IMPORTANT: If you add subfolders, the Application object is displayed in the lowest level folder.
6. Click OK to save the changes.

11 Reporting on Application Management Events

ZENworks® for Desktops (ZfD) Application Management supports reporting on the success or failure of the following events:

- Launching of an application
- Distribution of an application
- Filtering of an application when the workstation does not meet the application's system requirements
- Removal of an application (uninstall)
- Caching of an application's installation source files

Events can be sent to a database, as SNMP traps to a management console, or recorded in a text log file. Because event reporting is established on a per application basis, you can use a database for reports from one application, SNMP traps for reports from a second application, and a text log file for reports from a third application. Or, you can use all three methods for different events for the same application (for example, launch events sent to a database and caching events sent to a log file).

The following sections provide information about setting up each type of event reporting and configuring Application objects to use one or more reporting methods:

- "Setting Up Database Reporting" on page 95
- "Setting Up SNMP Trap Reporting" on page 102
- "Setting Up Log File Reporting" on page 104
- "Configuring Applications to Use Reporting" on page 104
- "Generating Database Reports" on page 105
- "Understanding Log File Reports" on page 106

If you are distributing .MSI applications (applications installed by Microsoft* Windows* Installer), you can turn on verbose logging so that the Windows Installer will output information to a log file on the user's workstation. The following section provides information:

- "Enabling Windows Installer Verbose Logging" on page 107

Setting Up Database Reporting

Novell® Application Launcher™/Explorer can record events to most ODBC-compatible databases, provided:

- Each user's workstation has the correct database driver installed.
- The connection is configured correctly in NDS®.

ZfD includes a Sybase* database that you can install. Sybase is also used for the Workstation Inventory database. If you plan to use a database for Application Management reports and you also plan to use Workstation Inventory, you can use the same database installation for both purposes.

NOTE: Although the same database installation can be used for both Application Management and Workstation Inventory, each component still uses its own database file. Application Management creates a NAL.DB database file and Workstation Inventory creates a MGMTDB.DB database file.

To set up database reporting, you need to complete the following tasks:

- "Installing the Sybase Database" on page 96
- "Installing ODBC Drivers to Workstations" on page 96
- "Creating a ZENworks Database Object" on page 96
- "Configuring the Database's JDBC and ODBC Information" on page 97
- "Granting ODBC Property Rights to Users" on page 99
- "Enabling the ZENworks Database Policy" on page 100
- "Configuring Application Objects to Use Database Reporting" on page 101

Installing the Sybase Database

If you have not installed a database to use, you can install the Sybase database included on the ZENworks for Desktops *Program* CD. For instructions, see Installing Application Management in Application Management in ZENworks for Desktops 3.2 Deployment Guide.

The Sybase database installation requires approximately 16 MB on a network server. However, as with all reporting databases, the database can expand rapidly to consume large amounts of disk space.

Installing ODBC Drivers to Workstations

Application Launcher/Explorer uses an ODBC driver to write application event information to the database.You need to ensure that the correct ODBC driver (for the database you are using) is installed on each workstation for which you want to record event information.

The correct ODBC driver (DBODBC6.DLL) for the Sybase database is installed by default. However, on Windows 95/98, you may need to install two additional DLLs (ODBCCP32.DLL and ODBCINT.DLL) that are not installed during a Windows minimal installation. To install these files, copy them from the NAL REPORTING directory on the *Companion* CD to the Windows System directory (for example, C:\WINDOWS\SYSTEM). You can also use an Application object to distribute them to the appropriate workstation. You do not need to do this on Windows NT/2000/XP. The files are already present.

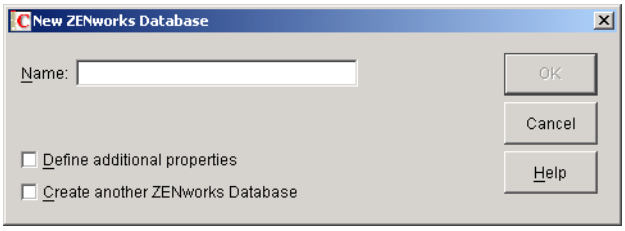
Creating a ZENworks Database Object

If you are using the Sybase database that comes with ZfD and have already installed it, the installation program creates the database object in NDS. You can skip to the next section, "Configuring the Database's JDBC and ODBC Information" on page 97.

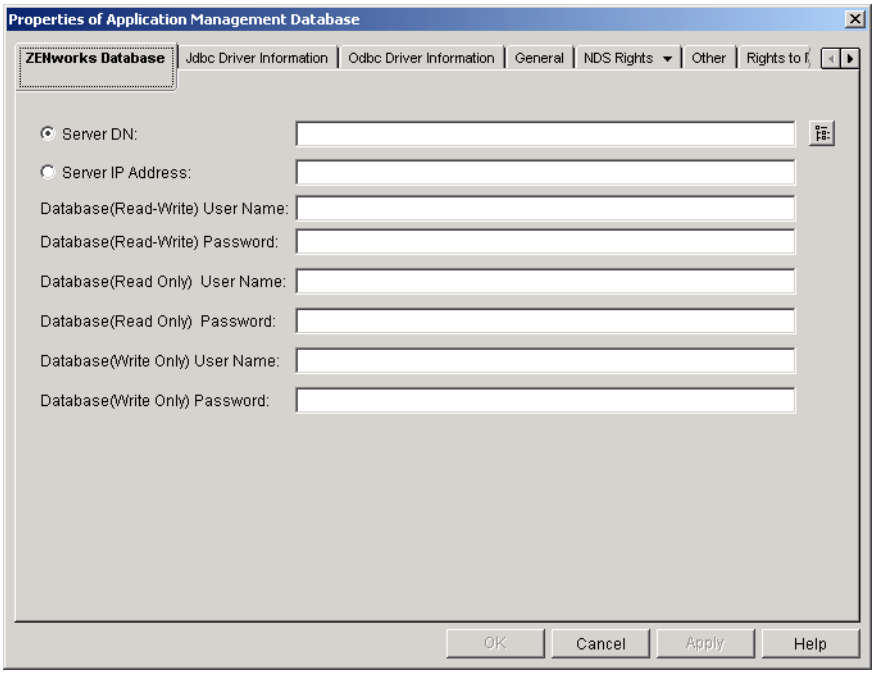
If you are using another database, such as the Oracle* database the comes with NetWare® 5.1, you will need to create a ZENworks Database object in NDS to represent the database.

To create a ZENworks Database object:

1. Right-click the container in which you want to create the object > click New > click Object to display the New Object dialog box.
2. Select ZENworks Database > click OK to display the New ZENworks Database dialog box.



3. In the Name box, type a name for the database, such as ZfDAppManReports.
4. Select the Define Additional Properties box > click OK.



5. In the Server DN field, browse for and select the Server object for the server where the database is physically installed and running.

   IMPORTANT: If the ZENworks database is located on a NetWare 4.*x* server, you need to enter the server's IP address in the Server IP Address field rather than adding the server's object to the Server DN field.
6. If you want to set up Read-Write, Read-Only, or Write-Only users, enter information in the appropriate user name and password fields.
7. Click OK to save the information.

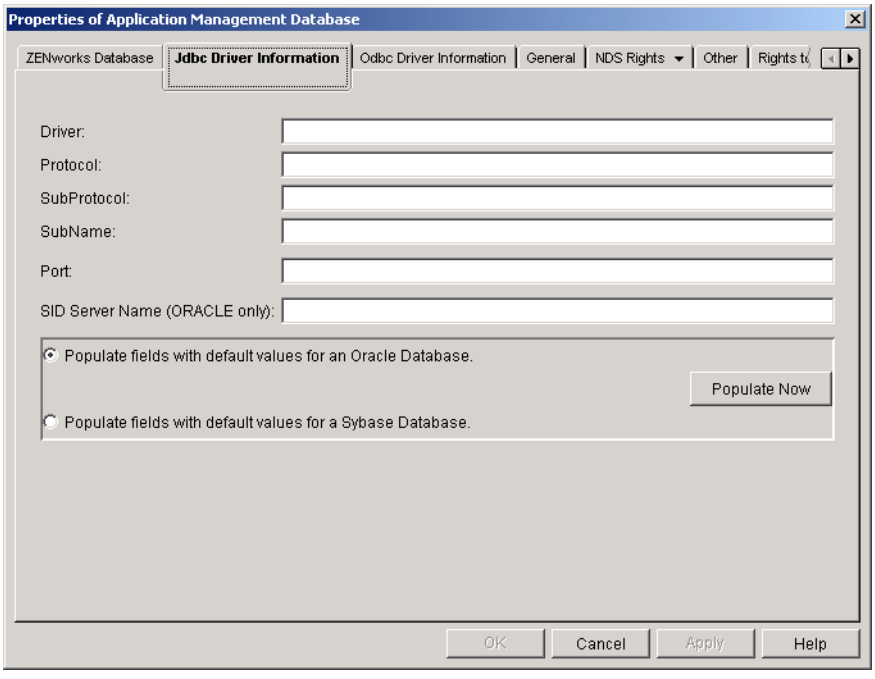
Configuring the Database's JDBC and ODBC Information

ConsoleOne® uses a JDBC driver to pull information from the database for a set of predefined Application Management reports. If you want to use these predefined reports, you need to configure the database object with the correct JDBC driver information.

Application Launcher/Explorer uses an ODBC driver to write event information to the database. You need to configure the database object with the ODBC driver information that Application Launcher/Explorer will need.

To provide the JDBC and ODBC information:

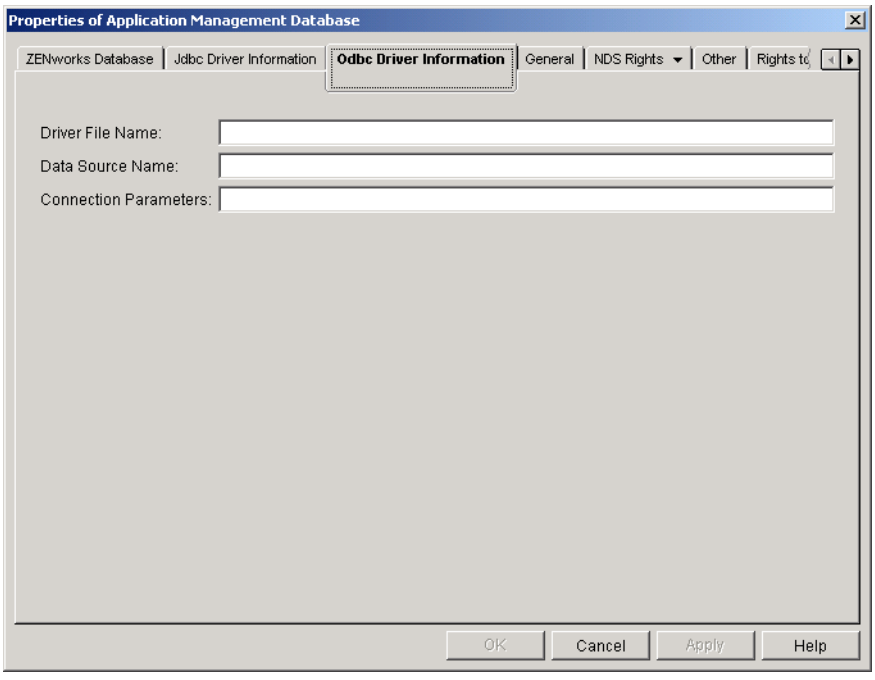
1. Right-click the database object > click Properties.
2. Click the JDBC Driver Information tab.



3. If you are using a Sybase or Oracle database, click the appropriate Populate option > click Populate Now to automatically populate the fields with the default information for a Sybase or Oracle database.

   or

   If you are using a different type of database, fill in the fields with the appropriate information for your database. Click the Help button for a description of each field.
4. Click the ODBC Driver Information tab.



5 Fill in the following fields:

Driver File Name: Enter the name of the ODBC driver file that resides on the workstation to enable Application Launcher/Explorer to access the database. For Sybase, the driver file name is dbodbc6.dll.

Data Source Name: Enter **`NAL Reporting`**.

Connection Parameters: Enter the appropriate commands to connect to the database. For Sybase, these commands are:

```
CommLinks=TCPIP{Host=IPAddress:2638};AutoStop=Yes;Integrated=No;DBN=NAL;
ENG=IPAddress
```

where *IPAddress* is the actual IP address of the server where the database resides.

6 Click OK to save the JDBC and ODBC driver information.

Granting ODBC Property Rights to Users

You need to grant users Read and Compare rights to the ODBC properties you defined for the database object in the previous section. This allows Application Launcher/Explorer to retrieve the ODBC information it needs to access the database.

To grant rights:

1 Right-click the ZENworks Database object > click Trustees of This Object.

2 Click Add Trustee.

3 Select [PUBLIC] > click OK to add [PUBLIC] to the list of trustees.

Adding [PUBLIC] as a trustee gives every user Read and Compare rights to all of the database object's properties, including the various user names and passwords that can be used to access the database. To avoid this, you need to limit the [PUBLIC] access to the three ODBC properties.

4 In the Property list, select [All Attribute Rights] > click Delete Property to remove it from the list.

5 Click Add Property to display the Add Property dialog box > select zendbODBCConnectionParameters > click OK to add it to the Property list.

The default rights, Read and Compare, are sufficient. You do not need to change these rights.

6 Repeat Step 5 to add the following two properties: zendbODBCDataSourceName and zendbODBCDriverFileName. Keep the default rights (Read and Compare).

7 Click OK > OK to save the changes.

Enabling the ZENworks Database Policy

Before Application Management can use the database, you need to:

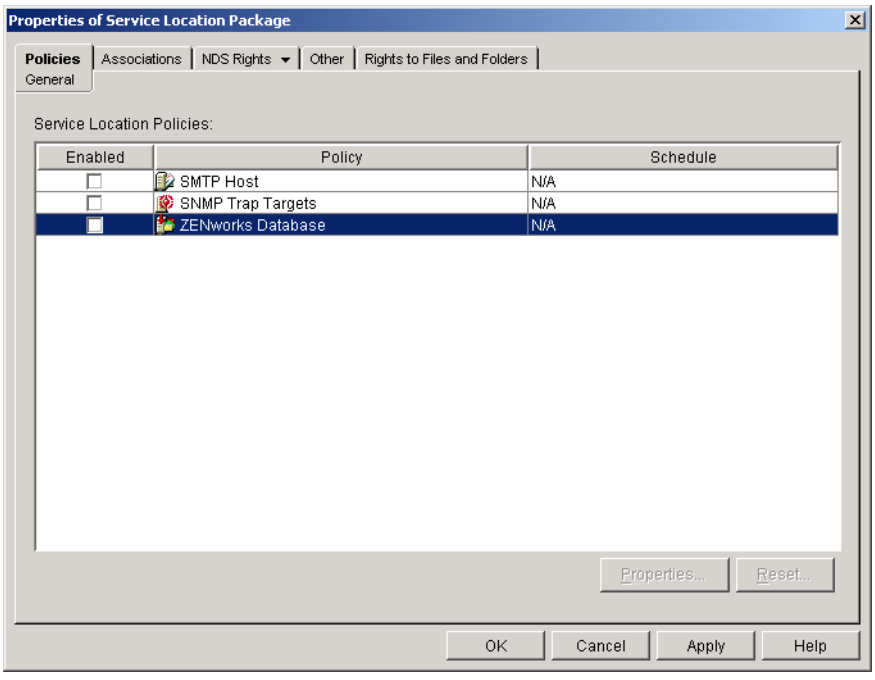
- Activate a Database policy in an NDS Service Location Package. The Database policy simply points to the location of the ZENworks database you are using. A Service Location Package can have one Database policy only, and each Database policy can point to one database only. If you haven't created a Service Location Package, or if your current packages' Database policies are being used for other databases, you will need to create a new Service Location Package. Instructions are provided in the steps below.
- Associate the Service Location Package with the containers where the users or workstations reside whose reports you want sent to the database.. This association is how Application Launcher/Explorer knows which database to use when reporting events for a user or workstation.

To activate a ZENworks Database policy and associate containers with it:

1 In ConsoleOne, right-click the Service Location Package you want to use > click Properties.

or

If you do not have a Service Location Package, right-click the container where you want to create one > click New > click Policy Package. Follow the instructions provided in the Policy Package Wizard to create a Service Location Package.



2 On the General page, check the box in the Enabled column to enable the ZENworks Database Policy.

3 Select the ZENworks Database Policy in the list > click Properties to display the Database Location page.

4 In the ZENworks Database DN field, browse for and select the database object you want to use for Application Management reporting. This should be the same object you configured in "Configuring the Database's JDBC and ODBC Information" on page 97.

5 Click OK to return to the General page.

6 Click Associations to display the Associations page.

You use this page to associate the Service Location Package with the containers where the users or workstations reside whose reports you want sent to the database. If a parent container includes several containers where User and Workstation objects reside, you can select the parent container rather than each individual container.

7 Click Add > browse for and select the container you want to add > click OK to add it to the list.

8 Repeat Step 7 to add additional containers.

9 When you've finished adding containers, click OK to save the information.

Configuring Application Objects to Use Database Reporting

After you've set up the database you will use for reporting, you can start configuring Application objects to use database reporting. Because event reporting is configured on a per-application basis, you can choose which applications you want to collect event reports for and which ones you don't.

For detailed instructions about configuring an application to use database reporting, SNMP trap reporting, or log file reporting, see "Configuring Applications to Use Reporting" on page 104.

Setting Up SNMP Trap Reporting

If you have a management console to collect SNMP traps, you can have Application Launcher/Explorer send SNMP traps to the management console.

To set up SNMP trap reporting, you need to complete the following tasks:

- "Enabling the SNMP Trap Targets Policy" on page 102
- "Configuring Application Objects to Use SNMP Trap Reporting" on page 103

Enabling the SNMP Trap Targets Policy

Before Application Management can use SNMP traps for event reporting, you need to:

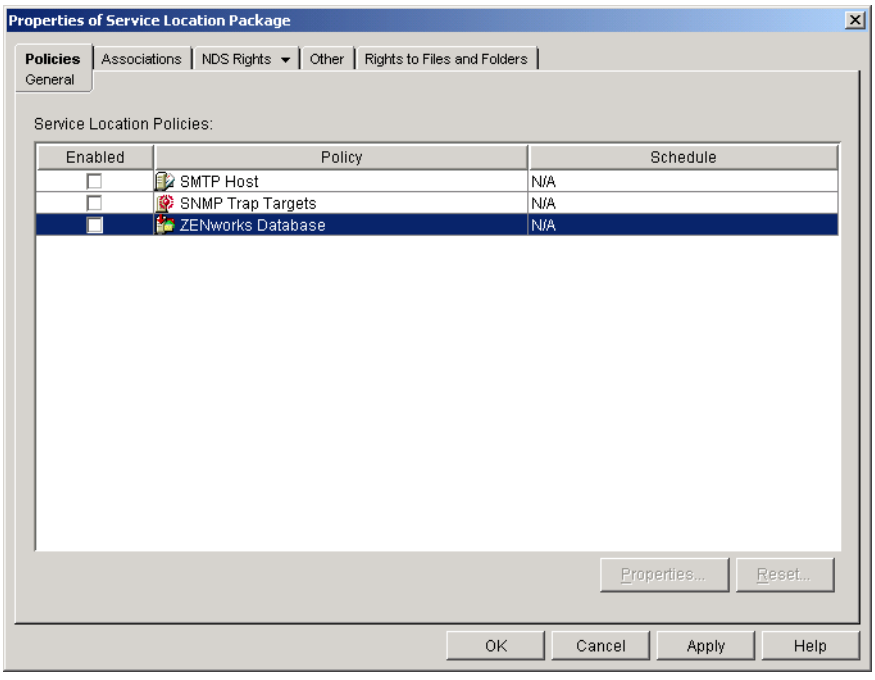
- Activate an SNMP Trap Targets policy in an NDS Service Location Package. The SNMP Trap Targets policy simply points to the IP address (or addresses) of the management console that will display the traps. A Service Location Package can have one SNMP Trap Targets policy only. If you haven't created a Service Location Package, or if your current packages' SNMP Trap Targets policies are being used for other databases, you will need to create a new Service Location Package. Instructions are provided in the steps below.
- Associate the Service Location Package with the containers where the users or workstations reside who you want the SNMP Trap Targets policy applied to. This association is how Application Launcher/Explorer knows which SNMP trap target to use when reporting events for the users or workstations.

To activate an SNMP Trap Targets policy and associate it with containers:

1. In ConsoleOne, right-click the Service Location Package you want to use > click Properties.

   or

   If you do not have a Service Location Package, right-click the container where you want to create one > click New > click Policy Package. Follow the instructions provided in the Policy Package Wizard to create a Service Location Package.



2. On the General page, check the box in the Enabled column to enable the SNMP Trap Targets Policy.
3. Select the policy in the list > click Properties to display the SNMP Trap Targets list.
4. Click Add to display the SNMP Target dialog box > enter the IP address of the workstation or server where the management console is running > click OK to add the IP address to the list.
5. Repeat Step 4 to add additional targets.
6. When you've finished adding targets, click OK to return to the General page.
7. Click Associations to display the Associations page.

   You use this page to associate the Service Location Package with the containers where the users or workstations reside who you want the SNMP Trap Targets policy applied to. If a parent container includes several containers where User and Workstation objects reside, you can select the parent container rather than each individual container.
8. Click Add > browse for and select the container you want to add >click OK to add it to the list.
9. Repeat Step 8 to add additional containers.
10. When you've finished adding containers, click OK to save the information.

Configuring Application Objects to Use SNMP Trap Reporting

After you've enabled the SNMP Trap Targets policy and have your management console running, you can start configuring Application objects to use SNMP trap reporting. Because event reporting is configured on a per-application basis, you can choose which applications you want to collect event reports for and which ones you don't.

For detailed instructions about configuring an application to use SNMP trap reporting, database reporting, or log file reporting, see "Configuring Applications to Use Reporting" on page 104.

Setting Up Log File Reporting

You can have Application Launcher/Explorer record events to a log file. This can be an individual log file located on the user's workstation or a common log file on a network server. When using a common log file, users must be given Read and Write rights to the log file, but Application Launcher/Explorer will automatically authenticate them to the log file location.

To set up log file reporting, you need to complete the following tasks:

- "Setting Up a Common Log File Location" on page 104
- "Configuring Application Objects to Use Log File Reporting" on page 104

Setting Up a Common Log File Location

With log file reporting, you have two options. You can have Application Launcher/Explorer log events for each individual user to a file on the user's local drive, or you can have Application Launcher/Explorer log events for all users to a file in a common network location.

If you want Application Launcher/Application Explorer to log events to a file in a common network location, you need to establish the network directory and provide users with Read and Write rights to files in the directory.

Because log file names are established on a per-application basis, you can have individual log files for each application (by specifying a different log file name for each Application object) or one log file for all applications (by specifying the same log file name for all Application objects). You cannot have log files on a per-user basis, unless you have Application Explorer/Launcher save the files to the users' local drives.

Configuring Application Objects to Use Log File Reporting

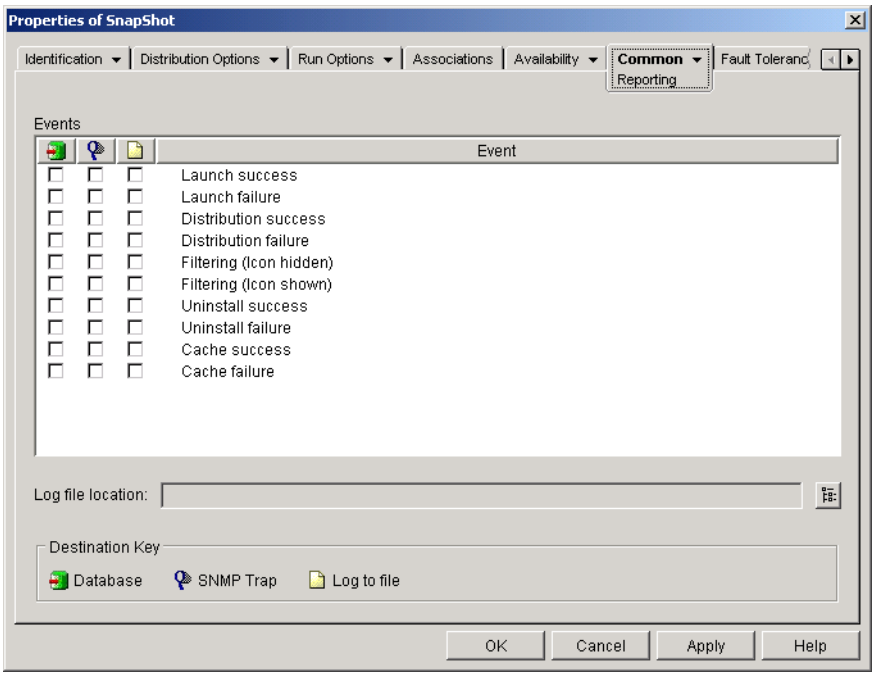
After you've set up a common log file location (if you plan to use a common log file), you can start configuring Application objects to use log file reporting. Because event reporting is configured on a per-application basis, you can choose which applications you want to collect event reports for and which ones you don't.

For detailed instructions about configuring an application to use log file reporting, database reporting, or SNMP trap reporting, see "Configuring Applications to Use Reporting" on page 104.

Configuring Applications to Use Reporting

Application Launcher/Explorer must know which method of reporting (database, SNMP trap, or log file) to use for an application and which events to report for the application. You provide this information through the Application object's Reporting page (Common tab).

1. In ConsoleOne, right-click the Application object for which you want to configure reporting > click Properties.
2. Click the Common tab > Reporting.



3 Fill in the following fields:

Events: Select the events (launch, distribution, filtering, uninstall, and cache) that you want reported and the destination where you want the events sent. You can send events to a database, to a management console via an SNMP trap, or to a text log file. If necessary, you can send events to multiple destinations (for example, both a database and a text log file).

Log File Location: If you selected a log file as the destination for any of the event reports, click the Browse button to display the Open dialog box > browse to and open the folder in which you want the log file located > type a name for the log file in the File Name box > click OK.

If you want to save the events for all users to the same log file, specify a log file in a common network location (one that users have Read and Write rights to). If you want users to have individual log files, specify a location on their local drive (for example, c:\temp).

4 Click OK to save the changes.

Generating Database Reports

When an event is recorded to a database, the following information is included: event type, date and time, user distinguished name, workstation distinguished name, workstation address, application distinguished name, application global unique identifier (GUID), application version string, and event strings.

You can use a database query to search for specific information. See your database documentation for information about performing queries.

In addition, Application Management includes a set of predefined reports for you to use. There are six basic reports that let you report on the success or failure of an event either by application, by user, or by workstation. For example, you could use the Failure by App report to view a list of all application distributions, sorted by user, that failed. Or you could use the Failure by User to view a list of all application launches, sorted by user, that failed.

To access the predefined reports:

1. Right-click the ZENworks Database object > click Reporting.
2. In the Available Reports list, expand the ZENworks NAL Reports category > select the report you want.
3. In the Event Type list, select the event you want to include in the report.
4. Click Run Selected Report.

Understanding Log File Reports

The following is a log file entry for a single event. Each field in the entry is described below.

```
"LaunchFail","11","5/10/2000:8:28PM",
"MAIN_TREE::.ssmith.xyzcorp",
"MAIN_TREE::ssmith_winnt.xyzcorp","01010480:00C04F6AABC6",
"MAIN_TREE::.testapp.org.xyzcorp",
"119C2580-949-11D3-BD13-00C04F6AABC6",
"5","-53429","","","","","","","524288"
```

Field	Example	Description
Event Type	LaunchFail	The event that occurred and whether it was successful or failed. Possible event types are: LaunchSuccess LaunchFail DistributionSuccess DistributionFail FilterShow FilterHide UninstallSuccess UninstallFail CacheSuccess CacheFail
Event Type Code	11	The code associated with the event. Possible codes are: 10 - LaunchSuccess 11 - LaunchFail 20 - DistributionSuccess 21 - DistributionFail 30 - FilterHide 40 - FilterShow 50 - UninstallSuccess 51 - UninstallFail 60 - CacheSuccess 61 - CacheFail
Date and Time	5/10/2000:8:28PM	The date (5/10/2000) and time (8:28PM) the event occurred.
User's Distinguished Name and Tree	MAIN_TREE::.ssmith.xyzcorp	The distinguished name and tree of the user for which the event occurred.

Field	Example	Description
Workstation Distinguished Name and Tree	MAIN_TREE::ssmith_winnt.xyzcorp	The distinguished name and tree of the workstation on which the event occurred. This field contains information only if the workstation has been imported into NDS as a Workstation object.
Workstation Address	01010480:00C04F6AABC6	The IPX™ or IP address of the workstation on which the event occurred.
Application Distinguished Name and Tree	MAIN_TREE::.testapp.org.xyzcorp	The distinguished name and tree of the Application object for which the event occurred.
Application GUID	119C2580-949-11D3-BD13-00C04F6AABC6	The global unique identifier assigned to the Application object. The GUID is located on the Application object's Options page (Distribution Options tab).
Application Version Number	5	The version number assigned to the Application object. Possible numbers range from 0 to 65535. The version number is located on the Application object's Options page (Distribution Options tab).
Event Code Major	-53429	The error code generated by Application Launcher/Explorer.
Event Code Minor	no example	Additional error code.
Event String 1	no example	Error string.
Event String 2	no example	Error string.
Event String 3	no example	Error string.
Event String 4	no example	Error string.
Event String 5	no example	Error string.
Application Flag	no example	Application object bitmask

Enabling Windows Installer Verbose Logging

When you distribute an application based on a .MSI package rather than a .AOT/.AXT package, Application Launcher/Explorer launches the Microsoft Windows Installer so that it can install the application according to the information and files in the .MSI package. By default, the Windows Installer creates a MSI*xxxxx*.LOG file that includes basic information and messages.

If you need to troubleshoot problems with the installation, you can set up verbose logging for the Windows Installer. The Windows Installer will create a log file, ZAPPMSI.LOG, in the user's temporary directory on the workstation.

To enable verbose logging on a workstation:

1. Modify the Windows registry to add the following key:

   ```
   HKEY_LOCAL_MACHINE\Software\NetWare\NAL\1.0\Debug
   ```

2. Under the Debug key, add a DWORD value. Set the value name to MSI and the value data to 1.
3. Save the registry.
4. Restart the workstation.

You need to modify the registry of each workstation where you want to enable verbose logging. We recommend that you create an Application object whose only function is to modify the registry.

For information about Windows Installer error messages included in the MSI*xxxxx*.LOG file or the ZAPPMSI.LOG file, see the Windows Installer Error Messages document (http://msdn.microsoft.com./library/default.asp?url=library/en-us/msi/hh/msi/erro_89f7.asp) at the Microsoft Developer Network (MSDN) site.

For information about Windows Installer error codes returned through Application Launcher/Explorer, see the Error Codes document (http://msdn.microsoft.com./library/default.asp?url=library/en-us/msi/hh/msi/code_13ub.asp) at the Microsoft Developer Network site.

12 Metering Software Licenses

ZENworks® for Desktops (ZfD) Application Management integrates with Novell® Licensing Services (NLS) to enable you to track an application's usage and comply with the application's license agreement. When a user launches an application that has been configured as part of NLS, Novell Application Launcher™/Explorer checks to make sure that a license is available before running the application.

To set up software metering, complete the tasks in the following sections:

- Create a separate License container and one or more Metered Certificates for each application you want to track. For instructions, see the NLS documentation at the Novell Documentation Web site (http://www.novell.com/documentation).
- Configure the Application object in NDS® to use NLS and software metering. You won't be able to complete this step until after you've created an Application object for the application. For details about creating an Application object, see Chapter 6, "Distributing Applications," on page 53. For details about configuring the Application object to use software metering, see Chapter 12, "Metering Software Licenses," on page 109.

Installing Novell Licensing Services

Novell Licensing Services (NLS) must be installed before you can use Application Launcher/Explorer to meter software licenses. NLS is included with NetWare 4.*x*, 5.*x*, and 6, and with Novell Cluster Services™ . For information about installing NLS, see the documentation for the above listed products at the Novell Documentation Web site (http://www.novell.com/documentation).

Because NLS administration is performed through NetWare® Administrator, software metering is not available in a pure Windows 2000 environment.

Creating License Containers and Metered Certificates

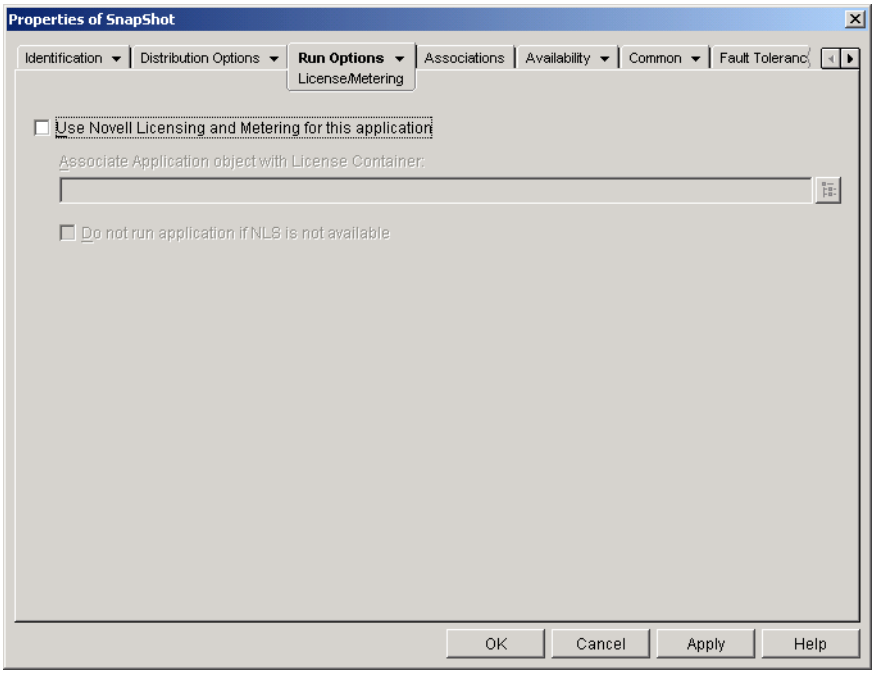
You must create a License container for each application you want to meter. Within the License container, you then need to create one or more Metered Certificates that account for the number of licenses you have available for the application. For example, if you initially have 200 licenses for the application, you can create a Metered Certificate of 200 licenses. Later, if you purchase 100 additional licenses, you can create a second Metered Certificate of 100 licenses. For instructions about creating License containers and Metered Certificates, see the NLS documentation at the Novell Documentation Web site (http://www.novell.com/documentation).

Configuring Applications to Use License Metering

Once you have installed NLS and have a License container and Metered Certificate created for an application, you need to configure the Application object to use NLS and license metering. This enables Application Launcher/Explorer to enforce the licensing you've established for the application.

To enable Application Launcher/Explorer to enforce an application's licensing:

1. In ConsoleOne, right-click the Application object > click Properties.
2. Click the Run Options tab > License/Metering.



3. Check the Use Novell Licensing and Metering for this Application box to turn on the option.
4. In the Associate Application Object with License Container field, click the Browse button and select the application's License container.
5. If you don't want Application Launcher/Explorer to run the application when NLS is not available, check the Do Not Run if NLS Is Not Available box. Otherwise, Application Launcher/Explorer will run the application.
6. Click OK.

13 SnAppShot

To help you create installation packages for applications installed to Windows* 95/98 or Windows NT*/2000/XP workstations, ZENworks® for Desktops (ZfD) Application Management provides the snAppShot™ utility. The following sections provide information about snAppShot and instructions for using the utility.

Understanding SnAppShot

SnAppshot records the changes that occur on a workstation as an application is installed. As the installation proceeds, snAppShot captures the differences between the workstation's pre-installation configuration state and the workstation's post-installation state, compares the two pictures, and creates an application installation package that consists of two Application object template (.AOT or .AXT) files, one or more application source (.FIL) files, and one file definition (FILEDEF.TXT) file.

Application Object Templates

You use the Application object template file to create the Application object in NDS®. Both Application object template (.AOT and .AXT) files contain the same information, which is used to populate the Application object property fields during creation of the object:

- The NDS name and workstation shortcut name to be given the Application object.
- The modifications that need to be made to the workstation's configuration settings (registry settings, INI settings, text file modifications, and so forth) during installation of the application.
- The macro definitions to use during installation.
- The list of application files to copy to the workstation during installation, including the source location to copy the files from and the target location to copy the files to.

The .AOT file is a binary file that cannot be edited; the .AXT file is a text file that can be modified with a text editor. If you need to modify the Application object template after snAppShot has created it, you should modify the .AXT file and use it to create the Application object. Otherwise, you should use the .AOT file because data from the .AOT file is imported more quickly.

Application Source Files

SnAppShot also tracks all of the application files that are copied to the workstation. These files, which become the application source files, are copied to a network source location, renamed numerically starting with 1, and given a .FIL file extension (for example, 1.FIL). Novell® Application Launcher™/Explorer uses these source files when installing the application to the workstation.

Application File Definition File

To map the .FIL files to their original files, SnAppShot creates a file definition (FILEDEF.TXT) file. This text file not only maps the .FIL files to the original files, but also specifies the target location and name to be used when installing the files to the workstation. For example:

```
1.fil=C:\DMI\WIN32\_DEISL1.ISU
2.fil=C:\DMI\WIN32\bin\Wdmiutil.dll
```

Preparing a SnAppShot Workstation

Before running snAppShot on a workstation to create an installation package for an application, you should:

- Make sure the workstation is clean. A clean workstation has only the operating system and the Novell Client™ installed.
- Make sure the workstation is representative of the type of workstation to which the application will be distributed. For example, if you are distributing the application to Windows 2000 users on a Dell* OptiPlex* GX110, run snAppShot on a Dell OptiPlex GX100 running Windows 2000.
  Depending on the application and what occurs during an install, it may be necessary to create different Application objects to be used for different types of workstations.

Creating an Installation Package

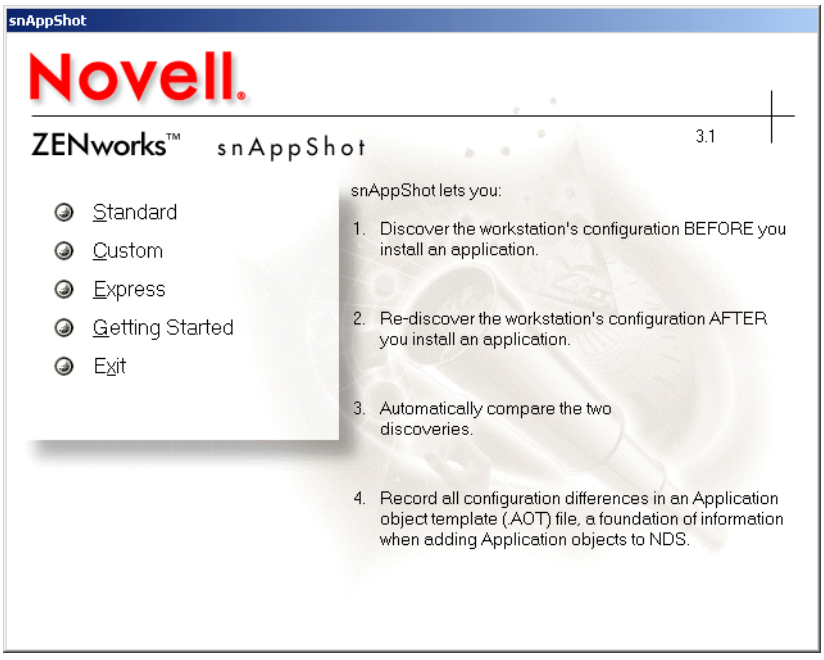
To create an installation package, snAppShot uses the following process:

- Takes an image of the workstation before the application is installed. You determine which drives are scanned and which configuration settings (registry settings, INI settings, and so forth) are recorded.
- Lets you install the application.
- Takes another image of the workstation, records the differences between the two images, and creates the installation package (.AOT and .AXT files, .FIL files, and FILEDEF.TXT file) in the network location you've specified.

To run snAppShot and create an installation package:

1. On the clean and representative workstation (see "Preparing a SnAppShot Workstation" on page 112), start snAppShot (SNAPSHOT.EXE) from the SYS:\PUBLIC\SNAPSHOT directory.

   For information about switches you can use when starting snAppShot, see "Command Line Switches" on page 113.



2 Select the mode you want to use:

Standard: Uses the snAppShot default preference file during the discovery process. In most cases, these preferences should be sufficient.

Custom: Allows you to choose a previously created preference file to apply to the discovery process or to use the snAppShot default preference file. Unlike the Standard mode, Custom mode lets you make changes to specific preferences to discover drives, files, folders, registry settings, and shortcuts.

Express: Lets you choose a previously created preference file. No modifications can be made to the preferences.

3 Follow the on-screen prompts to create the installation package. If you need more information than is provided on the screen, click the Help button.

Command Line Switches

SnAppShot includes two switches that you can use on the command line. The syntax is:

```
snapshot switch
```

/u:*filename*.ini

This switch enables you specify the file from which snAppShot will retrieve preference settings. You must have already created the preferences file during a previous snAppShot session. Using this switch is similar to running snAppShot, selecting the Express option, and then selecting the preferences file.

If the file is not in the same directory as snAppShot, specify the full path to the file.

/slow

By default, the snAppShot discovery process is optimized for a single-byte operating system. If you are running snAppShot on a double-byte operating system, you should use the /slow switch.

This causes snAppShot to use a string comparison routine optimized for double-byte characters. As a result, SnAppShot will run slower.

14 Application Object Settings

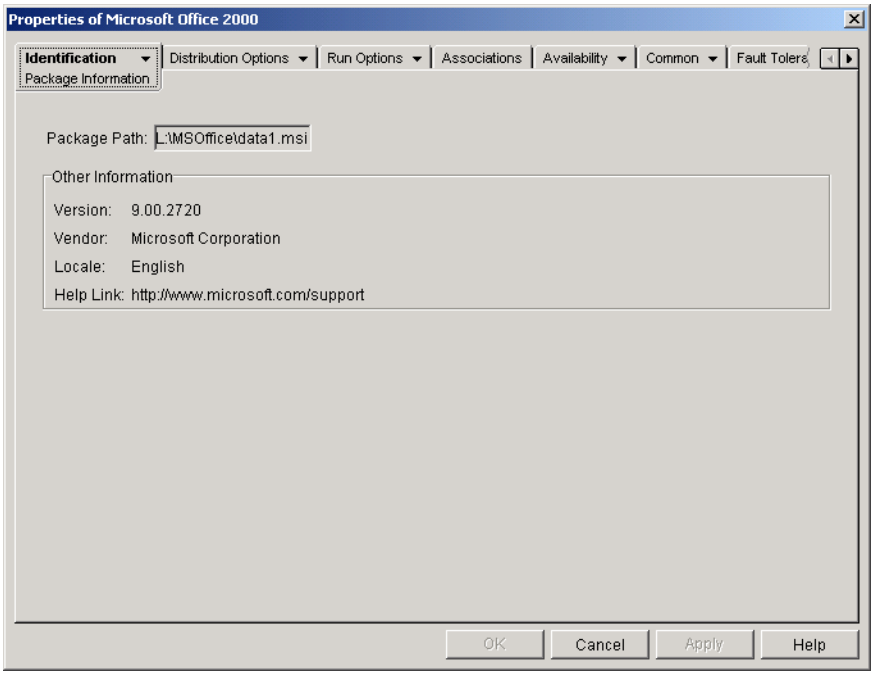
An Application object includes many settings (properties) you can modify to manage the application. The following sections correspond to each tab on the Application object.

Identification Tab

The Identification tab includes the following pages to help you configure how the Application object is displayed to users:

Package Information Page (.MSI Application Object Only)

The Package Information property page, shown below, displays information about the Microsoft* Windows* Installer package file (.MSI file) associated with the application. This page is for informational purposes only; you cannot use this page to modify the package's information.



Package Path

Displays the location of the .MSI file being used by the Application object.

Version

Displays the version of the .MSI file.

Vendor

Displays the creator of the .MSI file.

Locale

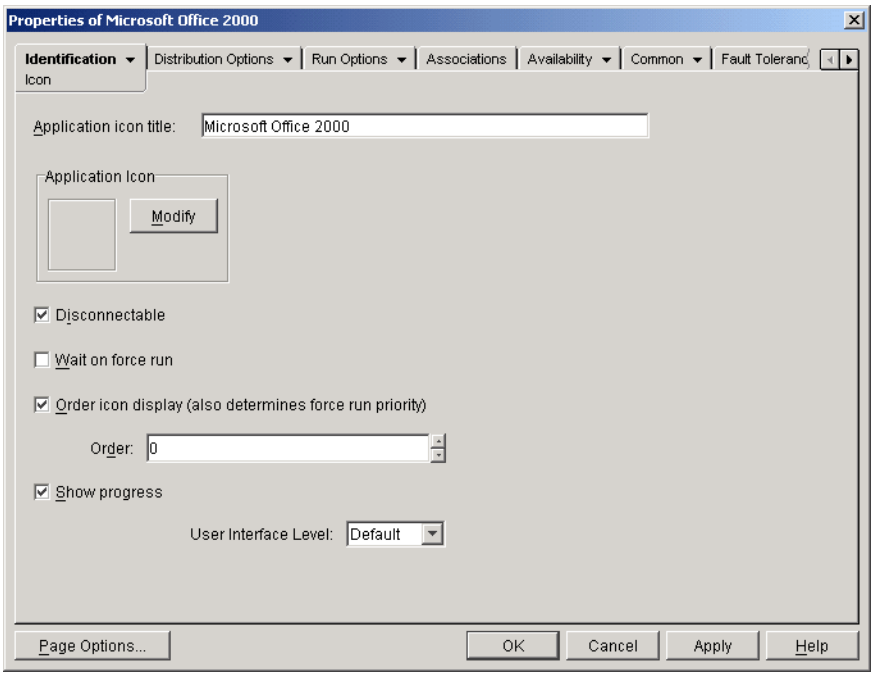
Displays the locale defined in the .MSI file.

Help Link

Displays the Web location to visit for information and help about the application.

Icon Page

The Icon property page, shown below, determines the Application object's icon that Novell® Application Launcher™ /Explorer displays on a workstation. You can give the application icon a title, select the graphic to use for the icon, and give the icon a display order and force run priority. You can determine whether or not Application Launcher/Explorer should continue to display the Application object on the workstation when the user has disconnected from NDS®.



Application Icon Title

Enter the text you want to appear as the title for the Application object's icon wherever the icon is displayed. If necessary, you can use the Description page (Identification tab) for longer descriptions of the application.

Application Icon

Select the icon you want to appear wherever the Application object's icon is displayed. If you do not specify an icon, a default Application object icon is used.

Disconnectable

Check this option to mark the application as being able to be run on a workstation that is disconnected from NDS.

IMPORTANT: The application must be distributed to the workstation before the user can run it in disconnected mode, or the application must be cached on the workstation. You can force the application to be distributed on the workstation by selecting the Force Run characteristic (Associations page). You can force the application to be cached to the workstation by selecting the Force Cache characteristic (Associations page).

Wait on Force Run

This option applies only if the application and at least one other application are using the Force Run option (Associations page).

Check this option to force the application to wait until the application before it terminates. The application order is defined in the Order Icon Display (Also Determines Force Run Priority) field. Reboots will be queued until the final application has terminated.

Order Icon Display (Also Determines Force Run Priority)

This option dictates the order in which applications set as Force Run will be started. Select this option to enable it, and then use the Order list to select the application's position in the Force Run order.

IMPORTANT: Despite the field title (Order Icon Display), this option does not determine the order in which Application Launcher/Explorer displays icons. Icon order is determined by the user through the View > Arrange Icon setting in Application Launcher/Explorer.

You control the order in which the application is started by entering a numeric value in the Order box. A value of zero gives the application the highest priority. The maximum value is 999. For example, if you want this application to start after two other applications that have been given the order of 0 and 1, you would enter 2 in the Order box.

Application Launcher/Explorer will run the application without waiting for the previously started application to terminate, unless the Wait on Force Run option is enabled.

Show Progress

This option displays a progress bar to users anytime an application is distributed to or removed from their workstations. Turn off this option if you are distributing only a small change, such as a registry modification. Turn on this option if you are distributing or removing a large application and want to give the user an idea of how long the process will take.

User Interface Level

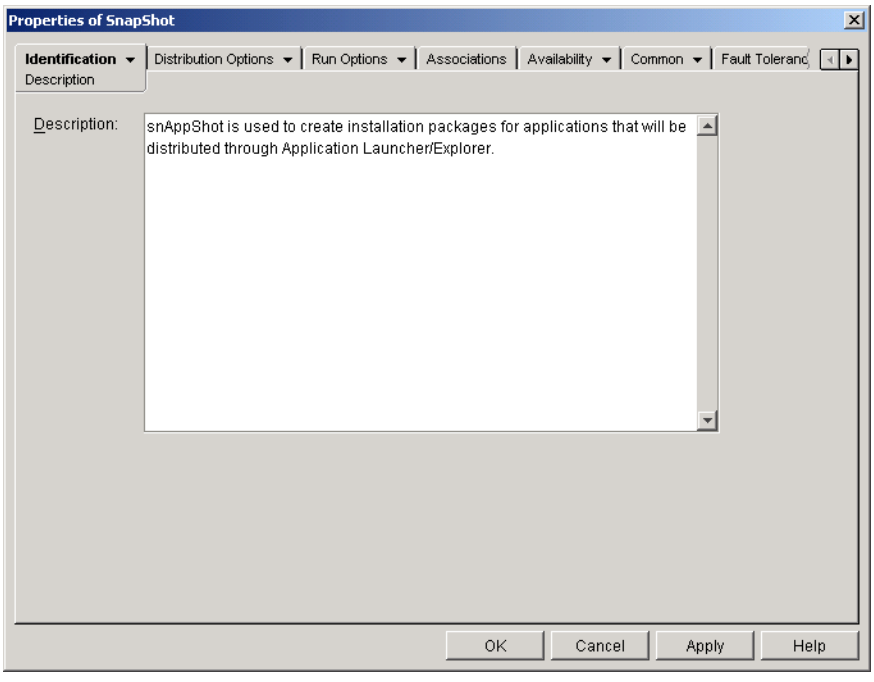
This option appears only if the Application object uses a Microsoft Windows Installer (.MSI) package. During distribution of a .MSI Application object, Application Launcher/Explorer launches Windows Installer to install the application. As a result, rather than showing the standard Application Launcher/Explorer installation progress bar, Windows Installer uses the installation user interface established for the .MSI package. You can use the following settings to determine the amount of user interface the Windows Installer will display during installation.

- Default: Displays an appropriate user interface level (as chosen by Windows Installer).
- Silent: Displays no user interface.
- Progress: Displays simple progress information and error messages/prompts.
- Reduced: Displays full user interface with Wizard dialog boxes suppressed.
- Full: Displays full user interface (Wizard dialog boxes, progress information, error messages and prompts, and so forth).

Application Launcher/Explorer passes the selected setting to Windows Installer as a startup parameter. For more information about these settings, see the Microsoft Windows Installer documentation.

Description Page

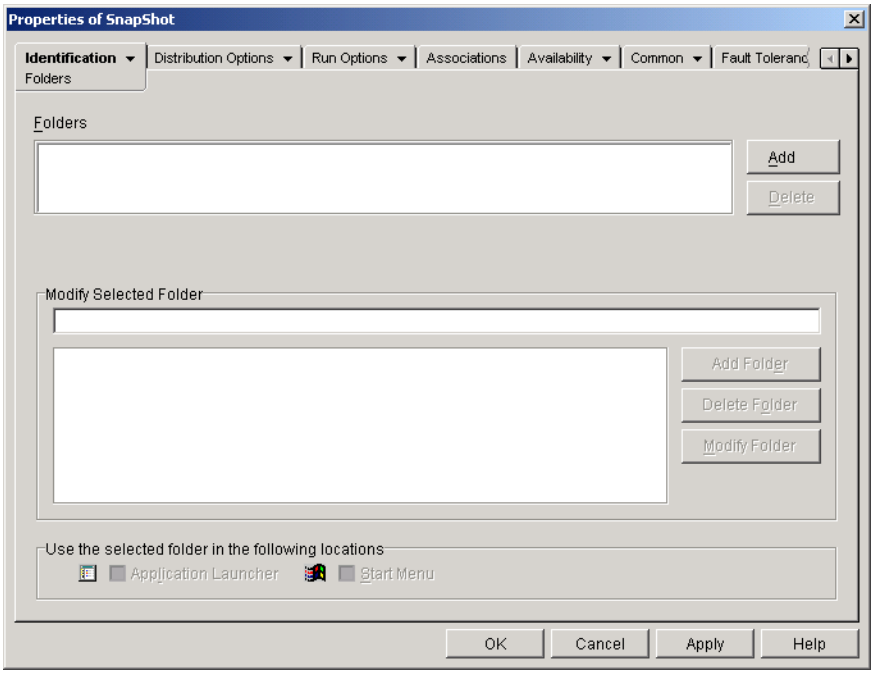
The Description property page, shown below, provides users more complete information about the Application object than the application icon title allows.



If you have enabled the Prompt User Before Distribution option (Distribution Options > Options page), users will see this description when Application Launcher/Explorer first distributes the application to them. They can also view an Application object's properties to see the description. To display the properties, right-click the Application object (on the workstation) > click Properties.

Folders Page

The Folders property page, shown below, lets you specify the folders where you want Application Launcher/Explorer to place the application when distributing it to a workstation.



You can add the application to two different types of folders: a custom folder and a linked folder.

A custom folder is a folder created specifically for the Application object. No other Application objects can be included in the folder. Custom folders support folders within folders, which means that you can create a custom folder structure. For example, although you could not have Calculator and Notepad in the same custom folder, you could create two subfolders within the same custom folder and place the two programs in the two subfolders (in otherwords, WINAPPS\CALCULATOR\CALC.EXE and WINAPPS\ NOTEPAD\NOTEPAD.EXE).

A linked folder is simply an association to an existing Application Folder object. The Application Folder object must already exist in NDS. If the Application Folder object includes multiple folders (a folder structure) you can add the application to any folder in the structure.

HINT: If you plan to create a complex folder structure for the applications you distribute, we recommend that you use an Application Folder object and then link Application objects to the Application Folder object. An Application Folder object requires you to define the folder structure one time only, whereas custom folders must be defined for each Application object. If you choose to use custom folders for your folder structure, make sure you use the same folder names when defining the custom folder structure for each Application object. Any variation will cause Application Launcher/Explorer to create different custom folder structures.

Folders

The Folders list displays the custom folders and linked folders (Application Folder objects) that the application has been added to. Application Launcher/Explorer will create (if necessary) the listed folders when distributing the application to the workstation.

Add

Click Add to add a custom folder or a linked folder to the Folders list. If you want the application to appear in multiple folders, add each folder to the list.

When you add a custom folder, it appears in the list with New Folder as its title. You can select the folder in the list and use the Modify Selected Folder box to change the folder's name or to add subfolders to it (see Modify Selected Folders below).

Delete

Select a folder in the folder list > click Delete to remove the folder from the list.

Modify Selected Folder

The Modify Selected Folder box lets you modify name and structure information for the folder that is selected in the Folders list. You can modify information for custom folders and linked folders. However, after you modify a linked folder's information, it is converted to a custom folder.

Add Folder

Select the folder in the folder tree > click Add to add a subfolder to the folder. After you add a subfolder and Application Launcher/Explorer refreshes, users will see the application in the subfolder rather than in the folder.

Delete Folder

Select the folder in the folder tree > click Delete to delete the folder.

Modify Folder

Select the folder in the folder tree > click Modify to change the name of the folder.

If you want to add the application to a new subfolder of an existing folder, enter *existing_folder_name\new_subfolder_name*.

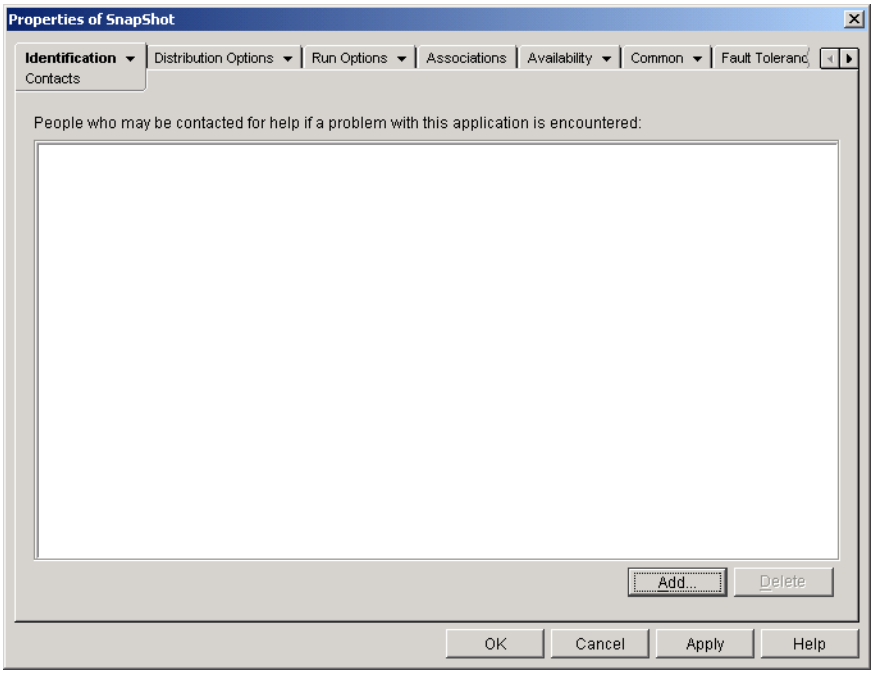
Use the Selected Folder in the Following Locations

Application Launcher/Explorer can display folders on the Windows Start menu and in the Application Launcher/Explorer window (provided these locations are enabled on the Application object's Associations page). Select a folder in the Folders list > check the boxes for the locations where you want to use the folder.

If you don't select either location, Application Launcher/Explorer will still display the Application object on the Start menu and in the Application Launcher/Explorer window (if these locations are enabled on the Associations page), but the object will not appear in the folders you've defined.

Contacts Page

The Contacts property page, shown below, lists the names, e-mail addresses, and phone numbers of the application's support staff. Users can access this information through the Application object's properties. To display the properties, right-click the Application object (on the workstation) > click Properties > click Help Contacts.

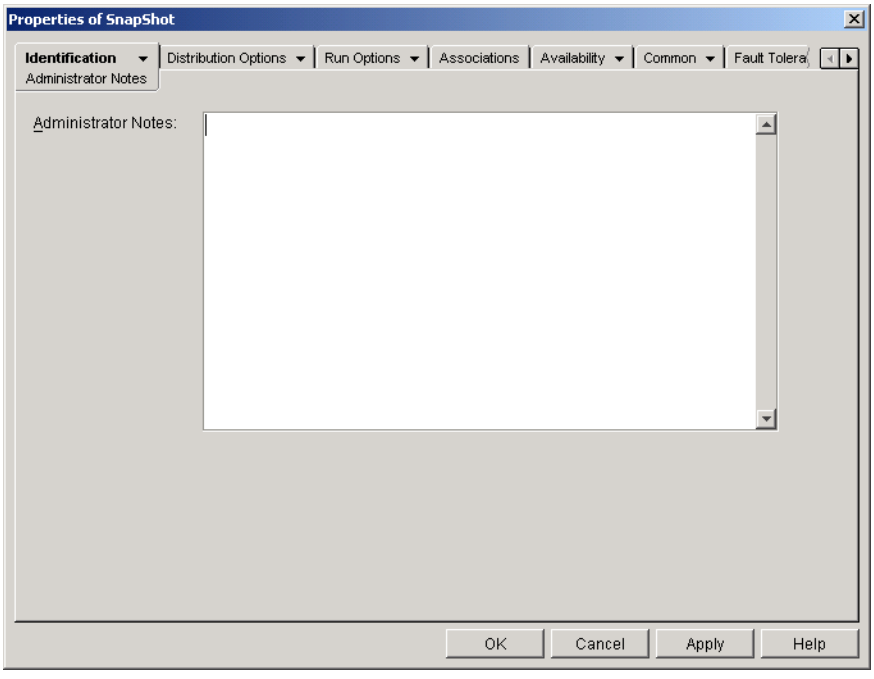


You can tailor the information to direct users to the support staff at their locations. If you enter the support contact's e-mail address, users will be able to send an e-mail message directly from the Help Contacts page of the Properties dialog box.

NOTE: Users must have the NDS rights required to read the E-Mail Address (MailboxID) and Telephone (Telephone Number) attributes of the users defined as contacts.

Administrator Notes Page

The Administrator Notes property page, shown below, lets you record notes for yourself or other administrators. For example, you could remind yourself about special settings for an application. Or, if you have several administrators, you could write a history of upgrades and file changes.



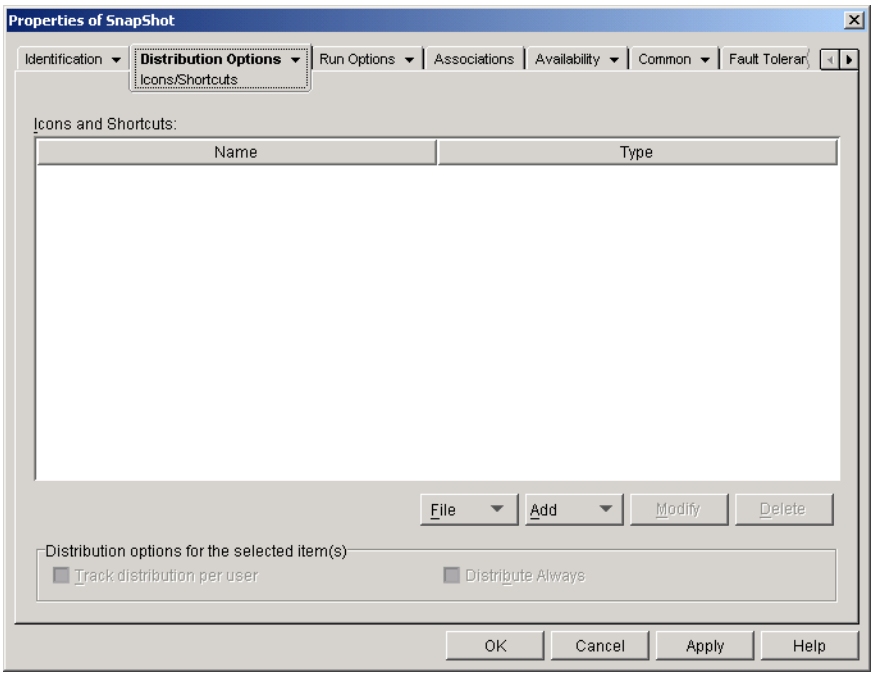
Distribution Options Tab

The Distribution Options tab includes the following pages to help you configure how the Application object is distributed to users:

- “Icons/Shortcuts Page (.AOT/.AXT Application Object Only)” on page 122
- “Registry Page” on page 124
- “Application Files Page (.AOT/.AXT Application Object Only)” on page 127
- “INI Settings Page” on page 130
- “Text Files Page (.AOT/.AXT Application Object Only)” on page 132
- “Distribution Scripts Page” on page 135
- “Pre-Install Schedule Page (.AOT/.AXT Application Object Only)” on page 136
- “Options Page” on page 138

Icons/Shortcuts Page (.AOT/.AXT Application Object Only)

The Icons/Shortcuts property page, shown below, determines the icons and shortcuts that Application Launcher/Explorer will create when distributing the application to the workstation. You can add the application's icon as an item in a program group or as a shortcut on the workstation's desktop or in a folder. You can also delete existing icons, shortcuts, and program groups.



The icons and shortcuts you add with this page are in addition to the Application object's icon. Although the Application object's icon may cause various actions to occur, including installing the application or running it, the icons and shortcuts defined on this page link directly to the application's executable file and simply launch the application.

You can use icons and shortcuts in combination with other options to create the user environment you want. For example, you could define the icons and shortcuts you want created and configure the Application object to run one time (Run Options > Applications). When a user selected the Application object, Application Launcher/Explorer would run the application one time, create the icons and shortcuts, perform any other tasks specified by the Application object's properties, and then remove the Application object's icon from the workstation. Thereafter, the user would need to select the icon or shortcut to launch the application.

IMPORTANT: Program groups and program group items are supported on Windows 95/98 workstations but not on Windows NT*/2000/XP workstations. Shortcuts are supported on all four Windows versions.

Icons and Shortcuts

This list displays the icons and shortcuts that will be created when the application is distributed to a workstation.

File

Click File > Find to search for icon and shortcut definitions that include certain information.

Click File > Import to import icons and shortcuts from another Application object.

Add

Click Add to add a new program group, program group item, or shortcut.

Modify

Select an icon or shortcut from the Icons and Shortcuts list > click Modify to change the information associated with it.

Delete

Select an icon or shortcut from the Icons and Shortcuts list > click Delete to delete it from the list.

Track Distribution Per User

If you have implemented roaming user profiles, use this option to ensure that particular icons and shortcuts are distributed to each workstation a user logs in to.

In the Icons and Shortcuts list, select the desired icon or shortcut > check Track Distribution Per User.

Distribute Always

By default, Application Launcher/Explorer will only create the icons and shortcuts defined in the Icons and Shortcuts list at the following times:

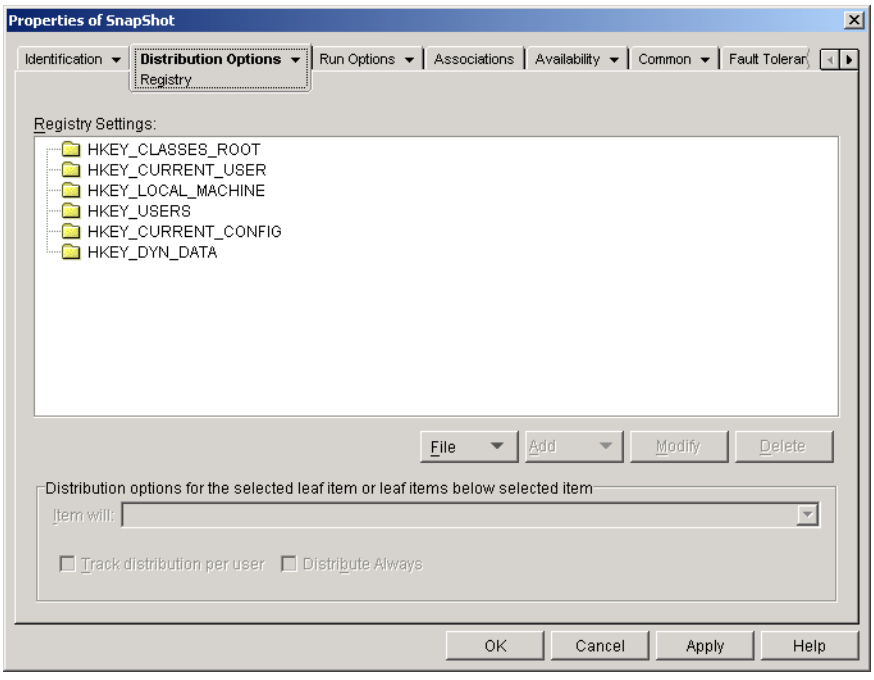
- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number (Distribution Options tab > Options page) has been changed.

To force Application Launcher/Explorer to create an icon or shortcut each time the application is launched, select the icon or shortcut in the Icons and Shortcuts list > check Distribute Always.

If the user has a NALCACHE directory on his or her local machine, Application Launcher/Explorer uses the information stored in the NALCACHE directory to create the icon or shortcut. If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), Application Launcher/Explorer uses the information stored in Novell eDirectory.

Registry Page

The Registry property page, shown below, determines the registry settings that Application Launcher/Explorer will create or delete when distributing the application to a workstation.



Registry Settings

The Registry Settings tree displays all settings that have been defined for the registry. When the application is distributed to a workstation, Application Launcher/Explorer will modify the workstation's registry according to the settings in this tree.

If you used a .AOT, .AXT, or .MSI file when creating the Application object, the tree automatically includes all registry settings that are defined in those templates.

File

Click File > Find to search for specific keys, value names, or value data in the registry.

Click File > Import to import registry settings from another Application object's .AOT or .AXT file, or from a registry file (.REG).

Click File > Export to export the registry settings to a registry file (.REG). To export the settings to a .AOT or .AXT file format, you must export the entire Application object using the Export Application Object option located on the Tools > Application Launcher Tools menu.

Add

This option lets you add registry settings to the Registry Settings tree. Only settings displayed in the Registry Settings tree will be created or deleted when the application is distributed.

To add a registry key or value, select the registry folder where you want to add the key, or select the key where you want to add a value > click the Add button > choose one of the following options:

- **Key:** Adds a key to the selected registry folder.
- **Binary:** Adds a binary value to the selected key.
- **Expand String:** Adds an expand string value to the selected key.
- **Default:** Adds a default string value to the selected key.

- **DWORD:** Adds a DWORD value to the selected key.
- **Multi-String Value:** Adds a multi-value string to the selected key.
- **String:** Adds a string value to the selected key.

After the key or value is added to the Registry Settings tree, you can use the Distribution Options list to determine whether or not the key or value is created in the workstation's registry or deleted from the registry.

You can use a macro for a key name, value name, or value data. For information about macros, see Chapter 15, “Macros,” on page 189.

Modify

Select the key or value you want to modify > click Modify.

Delete

Select the key or value you want to delete > click Delete. When you delete a key, everything subordinate to the key will also be deleted.

Distribution Options

Use these options to set individual distribution options for settings included in the Registry Settings tree.

Item Will

Use this option to specify whether the registry setting will be created or deleted during distribution.

In the Registry Settings tree, select the setting > select either Create or Delete from the Item Will list. If you delete a setting that has subordinate settings, the subordinate settings will also be deleted.

Track Distribution Per User

If you have implemented roaming user profiles, use this option to ensure that particular registry settings are distributed to each workstation a user logs in to. You should enable this option for all registry settings that are not saved as part of roaming user profiles.

In the Registry Settings list, select the desired registry modification > check Track Distribution Per User.

Distribute Always

By default, Application Launcher/Explorer will only distribute the registry modifications defined in the Registry Settings list at the following times:

- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number (Distribution Options tab > Options page) has been changed.

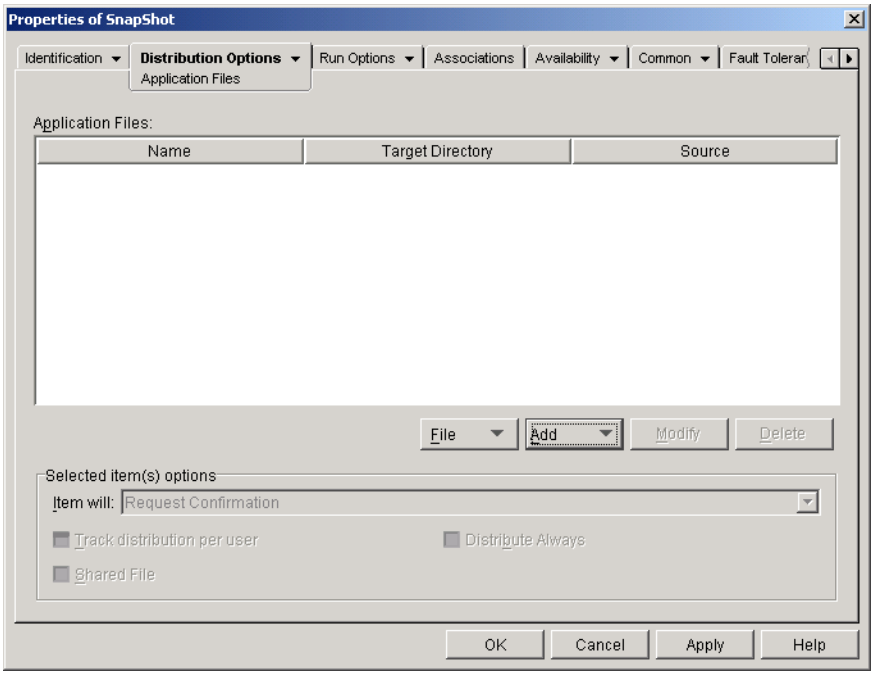
To force Application Launcher/Explorer to distribute a registry modification each time the application is launched, select the registry setting in the Registry Settings list > check Distribute Always.

If the user has a NALCACHE directory on his or her local machine, Application Launcher/Explorer uses the setting information stored in the NALCACHE directory to modify the registry.

If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), Application Launcher/Explorer uses the setting information stored in Novell eDirectory.

Application Files Page (.AOT/.AXT Application Object Only)

The Application Files property page, shown below, specifies the application files that Application Launcher/Explorer will install or remove when distributing the application to a workstation.



Application Files

The Application Files list displays all files and directories that will be installed or removed during distribution. The name, target directory (the location on the workstation where the file will be installed), and source (the file or directory that is being used to install the file) are listed for each application file or directory.

If you used a .AOT or .AXT file when creating the Application object, the list automatically includes all files and directories that are defined in those templates.

File

Click File > Find to search for specific items in the list. You can search for text in the Name, Target Directory, or Source fields. For example, you could search for all files and directories that are being installed under the Program Files directory.

Click File > Import to import application files and directories from another Application object's .AOT or .AXT file.

Add

This option lets you add files or directories to the Application Files list. Only files and directories displayed in the Application Files list will be installed to or removed from the workstation during distribution.

- **File:** To add a file to the list, click Add > File to display the Edit Files dialog box.

  In the Source File field, specify the file to be used as the source of the installation. You can use a mapped drive, UNC path, or macro, or you can browse and select the file (for example, \\SERVER1\VOL1\BOOKMARKS\BOOKMARK.HTM or %SOURCE_PATH%\BOOKMARK.HTM). The source file can be a single file that will be copied, multiple files (for example, %SOURCE_PATH%*.*), or a snAppShot™ application source (.FIL) file.

  If you are deleting a file from the workstation, leave this field blank.

  In the Target File field, specify the file on the workstation where the source file will be copied (for example, C:\PROGRAM FILES\NOVELL\BROWSER\BOOKMARK.HTM). You can also substitute a macro for the target path (for example, %TARGET_PATH%\BOOKMARK.HTM). If you are copying multiple files using a wildcard (*.*), specify the destination directory only (for example, C:\PROGRAM FILES\NOVELL\BROWSER\). If you are deleting the file from a workstation, enter the full path for the file from the perspective of the workstation > check the Target File to Be Deleted box.

- **Directory:** To add a directory to the list, click Add > Directory to display the Edit Directory dialog box.

  In the Name field, specify the directory to create or delete on the workstation (for example, C:\PROGRAM FILES\NOVELL). You can also substitute a macro for the directory path (for example, %DIRECTORY_TARGET_PATH%\NOVELL).

  Check the Directory to Be Deleted box if you want to delete the directory from the workstation. Otherwise, the directory will be created on the workstation.

Modify

Select the file or folder you want to modify > click Modify.

Delete

Select the file or folder you want to delete > click Delete to remove it from the Application Files list.

Selected Item(s) Options

Use these options to set individual distribution options for files and directories included in the Application Files list.

Item Will

Select a file in the Application Files list > select one of the following options from the Item Will list:

- **Copy Always:** Copies the file regardless of whether the file currently exists on the workstation.
- **Copy if Exists:** Copies the file only if the file currently exists on the workstation.

- **Copy if Does Not Exist:** Copies the file only if the file does not currently exist on the workstation.
- **Copy if Newer:** Copies the file only if its date and time are newer than the existing file's date and time, or if the file does not currently exist on the workstation.
- **Copy if Newer and Exists:** Copies the file only if it already exists on the workstation and has an older date or time.
- **Copy if Newer Version:** Copies the file only if its internal version is newer than the existing file's version (if version information is present). This is useful if you want to update the version of a .EXE or .DLL based on the compiled version information.
- **Request Confirmation:** Prompts the user to verify that the file should be copied.
- **Copy if Different:** Copies the file if its date, time, or size is different than the existing file's date, time, or size.
- **Delete:** Deletes the file from the workstation.

Select a folder in the Application Files list > select one of the following options from the Item Will list:

- **Create:** Creates the directory on the workstation.
- **Delete:** Deletes the directory from the workstation.

Track Distribution Per User

If you have implemented roaming user profiles, use this option to ensure that application files are distributed to each workstation a user logs in to. You should enable this option for all application files that are not saved as part of roaming user profiles.

In the Application Files list, select the file or folder you want to track > check Track Distribution Per User.

Distribute Always

By default, Application Launcher/Explorer will only distribute the file and folder modifications defined in the Application Files list at the following times:

- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number (Distribution Options tab > Options page) has been changed.

To force Application Launcher/Explorer to distribute a file or folder modification each time the application is launched, select the file or folder in the Application Files list > check Distribute Always.

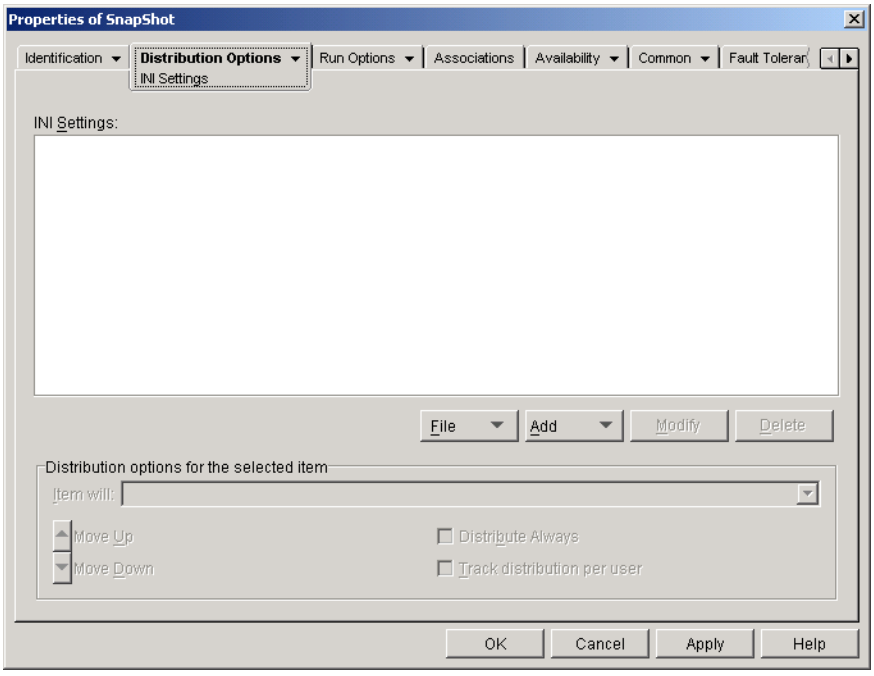
If the user has a NALCACHE directory on his or her local machine, Application Launcher/Explorer uses the information stored in the NALCACHE directory to install or remove the file or folder. If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), Application Launcher/Explorer uses the information stored in Novell eDirectory™.

Shared File

Use this option to mark a file as a shared file (that is, one that will be used by more than one application). Shared files are usually Windows .DLL files. SnAppShot detects shared files when it discovers application installation changes on a workstation.

INI Settings Page

The INI Settings property page, shown below, determines the .INI settings that Application Launcher/Explorer will create or delete when distributing the application to a workstation.



INI Settings

The INI Settings tree displays the .INI files that have been defined for the application, as well as all sections and values that have been added to each .INI file. When the application is distributed to a workstation, the .INI files are created if necessary, or existing .INI files are modified as needed.

If you used a .AOT, .AXT, or .MSI file when creating the Application object, the tree automatically includes all .INI settings that are defined in those templates.

File

Click File > Find to search for specific files, sections, or values.

Click File > Import to import .INI settings from another Application object's .AOT or .AXT file, or from a .INI file.

Click File > Export to export the settings to a .INI file. To export the settings to a .AOT or .AXT file, you must export the entire Application object using the Export Application Object option located on the Tools > Application Launcher Tools menu.

Add

This option lets you add INI settings to the INI Settings tree. Only settings displayed in the INI Settings tree will be created or deleted when the application is distributed. You can add a file to the tree, a section to a file, or a value to a section.

To do so, select the appropriate item in the tree > click the Add button > choose one of the following options:

- **File:** Adds a file to the INI Settings tree. After you name the file, you can begin adding sections to it.
- **Section:** Adds a section to the selected file. After you name the section, you can begin adding values to it.
- **Value:** Adds a value to the selected section. You must specify the value name and value data.

After you've added a value to the INI Settings tree, you can use the Distribution Options list to determine whether or not it is created or deleted from the workstation. If the value needs to be created but the file or section does not exist, Application Launcher/Explorer will create the file or section before adding the value.

You can use a macro for a section name, value name, or value data.

Modify

Select the file, section, or value you want to modify > click Modify.

Delete

Select the file, section, or value you want to delete from the INI Settings tree > click Delete. When deleting a file or section, everything subordinate to it will also be deleted.

Distribution Options

Use these options to set individual distribution options for value settings included in the INI Settings tree.

Item Will

Select a value in the INI Settings tree > select one of the following options from the Item Will list:

- **Create Always:** Creates the value regardless of whether the value currently exists in the section.
- **Create if Does Not Exist:** Creates the value only if the value does not currently exist in the section.
- **Create if Exists:** Creates the value only if the value currently exists in the section.
- **Create or Add to Existing Section:** Creates the value if the value does not currently exist in the section. If the value exists, it adds this value to the section in addition to the one that already exists. This is useful, for example, if you need multiple values of the same type, such as two "DEVICE=" values.
- **Create or Append to Existing Value:** Creates the value if the value does not currently exist in the section. If the value exists, it appends the data for the new value to the existing value. The first character in the value data needs to be the separator character, such as a space.
- **Delete:** Deletes the value from the section.

- **Delete or Remove From Existing Value:** Deletes the value from the section, or, if the value has multiple data entries, removes this value's data entry from the value. For example, suppose the following setting is in the WIN.INI file: `Run = sol.exe calc.exe`. Using this option, you can remove just calc.exe, leaving the following: `Run = sol.exe`. The first character in the value data needs to be a separator character, such as a space.

Track Distribution Per User

If you have implemented roaming user profiles, use this option to ensure that particular INI settings are distributed to each workstation a user logs in to. You should enable this option for all INI settings that are not saved as part of roaming user profiles.

In the INI Settings list, select the desired INI modification > check Track Distribution Per User.

Distribute Always

By default, Application Launcher/Explorer will only distribute the .INI modifications defined in the INI Settings list at the following times:

- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number (Distribution Options tab > Options page) has been changed.

To force Application Launcher/Explorer to distribute an INI modification each time the application is launched, select the INI setting in the INI Settings list > check Distribute Always.

If the user has a NALCACHE directory on his or her local machine, Application Launcher/Explorer uses the information stored in the NALCACHE directory to make the INI modification. If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), Application Launcher/Explorer uses the information stored in Novell eDirectory™.

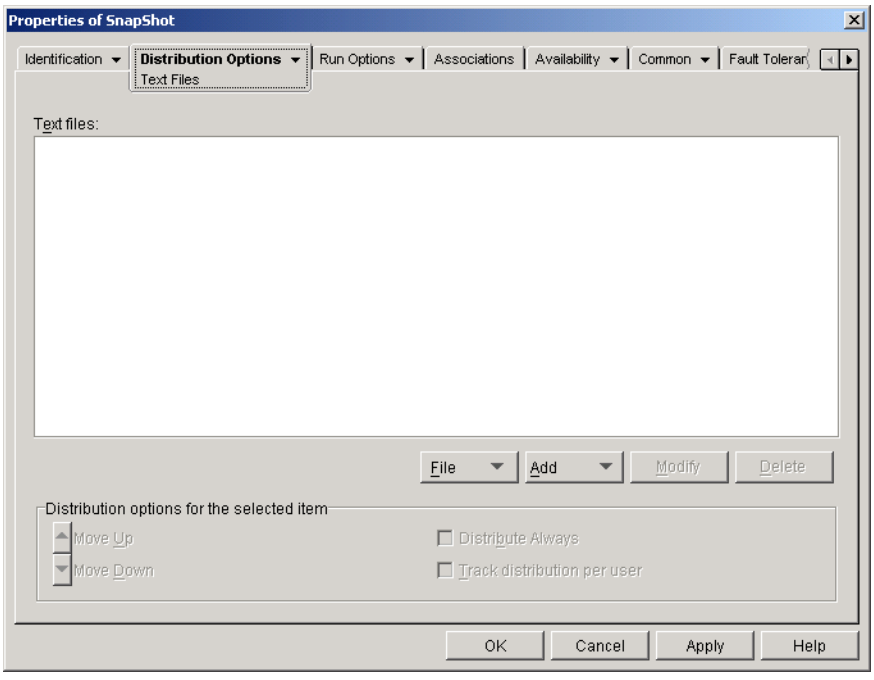
Move Up / Move Down

Use these options to position sections and values in the order in which you want them to be created, modified, or deleted.

In the INI Settings tree, select the section or value to move > click Move Up or Move Down.

Text Files Page (.AOT/.AXT Application Object Only)

The Text Files property page, shown below, determines the modifications that Application Launcher/Explorer will make to text files (such as CONFIG.SYS and AUTOEXEC.BAT) when distributing the application to a workstation.



Text Files

The Text Files tree shows all the text files that will be modified or added when the application is distributed. Each modification to a file is displayed subordinate to the file.

File

Click File > Find to search for specific files or information in the Text Files tree.

Click File > Import to import text files from another Application object's .AOT or .AXT file.

Add

This option lets you add text file modifications to the Text Files tree. Only the modifications displayed in the Text Files tree will be made when the application is distributed.

- **File:** To add a text file to the tree, click Add > File to create the file entry. You can type the filename or the path and filename (for example, AUTOEXEC.BAT or C:\AUTOEXEC.BAT). Only local workstation drives, UNC server paths, and macros are valid.

  In general, you should specify a path if possible. If you enter the filename only, Application Launcher/Explorer will search all directories specified in the workstation's PATH environment variable. If it does not find a matching filename, it will assume the file doesn't exist and create it in the first directory specified in the PATH variable.

- **Change:** To add a change to a file that is in the Text Files list, select the file, click Add > Change to display the Edit Text File dialog box. Make the desired changes. Click Help in the Edit Text File dialog box for information about each of the dialog box fields.

  You can add multiple modifications to a text file. For example, you may want to make one modification that replaces text in the file and another modification that adds text to the end of the file. Each modification you add is displayed beneath the text file in the Text Files list.

Modify

To change the name of a text file, select the file in the Text Files tree > click Modify > enter the new name.

To edit one of the text file's modifications, select the modification in the Text Files tree > click Modify to display the Edit Text File dialog box > make the desired changes. Click Help in the Edit Text File dialog box for information about each of the dialog box fields.

Delete

In the Text File tree, select the text file or text file modification you want to delete > click Delete.

Distribution Options

Use these options to set individual distribution options for text files and text file modifications. The options change depending on whether you have selected a text file or a text file modification in the Text Files tree.

No Reboot Needed If Modified

This option appears only when you have selected a text file. Check this option if you don't want users to reboot after you make changes to the selected text file. The Reboot and Prompt Reboot options on the Distribution Options > Options page override this setting.

Move Up / Move Down

These options appear only when you have selected a text file modification. Click Move Up or Move Down to position the modification according to the order in which you want it applied.

Distribute Always

By default, Application Launcher/Explorer will distribute the text file modifications defined in the Text Files list at the following times:

- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number (Distribution Options tab > Options page) has been changed.

To force Application Launcher/Explorer to distribute a text file modification each time the application is launched, select the modification in the Text Files list > check Distribute Always.

If the user has a NALCACHE directory on his or her local machine, Application Launcher/Explorer uses the information stored in the NALCACHE directory to make the modification. If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), Application Launcher/Explorer uses the information stored in Novell eDirectoryTM.

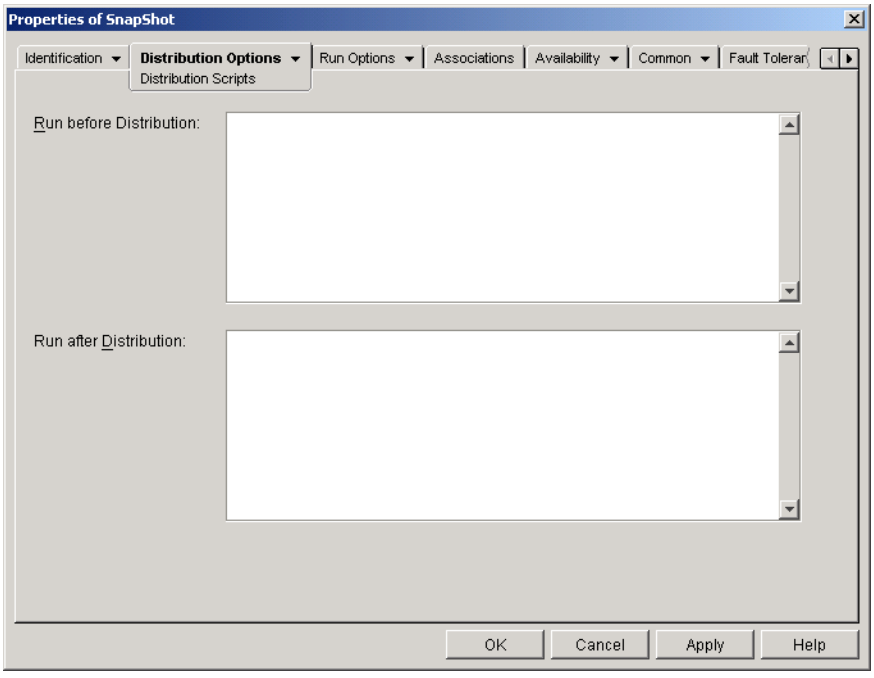
Track Distribution Per User

If you have implemented roaming user profiles, use this option to ensure that particular text file modifications are distributed to each workstation a user logs in to. You should enable this option for all modifications that are not saved as part of roaming user profiles.

In the Text Files list, select the desired modification > check Track Distribution Per User.

Distribution Scripts Page

The Distribution Scripts property page, shown below, defines the scripts Application Launcher/ Explorer will execute when distributing the application.



The scripts support the same commands and syntax as the Novell Client™, with the exception of the ones listed below. For script commands, syntax, and examples, see the Novell Client documentation (http://www.novell.com/documentation/lg/noclienu/docui/index.html) on the Novell Documentation Web site (http://www.novell.com/documentation).

Application Launcher/Explorer will not output anything to the screen, display errors, or support the following commands:

CLS
DISPLAY
EXIT
FDISPLAY
INCLUDE
LASTLOGINTIME
NO_DEFAULT
NOSWAP
PAUSE
PCOMPATIBLE
SCRIPT_SERVER
SET_TIME
SWAP
WRITE

IMPORTANT: On Windows NT/2000/XP, distribution scripts are run in the secure system space, which means that users do not see any of the script commands or command results. Therefore, you should not include any commands that require or initiate user interaction. If you do so, the script will be halted at that point. For

example, you would not want to include a command to run a program that requires user interaction because the program, which will be run in secure system space, will never be displayed to the user.

Run Before Distribution

Use this text window to enter any script commands you want executed before the application is distributed. The script is executed in the order shown below:

1. Run Before Launching script executed (Run Options > Launch Scripts page)
2. Run Before Distribution script executed
3. Application distributed (files copied, settings modified, etc.)
4. Run After Distribution script executed
5. Application launched
6. Application closed (by user)
7. Run After Termination executed (Run Options > Launch Scripts page)

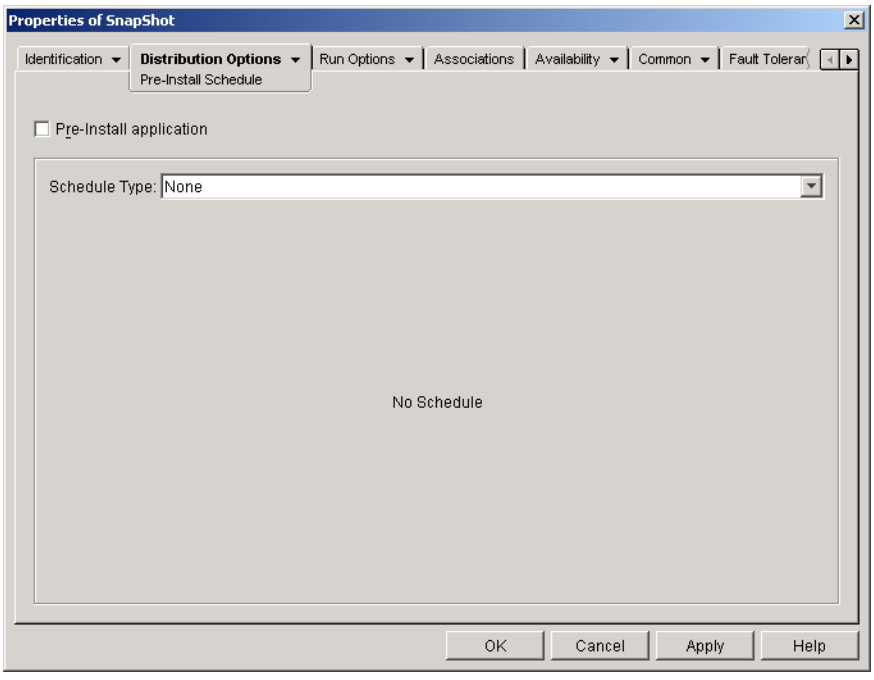
Run After Distribution

Use this text window to enter any script commands you want executed after the application is distributed. The script is executed in the order shown below:

1. Run Before Launching script executed (Run Options > Launch Scripts page)
2. Run Before Distribution script executed
3. Application distributed (files copied, settings modified, etc.)
4. Run After Distribution script executed
5. Application launched
6. Application closed (by user)
7. Run After Termination executed (Run Options > Launch Scripts page)

Pre-Install Schedule Page (.AOT/.AXT Application Object Only)

The Pre-Install Schedule property page, shown below, enables Application Launcher/Explorer to install the application to a workstation before the user launches the Application object the first time. Because you can specify when the installation will take place, this enables an off-line, or "lights-out," distribution of the application and saves the user the wait associated with installing the application. For example, you could pre-install the application after work hours so the application is ready to use when the user comes to work.



With a pre-install, Application Launcher/Explorer performs all workstation-related distribution processes (file copying, modifying text files, .INI files, and workstation registry settings). Then, when the user double-clicks the Application object, Application Launcher/Explorer finishes the installation by performing any user-specific distribution processes (modifying user registry keys, etc.).

You can pre-install an application that is associated with either workstations or users. For user-associated applications, the user must be logged in and Application Launcher/Explorer must be running. For workstation-associated applications, a user does not need to be logged in.

IMPORTANT: On Windows NT/2000/XP workstations, if a user is not logged in, the user-specific macros will point to the default user directories. This scenario affects the ability to place folders and icons on the Start menu. There are two ways to solve this issue: 1) Mark the macro entries in the Application object as Track Distribution Per User or 2) Change the user-specific macro to an All Users macro (i.e. %*PROGRAMS% to %*COMMONPROGRAMS%).

Pre-Install Application

Check this option to enable the application to be pre-installed. If you don't check this option, the application will not be pre-installed, even if you establish a schedule.

Schedule Type

Select the type of schedule you want to use. You can choose None, Specified Days, or Range of Days.

None

Use this option to indicate no schedule. The application will be pre-installed as soon as the system requirements have been established (Availability > System Requirements page) and the application has been associated with the object (Associations page).

Specified Days

Use this option to select specific dates when you want to pre-install the application. You cannot select more than 350 specific dates.

- **Date Range:** The Date Range list displays all dates when the application will be pre-installed. To add a date, click Add > select the date you want > click OK to display it in the list.
- **Times for Selected Dates:** Select the availability start time and end time. The times apply to all dates in the Date Range list.
- **Spread from Start Time (in Minutes):** Enter a number of minutes between available times if you don't want multiple workstations installing the application at once for fear of overloading the network. The spread option spreads out access times over the number of minutes specified so that all pre-installations don't occur at the same time.

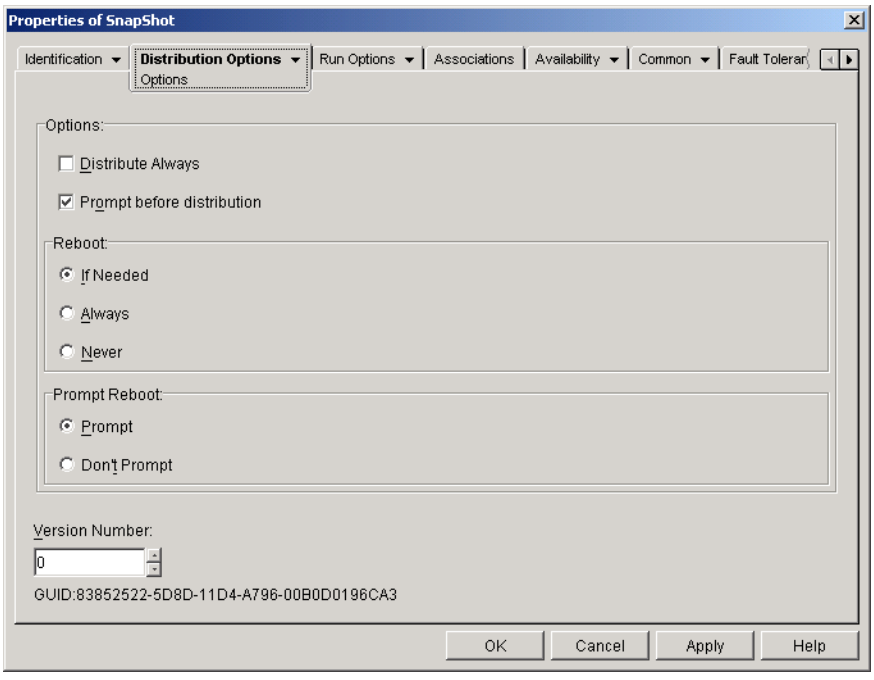
Range of Days

Use this option to select a range of days to pre-install the application. You can also use this option to pre-install the application only on certain days of the week within a given range of dates.

- **Date Range:** To define the range of days, select a start date and an end date > select the days (Sunday through Saturday) within the established date range. By default, all days are selected; a day is selected when the button is depressed.
- **Times for Selected Range:** Select the availability start time and end time. This option works differently depending on whether you selected one day or multiple days. If you selected one day, the application will be available between the start and end times on that day. For example, if you make the application available on Monday between 8:00 and 5:00, it will run between 8:00 and 5:00. However, if you make the application available Monday through Saturday between 8:00 and 5:00, the times are ignored. The application will be available Monday through Saturday, 24 hours a day.
- **Spread from Start Time (in Minutes):** Enter a number of minutes between available times if you don't want multiple workstations installing the application at once for fear of overloading the network. The spread option spreads out access times over the number of minutes specified so that all pre-installations don't occur at the same time.
- **Use the Schedule in GMT for All Clients:** The schedule is based on the workstation's time zone. If your network spans different time zones and you schedule an application to run at 1:00 p.m., it runs at 1:00 p.m. in each time zone. You can select this option to have workstations run applications at the same time regardless of their time zones (for example, 1:00 p.m. Rome time and 11:00 p.m. Los Angeles time).

Options Page

The Options property page, shown below, determines general options to be used by Application Launcher/Explorer when distributing the application to a workstation.



Options

These options let you determine if the application should always be distributed and if the user should be prompted to accept or reject the distribution.

Distribute Always

By default, Application Launcher/Explorer will make the distribution changes associated with the Application object at the following times:

- The first time the application is launched on a workstation.
- The first time the application is launched after the application's version number has been changed.

To force Application Launcher/Explorer to redistribute the application each time it is launched, check Distribute Always.

This option is useful to ensure that all application settings and files are updated every time the application runs. If the user has a NALCACHE directory on his or her local machine, the files and settings are distributed from the NALCACHE directory. If the user does not have a NALCACHE directory (for example, the user is running Application Launcher/Explorer through a terminal server client session) or if writing to the cache has been disabled for the user (User object > Application Launcher tab > Launcher Config tab > Enable Writing to Cache option), the application files and settings are updated from Novell eDirectory. To force a distribution from eDirectory even if the user has a NALCACHE directory on his or her local machine, you need to change the application's version number or have individual users right-click the Application object and click Verify.

If you need only specific files or settings to be distributed each time, you can update these on a case-by-case basis. For example, if you want to always distribute a particular registry key and value, you can set the Distribute Always option on the Registry Settings page (Distribution Options tab) for that particular key and value.

Because this setting causes all application files and settings to be distributed each time, it overrides the Distribute Always option on the Registry Settings, INI Settings, Application Files, Icons/Shortcuts, and Text Files pages (Distribution Options tab).

Prompt Before Distribution

Check this option to prompt users whether or not they want the application distributed to their workstation. Users are prompted the first time they click the application icon; all subsequent times they are not prompted. To better help users make a decision about installing the application, the prompt includes the text you've entered in the Description page (Identification tab).

Reboot

Select how a workstation reboot should occur. The available options are:

- **If Needed:** Application Launcher/Explorer reboots the workstation if changes need to be made that cannot occur while Windows is running (such as replacing open DLLs).
- **Always:** Application Launcher/Explorer always reboots the workstation after distributing the application.
- **Never:** Application Launcher/Explorer does not reboot the workstation. The changes take effect the next time the workstation reboots.

Prompt Reboot

Select whether or not the user is prompted to reboot the workstation.

Version Number

The version number is a unique number between 0 and 65535 that you can increment as you make revisions to the Application object. If you increment the version number, the application is distributed again the next time the user launches the Application object.

GUID

The GUID (global unique identifier) is a randomly generated string that provides a unique identifier for the application. When Application Launcher/Explorer distributes an application to a workstation, it adds the GUID to the workstation's Windows registry for tracking purposes.

You can use the GUID and version number to track and troubleshoot distributed applications. For example, if you want to ensure that a particular application or version has been distributed to a workstation, you can compare the GUID and version number as recorded in the Application object's Distribution page with the GUIDs that are currently included in the workstation's registry. Using the Synchronize Distributed GUIDs option (Tools > Application Launcher Tools menu), you can make several Application objects share the same GUID. This is useful if you are distributing a suite of applications. Using the Generate New GUIDs option (Tools > Application Launcher Tools menu), you can also ensure that two or more applications have different GUIDs.

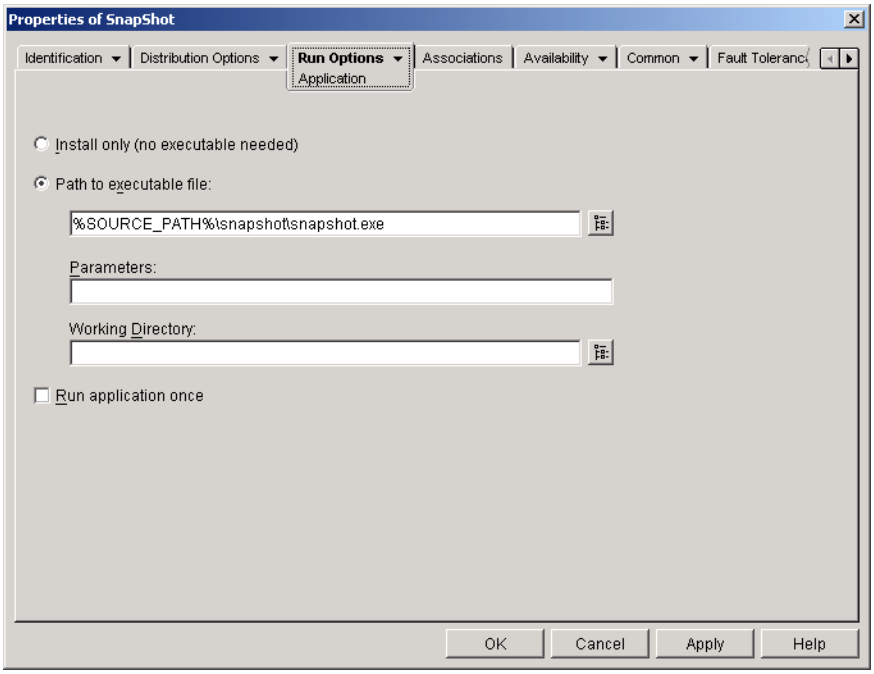
Run Options Tab

The Run Options tab includes the following pages to help you configure how the Application object runs on the workstation:

- “Application Page” on page 141

Application Page

The Application property page, shown below, determines general options to be used by Application Launcher/Explorer when running the application on a workstation.



Install Only (No Executable Needed)

Check this option if the Application object does not include an application executable that Application Launcher/Explorer should run after distributing the Application object. For example, you would want to use this option if the Application object's only purpose is to update some files on the workstation, such as a driver or font, or to make modifications to some workstation settings, such as the registry settings.

Path to Executable File

Enter, or browse for, the path to the executable that Application Launcher/Explorer will run after the application is distributed. Typically, this path is defined when you create the Application object and should already contain the path to where the executable is located on the network or where it will be located on the user's workstation after distribution.

The following path syntaxes are valid:

server\ *volume*: *path*
\\ *server*\ *volume*\ *path*
volume_object_name: *path*

directory_map_object_name: *path*
driveletter:\ *path*

You can also use macros in this field. For information about macros, see Chapter 15, “Macros,” on page 189.

Parameters

Specify any command line parameters that need to be passed to the executable specified in the Path to Executable File field. See your Windows documentation for more information. The field limit is 250 characters.

You can also use macros in this field. For information about macros, see Chapter 15, “Macros,” on page 189.

Working Directory

Specify the working directory of the executable you specified in the Path to Executable File field. Typically, this is the directory in which the executable file is located. However, if another directory contains additional files required by the application to run, specify that directory. See your Windows documentation for more information.

The following path syntaxes are valid:

server\ *volume*: *path*
\\ *server*\ *volume*\ *path*
volume_object_name: *path*
directory_map_object_name: *path*
driveletter:\ *path*

You can also use macros in this field. For information about macros, see Chapter 15, “Macros,” on page 189.

Run Application Once

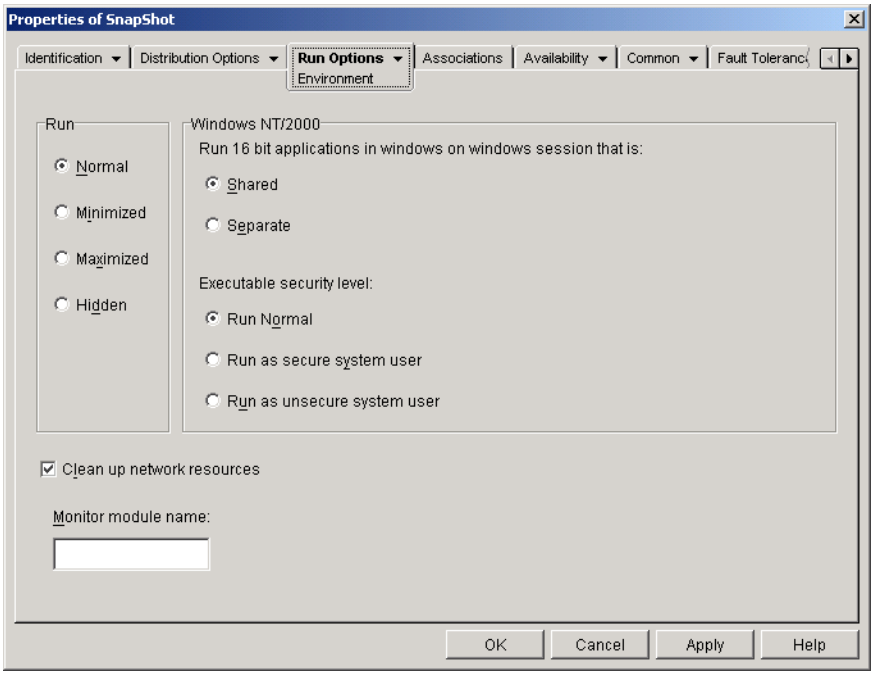
Check this option to have Application Launcher/Explorer run the application one time only and then remove the Application object's icon from the workstation. If the Application object's version number (Distribution Options > Options page) changes, the Application object icon will appear again so that the new version can be distributed.

This option can be useful when an Application object's only purpose is to install software to a workstation. Having the Application object's icon remain after the application has been installed can be confusing to users, especially if you have an application shortcut or program group icon created during the distribution (see the Distribution Options > Icons/Shortcuts page).

This option can also be used in combination with other Application object settings. For example, if the application is specified as Force Run on the Associations page (meaning that without any user involvement, the application will run when it becomes available to Application Launcher/Explorer), the application is forced to run only one time.

Environment Page

The Environment property page, shown below, specifies the workstation environment that Application Launcher/Explorer will create before running the application on the workstation.



Run

Select the application's initial window size: Normal, Minimized, Maximized, or Hidden. In Hidden mode, the application will run normally without a user interface available. This is useful if you want the application to process something then go away without user intervention. For example, you could use it for the Remote Control agent if you don't want it to appear in the taskbar.

Windows NT/2000/XP

Use these options to specify how applications run on Windows NT/2000/XP workstations.

Run 16-Bit Applications in Windows on Windows Session

If you are setting up a 16-bit application to run on Windows NT/2000/XP, specify either a shared or separate Windows on Windows (WOW) session. To run on Windows NT/2000/XP, 16-bit applications must run in a Virtual DOS Machine (VDM) that emulates Windows 3.1 functionality. 16-bit Windows applications can run in their own separate WOW sessions or they can share a WOW session with other 16-bit applications. Sharing a WOW session saves memory and allows applications to use DDE or OLE to communicate with other applications in the same WOW session. Running an application in its own separate WOW session allows for more robust operation because the application is isolated from other 16-bit applications. Because some applications do not run properly in a separate WOW session, the default option is to run the 16-bit Windows application in a shared WOW session.

Executable Security Level

Select one of the following security levels for the application:

- **Run Normal:** The application inherits the logged-in user's credentials. For example, the application has the same rights to the registry and the file system as the logged-in user.
- **Run As Secure System User:** Running under the System user, the application inherits the workstation's credentials and is run as a Windows NT/2000/XP process. For example, the application has full rights to the registry and the file system. Because the security level is set to Secure, the application's interface is not displayed to the user and the application is only visible in the Task Manager. This option is useful when distributing applications that require full access to the workstation but require no user intervention, such as a service pack or update.
- **Run as Unsecure System User:** This option is the same as Run As Secure System User, with the exception that the application's interface is displayed to the user. This means that the application can display dialog boxes and prompt the user for information if necessary. In return, the user will have the ability to do whatever that application offers on the workstation. For example, if you specify REGEDIT as an unsecure system user, the workstation's user will able to edit any registry values.

On a Windows 2000 Advanced Server functioning as a Windows terminal server, applications that run as Secure System User or Unsecure System User are displayed on the server's console and not in the user's terminal session. This occurs because the Application Launcher/Explorer Service for Windows NT/2000/XP, which launches and runs the application, is running as a console user, not as a terminal server user.

Clean Up Network Resources

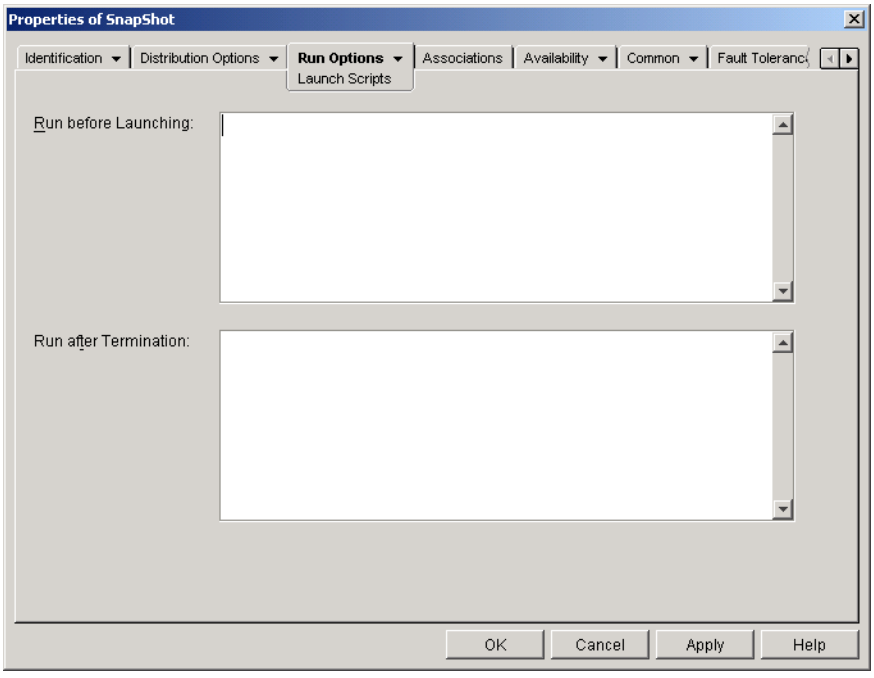
Check this option to remove network connections, drive mappings, and port captures that were established for running the application. If this option is not selected, the network resources remain in effect. If the resource is already in use when Application Launcher/Explorer starts the application, it is not cleaned up until all other distributed applications are finished using it. If distributed applications are still running when Application Launcher/Explorer is terminated, the allocated resources remain intact.

Monitor Module Name

When an application is launched, Application Launcher/Explorer monitors the executable of the application. When the executable terminates, the process of cleaning up network resources begins. However, it's possible that the executable filename is actually a "wrapper" that sets up environments, runs other executables, and then terminates. If Application Launcher/Explorer monitors the wrapper executable, it might prematurely start cleaning up network resources before the application has terminated. Consult your application documentation about whether the application uses a wrapper executable. If it does, find out the name of the module that remains running. Type this name (without the extension) in the text box provided.

Launch Scripts Page

The Launch Scripts property page, shown below, defines the scripts Application Launcher/ Explorer will execute when running the application.



The scripts support the same commands and syntax as the Novell Client, with the exception of the ones listed below. For script commands, syntax, and examples, see the Novell Client documentation (http://www.novell.com/documentation/lg/noclienu/docui/index.html) on the Novell Documentation Web site (http://www.novell.com/documentation).

Application Launcher/Explorer will not output anything to the screen, display errors, or support the following commands:

CLS
DISPLAY
EXIT
FDISPLAY
INCLUDE
LASTLOGINTIME
NO_DEFAULT
NOSWAP
PAUSE
PCOMPATIBLE
SCRIPT_SERVER
SET_TIME
SWAP
WRITE

Run Before Launching

Use this text window to enter any script commands you want Application Launcher/Explorer to execute before launching the application. The script is executed in the order shown below:

1. Run Before Launching script executed
2. Run Before Distribution script executed (Distribution Options > Distribution Scripts page)
3. Application distributed (files copied, settings modified, etc.)
4. Run After Distribution script executed (Distribution Options > Distribution Scripts page)
5. Application launched
6. Application closed (by user)
7. Run After Termination executed

Run After Termination

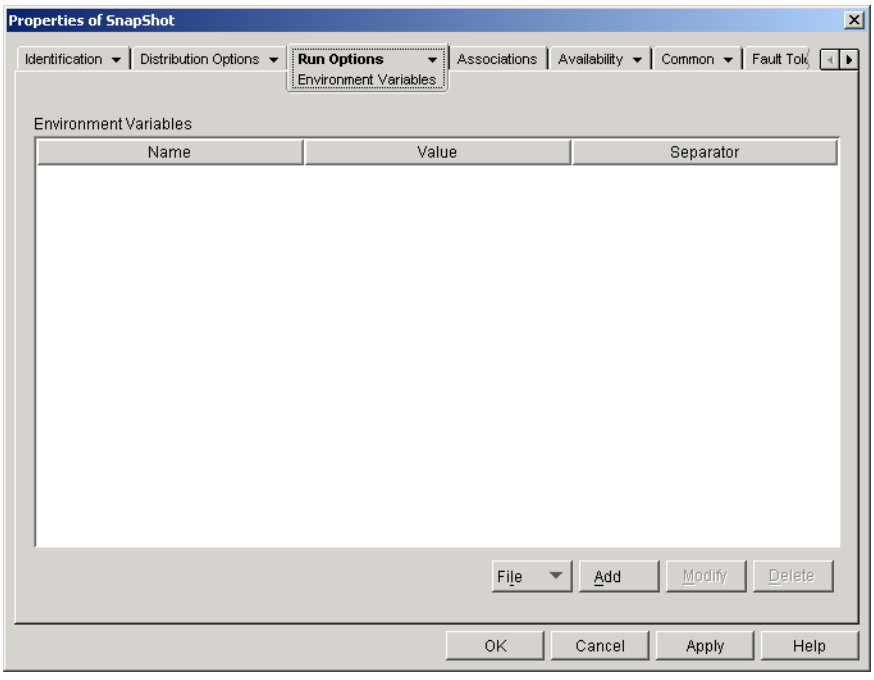
Use this text window to enter any script commands you want Application Launcher/Explorer to execute after the user closes the application. The script is executed in the order shown below:

1. Run Before Launching script executed
2. Run Before Distribution script executed (Distribution Options > Distribution Scripts page)
3. Application distributed (files copied, settings modified, etc.)
4. Run After Distribution script executed (Distribution Options > Distribution Scripts page)
5. Application launched
6. Application closed (by user)
7. Run After Termination script executed

IMPORTANT: The Run After Termination script is executed before the network resources are cleaned up (Run Options > Environment page). However, the Clean Up Network Resources option will not clean up drive mappings or port captures created by the Run Before Launching script. To clean up these resources, enter the appropriate commands in the Run After Termination script.

Environment Variables Page

The Environment Variables property page, shown below, specifies the environment variables that Application Launcher/Explorer will set before running the application. For example, you can specify the application's working directory in the PATH environment variable.



Environment Variables

The Environment Variables list displays all variables that will be modified before the application is run. Application Launcher/Explorer modifies only the variables in this list.

File

Click File > Find to search for variables or variable data in the Environment Variables list.

Click File > Import to import variables from another Application object's .AOT or .AXT file.

Add

To add a variable to the Environment Variables list, click Add to display the Edit Environment Variables dialog box > enter the variable name and data > check Append to Existing Data Using Separator Character (only if you want to append the data to the workstation's existing variable) and enter a separator character > click OK.

Modify

In the Environment Variables list, select the variable you want to modify > click Modify.

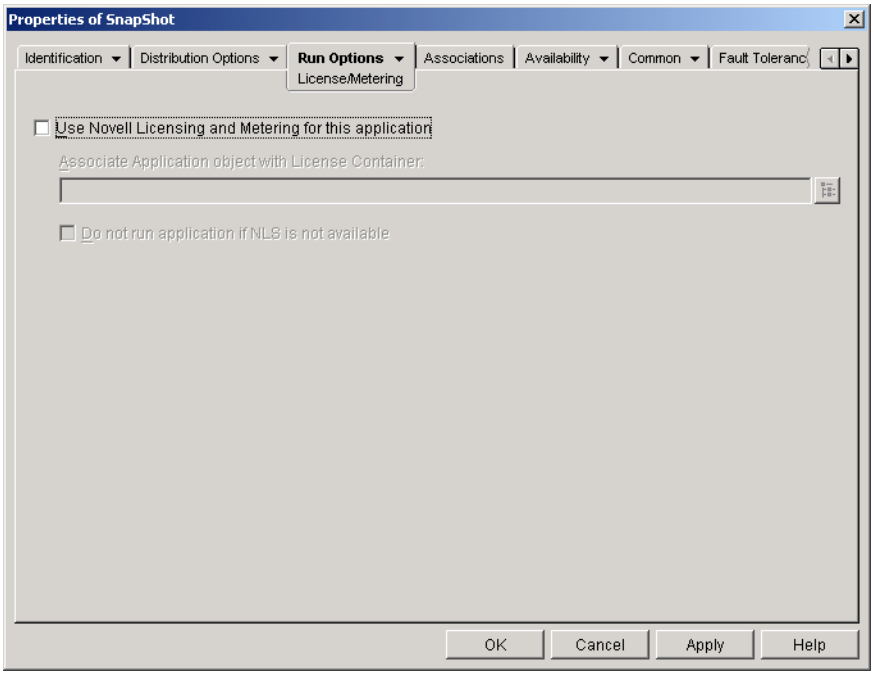
Delete

In the Environment Variables list, select the variable you want to delete > click Delete to remove it from the list.

License/Metering Page

The License/Metering property page, shown below, configures Application Launcher/Explorer to use Novell Licensing Services (NLS) to track application usage and comply with the application's licensing agreement. NLS must already be installed, and you must have created a License

Container and a Metered Certificate for the application. For detailed information about setting up license metering, see Chapter 12, “Metering Software Licenses,” on page 109.



Use Novell Licensing and Metering for this Application

Check this option to enable metering of the application.

Associate Application Object with License Container

Once metering is enabled, select the License Container in which you've created the application's Metered Certificate.

Do Not Run Application If NLS Is Not Available

Check this option to prevent users from running the application if NLS is not running.

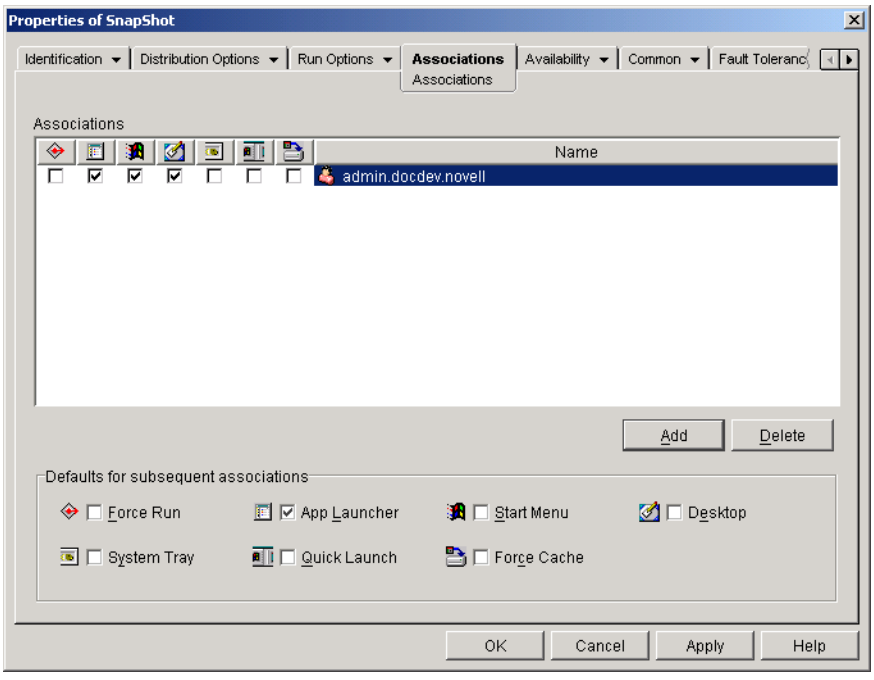
Associations Tab

The Associations tab includes one page only. This page lets you associate the Application object with users and workstations.

- “Associations Page” on page 148

Associations Page

The Associations property page, shown below, lists the objects that have been associated with the Application object. Objects that are associated with the Application object can see and use the application. You can grant rights to User, Workstation, Group, Workstation Group, Organizational Unit, Organization, and Country objects.



Associations

The Associations list displays the objects associated with the Application object and lets you add or delete objects.

Add

To associate an object with the Application object, click Add > browse and select the object > click OK. All objects receive the default characteristics (Force Run, App Launcher, Start Menu, Desktop, System Tray, Quick Launch, Force Cache) selected in the Defaults for Subsequent Associations list. After you add an object to the Associations list, you can modify its characteristics by checking or unchecking the appropriate boxes.

Delete

To disassociate an object from the Application object, select the object in the Associations list > click Delete.

Defaults for Subsequent Associations

When you add an object to the Associations list, the object receives the default characteristics selected in this box. If you change the characteristics that are selected, any objects you add after that will have the new characteristics.

Force Run

Automatically runs the application. With a user-associated application, the application is run immediately after Application Launcher/Explorer starts. With a workstation-associated application, the application is run immediately after the workstation starts up (initial startup or reboot).

You can use the Force Run option in conjunction with several other settings to achieve unique behaviors. For example, if you use the Force Run option with the Run Application Once option (Run Options tab > Applications page), as soon as the Application object is distributed it will be

run one time and then removed from the workstation. Or, suppose that you want to run the Application object immediately one time at a pre-determined time. If so, select Force Run, select the Run Application Once option on the Application page (Run Options tab), and define a schedule using the Schedule page (Availability tab).

If you want to force run several applications in a specific order, mark each of them as Force Run. Then give each Application object a numeric order by using the Order Icon Display option on the Icon page (Identification tab).

IMPORTANT: When associating an Application object with a workstation, Force Run will not work if the Application object uses a Microsoft Windows Installer (.MSI) package. This is true only when the Application object is associated with a workstation. Force Run works with .MSI Application objects associated with users.

App Launcher

Adds the Application object's icon to the Application Launcher/Explorer window.

Start Menu

If the workstation is running Application Explorer, this option adds the Application object to the Windows Start menu. The Application object will be added to the top of the Start menu, unless you assign the Application object to a folder and use the folder structure on the Start menu. See the Application object's Folders page (Identification tab).

Desktop

If the workstation is running Application Explorer, this option displays the Application object's icon on the Windows desktop.

System Tray

If the workstation is running Application Explorer, this option displays the Application object's icon in the Windows system tray.

Quick Launch

Displays the Application object's icon on the Windows Quick Launch toolbar.

Force Cache

Forces the application source files and other files required for installation to be copied to the workstation's cache directory. The user can then install or repair the application while disconnected from NDS. The files are compressed to save space on the workstation's local drive. For more information about caching applications, see Chapter 8, “Running in Disconnected Mode,” on page 73.

IMPORTANT: This option is required only if you want to ensure that the user can install or repair the application while disconnected from NDS. Without this option selected, the user will still be able to launch the application in disconnected mode, provided the application has already been distributed (installed) to the workstation.

Availability Tab

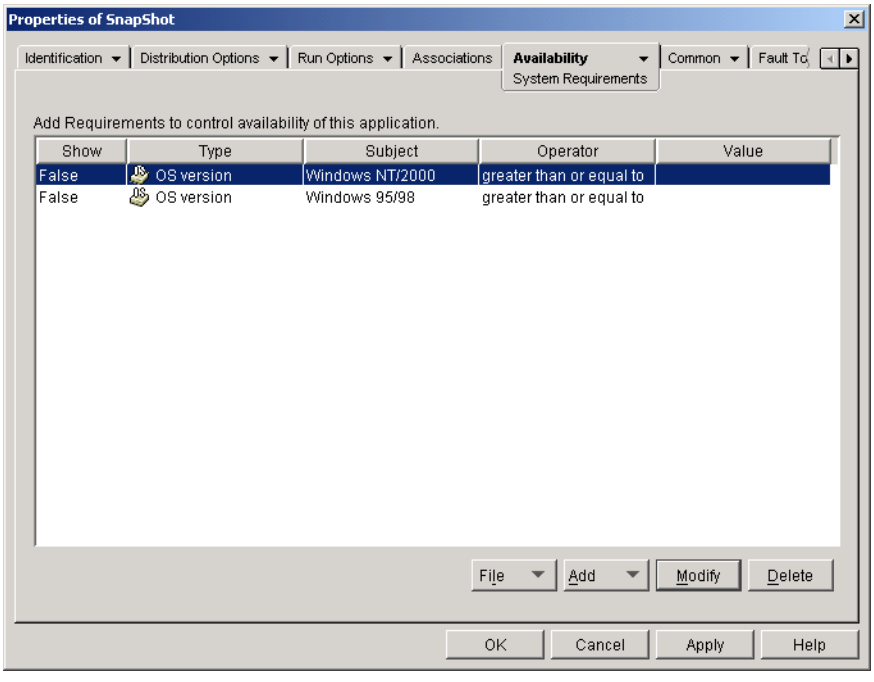
The Availability tab includes the following pages to help you determine the system requirements a workstation must meet before the application will be distributed to the workstation, the days and times the application will be available to users, and the messages and warnings Application

Launcher/Explorer will display to users when terminating an application that has become unavailable to users:

- "System Requirements Page" on page 151
- "Schedule Page" on page 162
- "Termination Page" on page 164

System Requirements Page

The System Requirements property page, shown below, determines the system requirements a workstation must meet before Application Launcher/Explorer will distribute the application to it.



Add Requirements to Control Availability of This Application

This list displays all the requirements associated with the distribution of the application. For each requirement, the following information is displayed:

- **Show:** This column indicates if the Application object's icon will be displayed on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met.

  If an icon is displayed in a disabled state, users can right-click the icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

- **Type:** This column shows the category of the system requirement. Categories are explained under Add below.

- **Subject:** This column shows the subject of the system requirement. For example, if the type is OS Version, the subject could be Windows 95/98 or Windows NT/2000/XP.

- **Operator:** This column shows if a condition (greater than, less than, equal to, etc.) must be met for the assigned value.

- **Value:** This column shows if a value is associated with the subject. For example, if Windows NT/2000/XP is the subject, the version may need to be greater than or equal to 4.00.950 in order for the application to be distributed.

File

Click File > Find to search for requirements that include certain information. For example, you could search for requirements that include "Windows," "greater than," or "system memory."

Click File > Import to import requirements from another Application object.

Add

Click this option to add a new system requirement, based on one of the following categories:

- **Applications:** Require a specific application to be installed or not be installed. The application must have been distributed through an Application object. For more information, see "Applications" on page 152.
- **Disk Space:** Require a specific amount of disk space on the workstation. For more information, see "Disk Space" on page 153.
- **Environment Variables:** Require specific environment variables to be present or not present. For more information, see "Environment Variables" on page 155.
- **Memory:** Require a specific amount of memory on the workstation. For more information, see "Memory" on page 155.
- **Operating System:** Require a specific operating system. For more information, see "Operating System" on page 156.
- **Processor:** Require a specific processor type. For more information, see "Processor" on page 157.
- **Registry:** Require specific registry values to be present or not present. For more information, see "Registry" on page 158.
- **File Existence:** Require a file to be present or not present. For more information, see "File Existence" on page 159.
- **File Version:** Require a file to be a specific version. For more information, see "File Version" on page 160.
- **File Date:** Require a file to be a specific date. For more information, see "File Date" on page 160.
- **File Size:** Require a file to be a specific size. For more information, see "File Size" on page 161.

Modify

Select a requirement in the list > click Modify to edit the information.

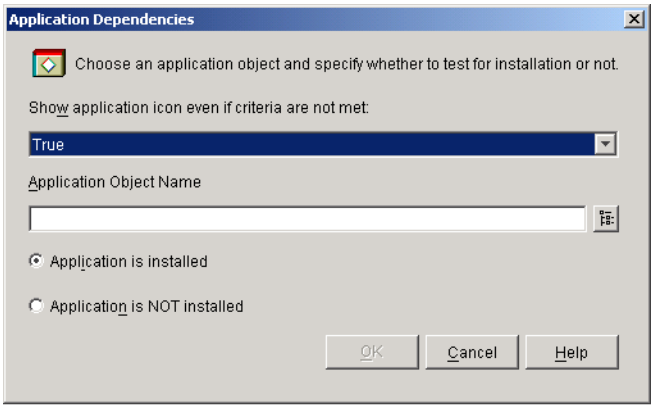
Delete

Select a requirement in the list > click Delete to remove the requirement.

Applications

The Application Dependencies dialog box (System Requirements page > Add > Application) lets you create a requirement based on the existence, or nonexistence, of another application.

Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Application Object Name

Browse and select the appropriate Application object.

Application Is Installed

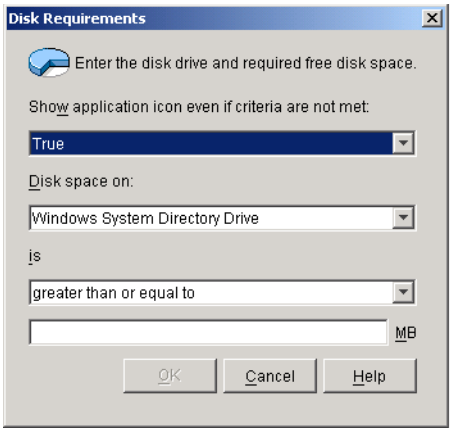
Select this option to indicate that the selected application must already be installed on the workstation.

Application Is Not Installed

Select this option to indicate that the selected application must not be installed on the workstation.

Disk Space

The Disk Requirements dialog box (System Requirements page > Add > Disk Space) lets you create a requirement based on the amount of disk space required by the application. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Disk Space On

Select the disk where you are requiring free space. The list includes the following options:

- **A through Z:** Allows you to select the disk that is mapped to drive A, B, C, and so on.
- **Windows System Directory Drive:** Allows you to select the disk where the Windows system directory (for example, WINDOWS\SYSTEM) resides.
- **Windows Directory Drive:** Allows you to select the disk where the Windows directory (for example, WINDOWS) resides.
- **Windows Temp Directory Drive:** Allows you to select the disk where the Windows temporary directory (for example, WINDOWS\TEMP) resides.

If you create multiple disk space requirements for the application, Application Launcher/Explorer adds the requirements together to determine the total disk space requirement. For example, if you specify 20 MB free on the Windows directory drive (which happens to be the C: drive), 10 MB free on the TEMP drive (which is also the C: drive), and 50 MB free on the D: drive, Application Launcher/Explorer distributes the Application object only if there is 30 MB available on the C: drive and 50 MB free on the D: drive.

Is (Conditional Statement)

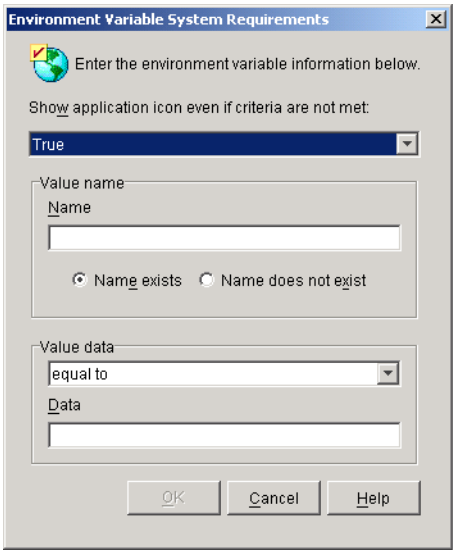
Select whether the available disk space must be less than, less than or equal to, equal to, greater than, greater than or equal to the amount listed in the MB field. For example, if you want to require at least 50 MB of free disk space, select Greater Than or Equal To and then enter 50 in the MB field.

MB (Condition)

Enter the disk space requirement.

Environment Variables

The Environment Variable System Requirements dialog box (System Requirements page > Add > Environment Variables) lets you create a requirement based on the existence, or nonexistence, of a specific environment variable. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Value Name

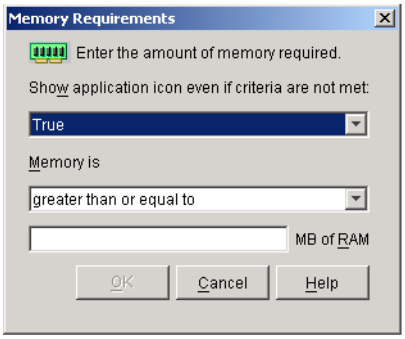
Enter the name of the environment variable. Select the Name Exists option to require the variable to already exist on the workstation, or select the Name Does Not Exist option to require the variable to not exist on the workstation.

Value Data

Specify whether the variable data must be equal to, not equal to, contain, or not contain the data you enter in the Data field.

Memory

The Memory Requirements dialog box (System Requirements page > Add > Memory) lets you create a requirement based on the amount of memory (RAM) required to run the application. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Memory Is (Conditional Statement)

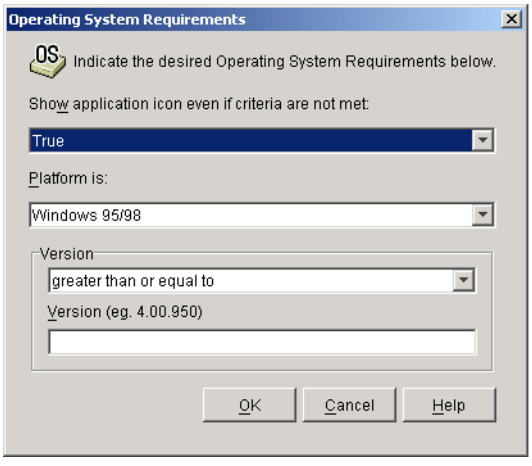
Select whether the total memory must be less than, less than or equal to, equal to, greater than, greater than or equal to the memory entered in the MB of RAM field. For example, if you want to require at least 32 MB of free RAM, select Greater Than or Equal To and then enter 32 in the MB of RAM field.

MB of RAM (Condition)

Enter the required memory amount.

Operating System

The Operating System Requirements dialog box (System Requirements page > Add > Operating System) lets you create a requirement based on the operating system required to run the application. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

IMPORTANT: With this option set to True, the application icon will be shown only if the operating system platform is the same as the one selected but the version does not meet the version requirement. For example, if you select Windows95/98 as the platform and enter greater than or equal to 4.02.1998 as the version, the icon will not display on a Windows NT/2000/XP workstation, will display in an active state on a Windows 98 workstation running version 4.02.1998 or newer, and will display in a disabled state on a Windows 95 workstation or a Windows 98 workstation running version 4.01.1998 or older.

Platform Is

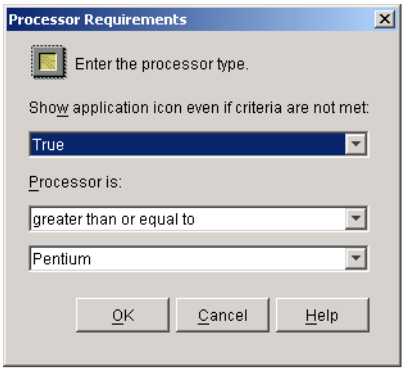
Select the operating system (Windows95/98 or Windows NT/2000/XP) the workstation must be running.

Version

Select whether the version number must be less than, less than or equal to, equal to, greater than, greater than or equal to the number entered in the Version field. For example, if you want to require at least version 4.00.95, select Greater Than or Equal To and then enter 4.00.95 in the Version field.

Processor

The Processor Requirements dialog box lets you create a requirement based on the processor required to run the application. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

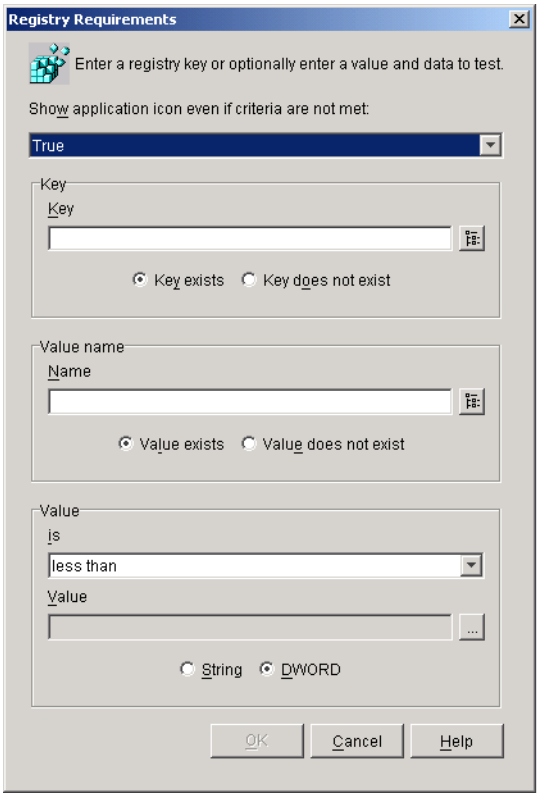
Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Processor Is

Select whether the processor must be less than, less than or equal to, equal to, greater than, or greater than or equal to the processor type (386, 486, Pentium*, Pentium Pro, Pentium II, Pentium III) selected in the processor list. For example, if you want to require at least a Pentium II processor, select Greater Than or Equal To and then select Pentium II.

Registry

The Registry Requirements dialog box lets you create a requirement based on a specific registry key or value. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

Key

Browse and select the registry key you want to check before distribution. Select Key Exists if the key must exist for the distribution to take place, or select Key Does Not Exist if the key cannot exist for the distribution to take place.

Name

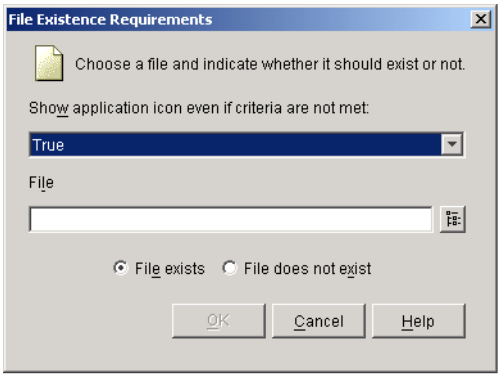
If the key has a specific value you want to check for, browse and select the value. Select Value Exists if the value must exist for the distribution to take place, or select Value Does Not Exist if the value cannot exist for the distribution to take place.

Value

If you specified a value in the Name field, select a condition (less than, less than or equal to, equal to, not equal to, greater than or equal to, greater than) for the value's data > enter the data in the Value field > select whether the value data is a string or DWORD type.

File Existence

The File Existence Requirements dialog box lets you create a requirement based on the existence, or nonexistence, of a specific file. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

File

Browse to select the file you want to search for.

File Exists

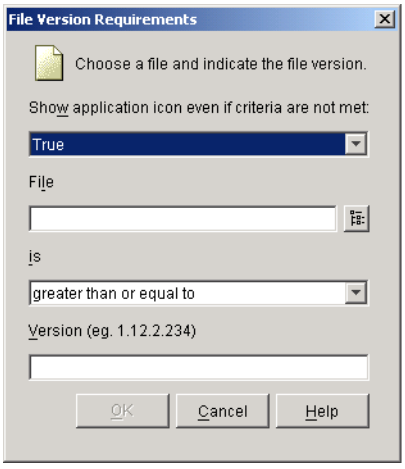
Select this option to require the file to exist on the workstation.

File Does Not Exist

Select this option to require the file to not exist on the workstation.

File Version

The File Version Requirements dialog box lets you create a requirement based on the version of a specific file. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

File

Browse to select the file whose version you want to check.

Is (Conditional Statement)

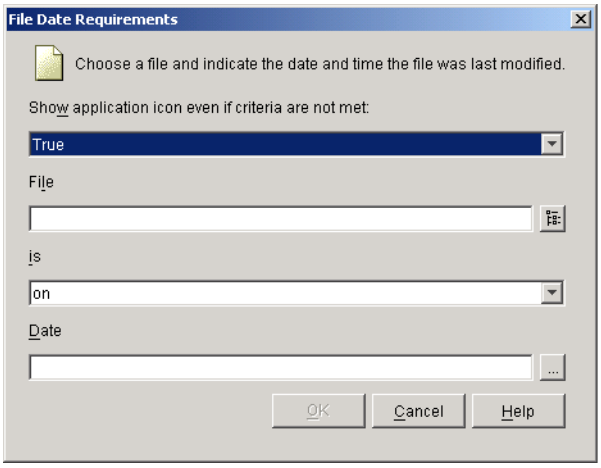
Select whether the version must be less than, less than or equal to, equal to, greater than, greater than or equal to the version entered in the Version field. For example, if you want to require at least version 1.12.2.234, select Greater Than or Equal To and then enter 1.12.2.234 in the Version field.

Version

Enter the file version.

File Date

The File Date Requirements dialog box lets you create a requirement based on the date of a specific file. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

File

Browse to select the file whose date you want to check.

Is (Conditional Statement)

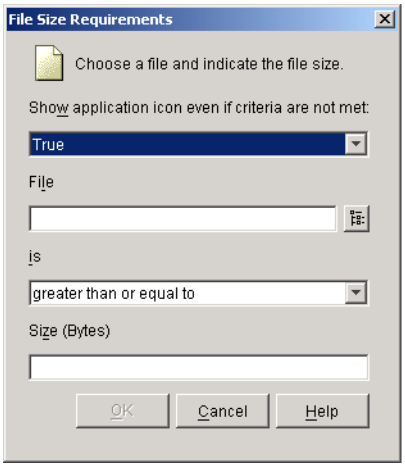
Select whether the file date must be before, on or before, on, on or after, or after the date entered in the Date field. For example, if you want to make sure the application is distributed only if the file is dated 15 January 2000 or older, you would select On or Before and then select the date.

Date

Use the Calendar to select the appropriate date and time.

File Size

The File Size Requirements dialog box lets you create a requirement based on the size of a specific file. Application Launcher/Explorer will not distribute the application to the workstation unless the requirement is met.



Show Application Icon Even If Criteria Are Not Met

Select True to display the application icon on the workstation regardless of whether or not the requirement is met. The icon will display in a disabled state if the requirement is not met. Users can right-click the disabled application's icon, select Details, then select Requirements in order to see which requirements were not met. They can then perform any necessary upgrades to the workstation configuration to meet the application requirements.

File

Browse to select the file whose size you want to check.

Is (Conditional Statement)

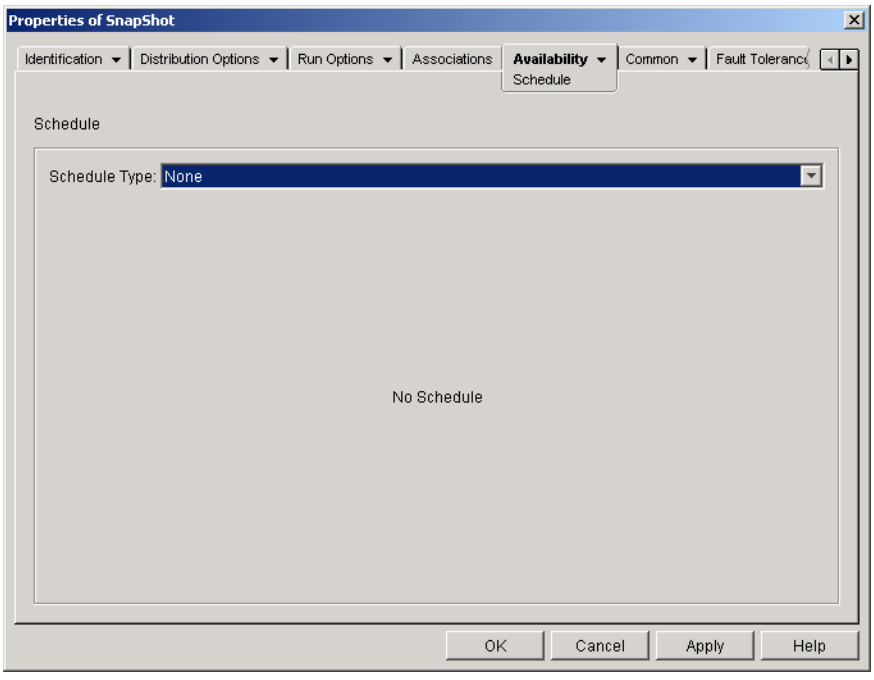
Select whether the size must be less than, less than or equal to, equal to, greater than, or greater than or equal to the size entered in the Size field. For example, if you want to require the file to be at least 200 KB, select Greater Than or Equal To and then enter 200 in the Size field.

Size

Enter the file size in kilobytes.

Schedule Page

The Schedule property page, shown below, defines the dates and times when Application Launcher/Explorer will make the Application object available to users.



Schedule Type

Select the type of schedule you want to use. You can choose None, Specified Days, or Range of Days.

None

Use this option to indicate no schedule. The Application object becomes available to an object as soon as the application's system requirements have been established (Availability > System Requirements page) and the application has been associated with the object (Associations page).

Specified Days

Use this option to select specific dates when you want the Application object to be available. You cannot select more than 350 specific dates.

Date Range: The Date Range list displays all dates when the Application object will be available. To add a date, click Add > select the date you want > click OK to display it in the list.

Times for Selected Dates: Select the availability start time and end time. The times apply to all dates in the Date Range list.

Spread from Start Time (in Minutes): Enter a number of minutes between available times if you don't want all users to run the application at the same time for fear of overloading the network. The spread option spreads out user access times over the number of minutes specified so they don't all run the application at once.

Range of Days

Use this option to select a range of dates to make the application available. You can also use this option to make applications available only on certain days of the week within a given range of dates.

Date Range: To define the range of days, select a start date and an end date, then select the days (Sunday through Saturday) within the established date range that the application will be available. By default, all days are selected; a day is selected when the button is depressed.

Times for Selected Range: Select the availability start time and end time. This option works differently depending on whether you selected one day or multiple days. If you selected one day, the application will be available between the start and end times on that day. For example, if you make the application available on Monday between 8:00 and 5:00, it will run between 8:00 and 5:00. However, if you make the application available Monday through Saturday between 8:00 and 5:00, the times are ignored. The application will be available Monday through Saturday, 24 hours a day.

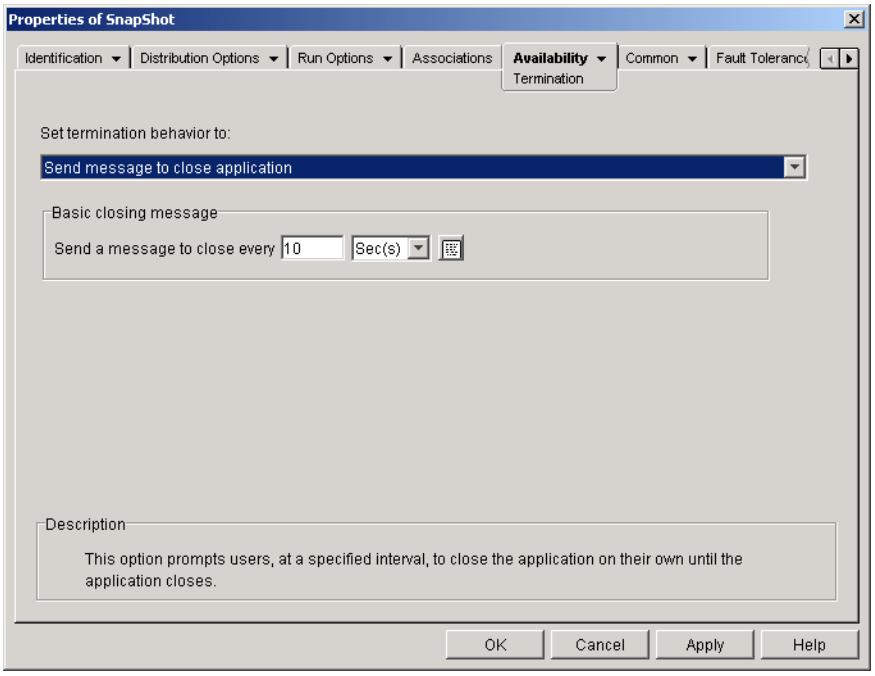
Spread from Start Time (in Minutes): Enter a number of minutes between available times if you don't want all users to run the application at the same time for fear of bringing down the network because of the load and traffic.

Use the Schedule in GMT for All Clients: The schedule is based on the workstation's time zone. If your network spans different time zones and you schedule an application to run at 1:00 p.m., it runs at 1:00 p.m. in each time zone. You can select this option to have workstations run applications at the same time regardless of their time zones (for example, 1:00 p.m. Rome time and 11:00 p.m. Los Angeles time.

Termination Page

The Termination property page, shown below, determines how Application Launcher/Explorer terminates the application if it becomes unavailable to a user while the user is running the application. An application becomes unavailable to a user when:

- You disassociate it from the user.
- The availability schedule expires.
- The application's system requirements change and the user's workstation no longer complies.



Set Termination Behavior To

Select the behavior you want used when the application terminates.

None

Select this option to disable any termination behaviors.

Send Message to Close Application

This option causes Application Launcher/Explorer to display a message instructing the user to close the application. The message appears periodically until the user closes the application.

In the Basic Closing Message box, select how often you want Application Launcher/Explorer to display the message. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired. Please close the
application to avoid losing your work.
```

Send Message to Close Then Prompt to Save Data

This option causes Application Launcher/Explorer to first display a message instructing the user to close the application. If the user does not close the application, Application Launcher/Explorer sends a call to the application instructing it to close. If the user has no unsaved data, the application closes immediately. If the user has unsaved data, the application displays a Save dialog box to allow the user to save the data. After the application closes, users cannot launch it again.

IMPORTANT: Some applications display a Save dialog box that includes a Cancel button in addition to Yes and No buttons. The Cancel button aborts the close operation and the application remains open. If the application's Save dialog box includes a Cancel button and you want to ensure that the application is closed, you must use the Send Message to Close, Prompt to Save, Then Force to Close option.

Warning Message (Optional): Check the Send Warning option if you want to warn the user to close the application, then enter the number of times to display the warning message and the interval between messages. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired. Please close the
application to avoid losing your work.
```

Prompt Closing Message: This message is displayed if the user does not close the application after receiving the warning message the specified number of times, or if the warning message option is not enabled.

In the Prompt Closing Message box, enter how often you want to prompt the user to close the application. If, after receiving the prompt, the user does not close the application, Application Launcher/Explorer attempts to close the application. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired and the application will
close shortly. Please save your work and exit the application.
```

Send Message to Close, Prompt to Save, Then Force to Close

This option causes Application Launcher/Explorer to first display a message instructing the user to close the application. If the user does not close the application, Application Launcher/Explorer sends a call to the application instructing it to close. If the user has no unsaved data, the application closes immediately. If the user has unsaved data, the application displays a Save dialog box to

allow the user to save the data. Regardless of the option (Yes, No, Cancel) the user selects, the application is closed.

Warning Message (Optional): Check the Send Warning option if you want to warn the user to close the application, then enter the number of times to display the warning and the interval between warnings. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired. Please close the
application to avoid losing your work.
```

Prompt Closing Message: This message is displayed if the user does not close the application after receiving the warning message the specified number of times, or if the warning message option is not enabled.

In the Prompt Closing Message box, enter how often you want to prompt the user to close the application. If, after receiving the prompt, the user does not close the application, Application Launcher/Explorer attempts to close the application. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired and the application will
close shortly. Please save your work and exit the application.
```

Application Termination: This message is displayed after Application Launcher/Explorer closes the application. If you don't want to use the default termination message, click the Message button and define a custom message. The default message is:

```
The application you were running has expired. For additional usage, please
contact your system administrator.
```

Send Message to Close Then Force Close with Explanation

This option prompts the user to close the application. If the user does not, Application Launcher/Explorer closes the application automatically and displays a termination message.

Warning Message (Optional): Check the Send Warning option if you want to warn the user to close the application, then enter the number of times to display the warning and the interval between warnings. If the user does not close the application, Application Launcher/Explorer closes the application automatically after the last warning message. The following default message will be used unless you click the Message button and define a custom message:

```
WARNING! Your access to this application has expired. Please close the
application to avoid losing your work.
```

Application Termination: This message is displayed after Application Launcher/Explorer closes the application. If you don't want to use the default termination message, click the Message button and define a custom message. The default message is:

```
The application you were running has expired. For additional usage, please
contact your system administrator.
```

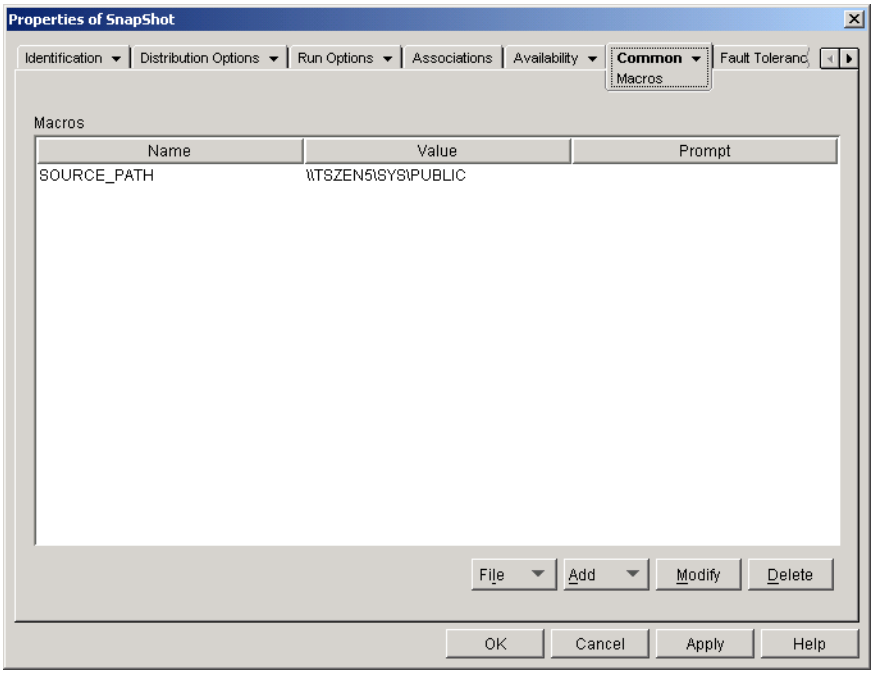
Common Tab

The Common tab includes the following pages:

- “Macros Page” on page 167
- “Drives/Ports Page” on page 169

Macros Page

The Macros property page, shown below, displays the macros that have been defined for use with the Application object.



These macros, referred to as Application object macros, are simply variable names that are associated with values, typically string values. For example, when you create an Application object using an .AOT or .AXT file, a SOURCE_PATH macro is automatically added to the list. This macro defines the location of the source files from which the application will be installed. Many times, you must enter the source path when defining other properties for the Application object. By creating a SOURCE_PATH macro, you only need to enter %SOURCE_PATH% rather than the actual source path.

You can use Application object macros when defining the following Application object properties:

- Path to Executable (Run Options > Applications page)
- Command Line (Run Options > Applications page)
- Working Directory (Run Options > Applications page)
- Drive Mapping Path (Common > Drives/Ports page)

- Capture Port Path (Common > Drives/Ports page)
- Key, Value Name, and Value Data strings (Distribution Options > Registry Settings page)
- Section, Value Name, and Value Data strings (Distribution Options > INI Settings page)
- Source File, Target File, Directory Name (Distribution Options > Application Files page)
- Find File, Find Next File, Add string (Distribution Options > Text Files page)
- All properties (Distribution Options > Icons/Shortcuts page)

IMPORTANT: When using a macro for any of these properties, you must enclose the macro name in % characters (for example, %SOURCE_PATH%).

Macros

The Macros list displays all macros that have been defined for use with the Application object.

File

Click File > Find to search for specific information in the Name, Value, and Prompt fields.

Click File > Import to import macros from another Application object's .AOT or .AXT file.

Add

Use the Add button to define an Application object macro and add it to the Macros list. You can add either a String Value macro or a Prompted macro.

String Value

A String Value macro is used to create a variable that has a string value associated with it. This lets you use the variable in multiple locations while defining the value in one location.

To create a String Value macro, click Add > String Value to display the Edit String Value dialog box. In the Value Name box, type a name for the variable > type the value for the variable in the Value Data box. Click OK to add the macro to the Macros list.

You can place macros within macros. In the following example, a special Windows macro, *WINDISK, is used when defining the TARGET_PATH macro:

```
Value Name: TARGET_PATH
Value Data: %*WINDISK%\Program Files
```

When embedding another macro in the string, you must enclose the macro in % characters, as shown in the above example. You can embed special Windows macros, NDS attribute macros, environment variable macros, login script macros, and other Application object macros. For information about these types of macros, see Chapter 15, "Macros," on page 189.

Prompted

A Prompted macro is used to create a macro that prompts the user to accept the default value (either a drive or string) or enter a new value.

To create a Prompted Drive macro, click Add > Prompted > Drive to display the Prompted Drive Macros dialog box. Fill in the fields as described below:

- **Macro Name:** Give the macro any name you want. Do not use spaces.

- **Prompt Text:** Enter the text you want presented to users. For example, "This application will be installed to your C: drive. Enter a different drive letter if desired:".
- **Default Value:** Select the drive that will be used if the user does not enter another drive letter.
- **Minimum Disk Space in MB:** Enter the minimum amount of free disk space required to install the application.

To create a Prompted String macro, click Add > Prompted > String to display the Prompted String Macros dialog box. Fill in the fields as described below:

- **Macro Name:** Give the macro any name you want. Do not use spaces.
- **Prompt Text:** Enter the text you want presented to users.
- **Default Value:** Select the value that will be used if the user does not enter another value in response to the prompt text.
- **Minimum Disk Space in MB:** Enter the minimum amount of free disk space required to install the application.
- **Maximum String Length in Chars:** Enter the maximum number of characters the user can enter as a response to the prompt.

Modify

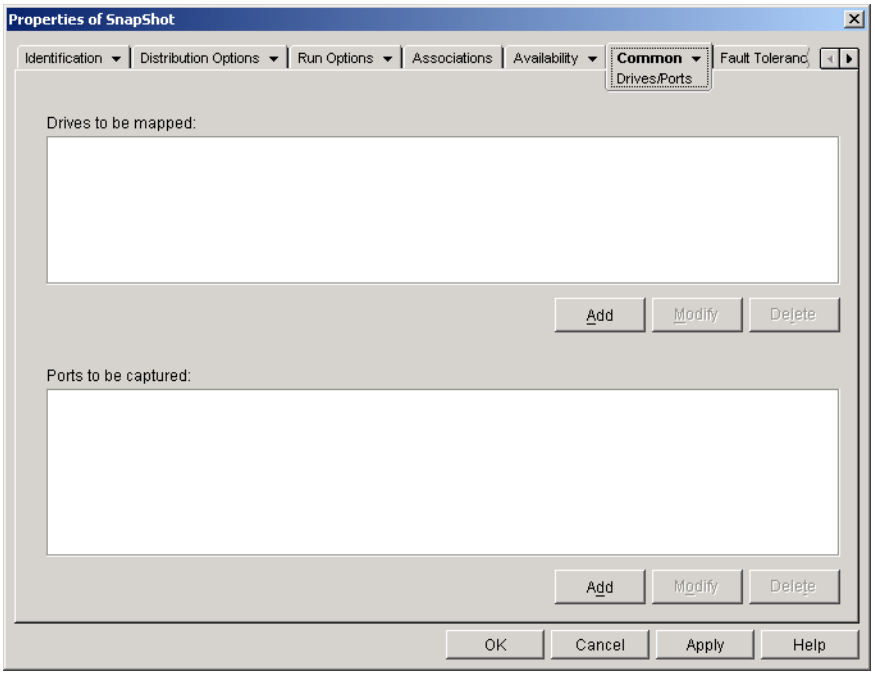
Select the macro whose information you want to modify > click Modify.

Delete

Select the macro you want to delete > click Delete.

Drives/Ports Page

The Drives/Ports property page, shown below, determines the drive mappings and port captures for the application. When a user launches the application (through the Application object), Application Launcher/Explorer establishes the drive mappings and port captures before launching the application.



For example, suppose you've set up a database application to run from drive W:. To ensure that W is mapped to the location of the application, you could map drive W: to the server, volume, and directory where the application exists. When Application Launcher/Explorer runs the application, it establishes the drive mapping according to the conditions defined when setting up the drive mapping.

Or, maybe users need access to a network location to store files created with a word processor. If you map a drive, the drive mapping becomes active as soon as the application runs.

By default, drive mappings and port captures are not released when the user closes the application. For Application Launcher/Explorer to release the drives and ports, you need to select the Clean Up Network Resources option (Run Options > Environment page). With this option selected, Application Launcher/Explorer releases any drives it mapped and ports it captured as long as the drives and ports are not being used by another application. If several applications use the same drive or port, then the drive mappings and port captures aren't cleaned up until the last application terminates.

Drives to Be Mapped

The Drives to Be Mapped list displays all drives that will be mapped before the application is launched.

Add

Click Add to display the Drive to Be Mapped dialog box. Fill in the following fields:

- **Root:** Check this option to treat the path as the root of the drive.
- **Option:** Select the type of drive to map. The available types are:
  - DRIVE: Select this option to map to a drive letter (A through Z).
  - S1: Select this option to assign the drive to the first available search drive
  - S2: Select this option to assign the drive to the last search drive.

- **Drive:** Assign a drive letter. The options are drives A through Z, or the next available drive.
- **Path:** Enter, or browse and select, the path you want mapped to the selected drive. If you enter the path, use the following syntax:

  ```
  server\ volume: path
  \\ server\ volume\ path
  volume_object_name: path
  directory_map_object_name: path
  driveletter:\ path
  ```

  You can also use a macro in this field. For information about macros, see Chapter 15, "Macros," on page 189.
- **Map If Drive Mapping Doesn't Exist or Same as Existing:** Select this option if you want Application Launcher/Explorer to map the drive if 1) it doesn't exist already or 2) it is the same as an existing drive mapping.
- **Overwrite any Existing Drive Mapping:** Select this option if you want Application Launcher/Explorer to replace any mapping that uses the requested drive letter. For example, if S: is mapped to \\SERVER1\SYS\PUBLIC and you've specified the new S: drive mapping as \\SERVER1\APPS\TIMECARD, the end result is that drive S: is mapped to \\SERVER1\APPS\TIMECARD.

  To identify this option in the Drives to Be Mapped list, the word FORCE is added to the mapping information.
- **Use the Existing Drive Mapping If Already Mapped:** Select this option to use the existing drive mapping even if it is not the same as the path requested. For example, if S: is mapped to \\SERVER1\SYS\PUBLIC and you've specified the new S: drive mapping as \\SERVER1\APPS\TIMECARD, the end result is that drive S: is still mapped to \\SERVER1\SYS\PUBLIC.

  To identify this option in the Drives to Be Mapped list, the word REUSE is added to the mapping information.

Modify

Select a drive mapping in the Drives to Be Mapped list > click Modify to display the Drive to be Mapped dialog box. Change the drive mapping information as needed. See the field descriptions above or click the Help button in the dialog box.

Delete

Select a drive mapping in the Drives to Be Mapped list > click Delete to remove the mapped drive.

Ports to Be Captured

The Ports to Be Captured list displays all ports that will be captured before the application is launched.

Add

Click Add to display the Ports to Be Captured dialog box. Fill in the following fields:

- **Port:** Select an LPT port to assign to the printer or queue.
- **Printer or Queue:** Browse to select a printer or queue.

You can also use a macro in this field. For information about macros, see Chapter 15, “Macros,” on page 189.

- **Capture Flags:** You can use this option to override notification, banner, and form feed settings defined on the user's workstation. Whenever a user prints from the application, the settings you defined will be used.

  In the Capture Flags box, select the Override Workstation Setting box for the corresponding Capture setting you want to override. After you do this, the corresponding Capture setting becomes active. Select the setting to turn it on. Leave the setting unchecked to turn it off.

  For example, if you select the Override Workstation Setting box for Notify and also select the Capture Setting box for Notify, when the user prints a document, the Novell Client displays a Notify alert panel to indicate the completion of the print job, no matter which Capture settings are on the user's workstation. However, if you select the Override Workstation Setting box for Notify but do not select the Capture Setting box for Notify, when the user prints a document, the Novell Client does not display a Notify alert panel to indicate the completion of the print job, no matter which Capture settings are used on the user's workstation.

Modify

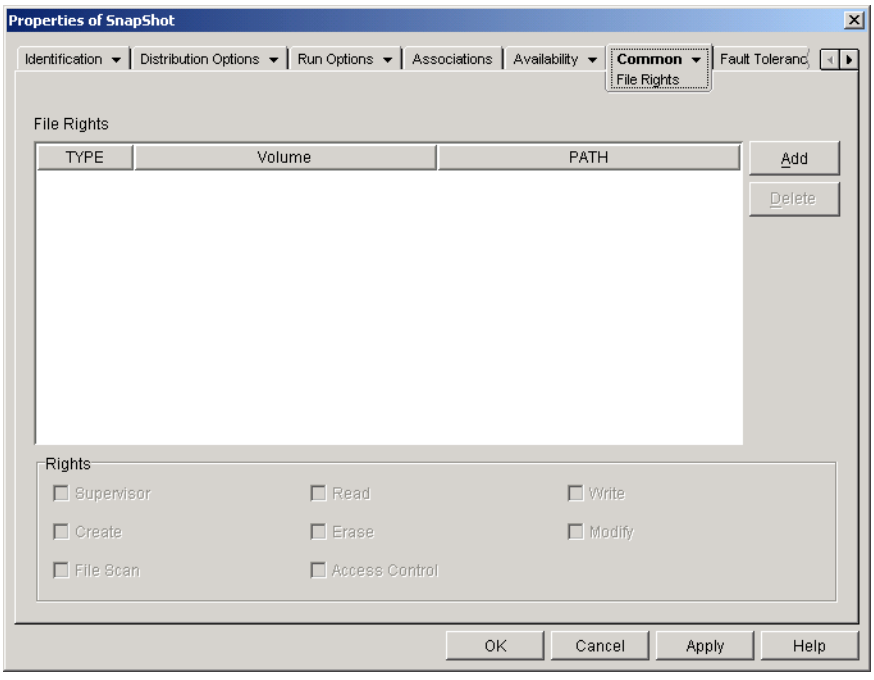
Select a port capture in the Ports to Be Captured list > click Modify to display the Ports to be Captured dialog box. Change the capture information as needed. See the field descriptions above or click the Help button in the dialog box.

Delete

Select a port capture in the Ports to Be Captured list > click Delete to remove the captured port.

File Rights Page

The File Rights property page, shown below, specifies the file, directory, and volume rights a user must have to run the application. A user receives these rights when his or her User object is associated with the Application object, or when a Group, Organizational Unit, Organization, or Country object of which the user is a member is associated with the Application object. The rights are removed from the user when the object is no longer associated with the Application object.



The file rights you set up are not dependent on whether the user is actually using the application. The user has continual file rights from the time the Application object is associated with the user until the time the association is removed.

If two separate Application objects give file rights to the same file, directory, or volume and the user is unassociated with only one of them, then the user loses all rights even though the user might still be associated with the other Application object.

File Rights

The File Rights list displays all files, directories, and volumes to which rights will be given. When you select a file, directory, or volume, the rights that have been granted are displayed in the Rights box. You can grant or remove rights by checking or unchecking the appropriate boxes.

Add

Click Add > browse for and select the file, directory, or volume you want to add > click OK to display it in the list.

Delete

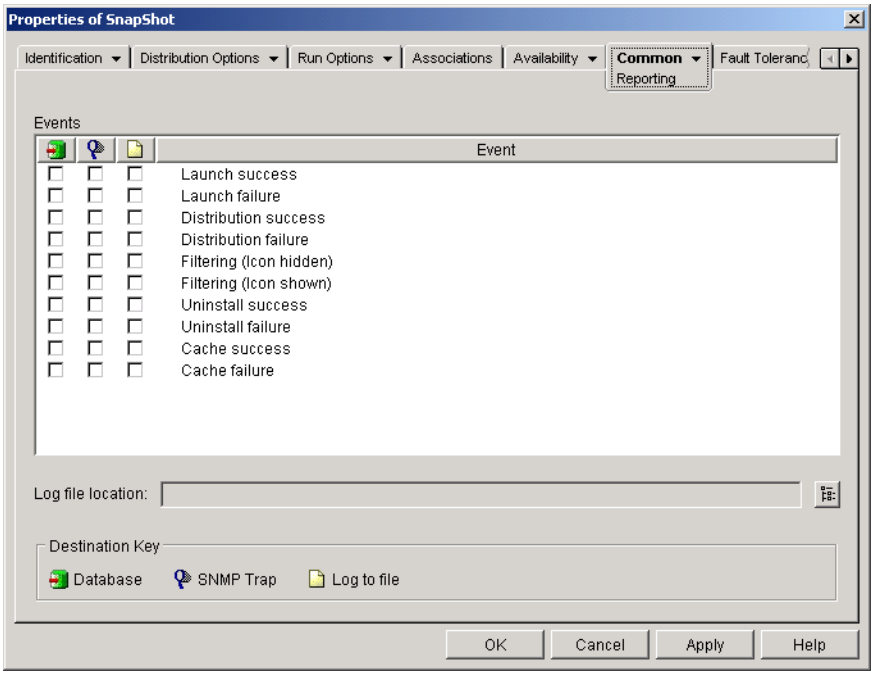
Select the file, directory, or volume you want to delete from the list > click Delete. Any users associated with the Application object will lose rights to the file, directory, or volume.

Rights

Select the file, directory, or volume (in the File Rights list) for which you are establishing users' rights > check the appropriate boxes.

Reporting Page

The Reporting property page, shown below, specifies the application events that you want Application Launcher/Explorer to report on and lets you specify the method of reporting.



Reports contain the following information: event type, date and time, user distinguished name, workstation distinguished name, workstation address, application distinguished name, application global unique identifier (GUID), application version string, and event strings.

For information about setting up reporting, see Chapter 11, “Reporting on Application Management Events,” on page 95.

Events

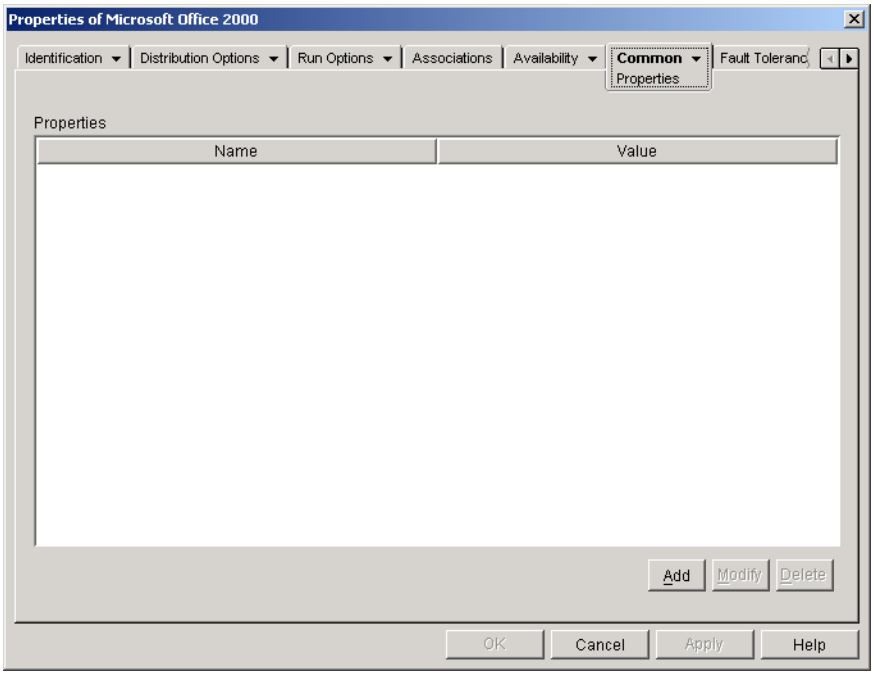
Select the events (distribution, launch, filtering, and uninstallation) that you want reported and the destination where you want the events sent. You can send events to a database, to a management console via an SNMP trap, or to a text log file. If necessary, you can send events to multiple destinations (for example, both a database and a text log file).

Log File Location

If you selected a log file as the destination for any of the event reports, enter (or browse to and select) the location and name for the log file.

Properties Page (.MSI Application Object Only)

The Properties property page, shown below, lets you override the public property values contained in the .MSI package and add new public properties.



The .MSI package contains the property values that were defined during the administrative installation of the application. These property values determine the way the Microsoft Windows Installer installs the application to the user's workstation. In some cases, you may want to change one or more of the property values. For example, a property value may define the default location for a user's work files. By adding the property to the Properties list and changing the property's value, you can override the default location defined in the .MSI package.

If necessary, you can add public properties that were not included in the .MSI package. When doing so, you should be careful to add only those properties that are valid for the package.

Add

To override a property value, you change the property value and add the property to the Properties list so that Application Launcher/Explorer knows to use that property value rather than the one defined in the .MSI package. To do so, click Add to display the Select Property to Add dialog box. In the Value Name field, select the property whose value you want to override > enter the new value in the Value Data field > click OK to add the property to the Properties list.

To define a new property that is not already included in the .MSI package, click Add to display the Select Property to Add dialog box. In the Value Name field, enter the new property's name > enter the property's value in the Value Data field > click OK to add the property to the Properties list.

Modify

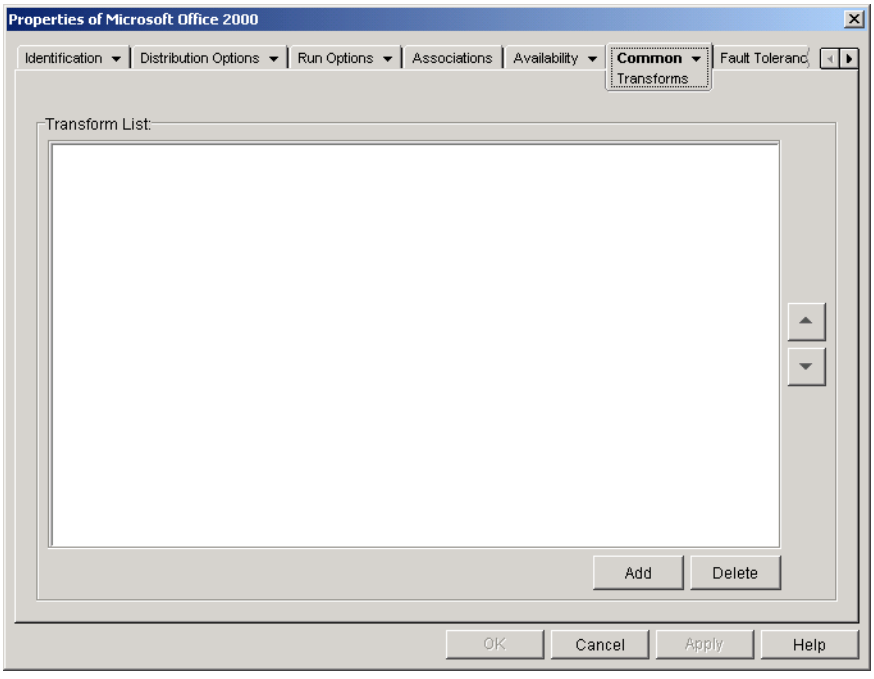
To modify a property that is in the Properties list, select the property > click Modify to display the Edit String Value dialog box > modify the value data > click OK.

Delete

To delete a property from the Properties list, select the property > click Delete. Deleting the property causes future installations of the application to use the property value defined in the .MSI package.

Transforms Page (.MSI Application Object Only)

The Transforms property page lists the transforms that Microsoft Windows Installer will apply to the .MSI package during distribution. A transform adds, deletes, or changes properties in the .MSI package to enable customizing of the installation for different groups of users.



Transforms are applied in the order they appear in the Transform List. If two transforms modify the same package property, the property retains the value applied by the last transform.

For information about creating transforms for your .MSI package, see the documentation you received with the software application.

Add

Click Add > browse to and select the transform file (.MST file) you want added to the Transform List > click OK to add it to the list. If the transform file is in the same location as the .MSI package, you can simply enter the filename in the Transform Path field.

Delete

Select a transform from the Transforms List > click Delete to remove it from the list.

Up-Arrow and Down-Arrow

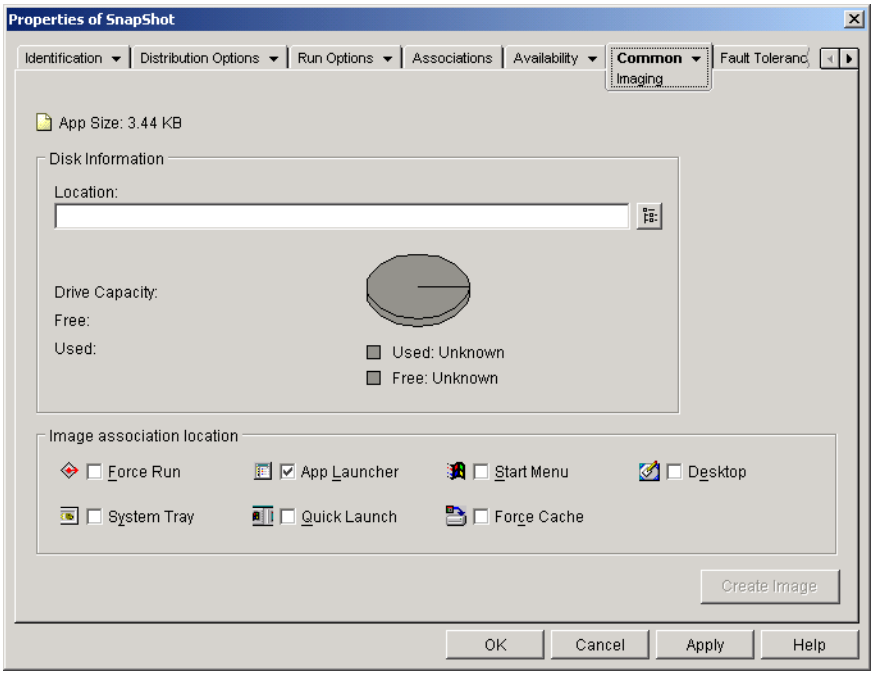
Select a transform from the Transform List > click the up-arrow to move the transform up in the list or click the down-arrow to move it down in the list. Application Launcher/Explorer applies the transforms in the order they are listed, from top to bottom.

Imaging Page

The Imaging property page, shown below, lets you create an image file for the Application object. You can use the image file as an add-on image to a base image file so that the application will be delivered to a workstation during imaging of the workstation.

During the imaging process, the add-on image is applied after the base image. Applying the add-on image results in the application files being added to the imaged workstation's NALCACHE directory, located on the workstation's Windows drive (typically C:). When Novell Application Launcher/Explorer starts, it reads the NALCACHE directory and displays the application's icon. After the user double-clicks the icon, the distribution process occurs and then the application is launched.

IMPORTANT: On Windows NT/2000/XP, users who do not have administrative rights to their workstation must be given Full Control access to NALCACHE directory. Otherwise, Application Launcher/Explorer will not be able to read the cache and display the application.



App Size

This field displays the size of the Application object. This includes all Application object information (.AOT or .AXT file) as well as application source files (.FIL files).

Disk Information

These fields let you specify a location and filename for the image and ensure that the disk to which you are saving the image has sufficient free space.

Location

Specify the location and filename for the image. You may want to save it in the same location as the base image file. The filename does not need to have a particular filename extension, although .ZMG is used as the default.

Drive Capacity, Free, and Used

After you've entered a location for the file, these fields display the amount of space on the disk, the amount of available free disk space, and the amount of used disk space. Verify that the Application object will fit in the amount of free disk space.

IMPORTANT: In addition to the image location, the ConsoleOne workstation's NALCACHE directory, located on the workstation's Windows drive (typically C:), is used temporarily to store the application's source files (.FIL files) and the Application object's settings (.AOT/.AXT file). The size of the source files will vary; the size of the settings file is typically less than 200 KB. Make sure that the workstation's Windows drive has sufficient disk space for these files.

Create Image

After you've defined the image location and selected the image associations (see "Image Association Location" on page 178), click the Create Image button to create the image. A dialog box will appear that lets you select from the following compression options:

- **None:** Creates the image file but does not compress it. This will result in the largest image size produced by any of the compression options.
- **Optimize Compression Time:** Applies the lowest level of compression. This minimizes the time required to compress the image file, but results in a larger file size than could be achieved by using the Balance Compression Time and Image Size option or Optimize Image Size option.
- **Balance Compression Time and Image Size:** Applies a medium level of compression in order to balance the amount of time required to compress the file against the size of the image file.
- **Optimize Image Size:** Applies the highest level of compression. This decreases the image file size but increases the time required to compress the image file as compared to the Optimize Compression Time option and Balance Compression Time and Image Size option.

Image Association Location

Specify the association characteristics for the Application object. These will be enforced when the image is applied to the workstation.

Force Run

Runs the Application object as soon as Application Launcher/Explorer or Workstation Helper starts and the Application object is available.

You can use the Force Run option in conjunction with several other settings to achieve unique behaviors. For example, if you use the Force Run option with the Run Application Once option (Run Options > Applications page), as soon as the Application object is distributed it will run one time and then be removed from the workstation. Or, suppose that you want to run the Application object immediately one time at a pre-determined time. If so, select Force Run, select the Run Application Once option on the Application page (Run Options tab), and define a schedule using the Schedule page (Availability tab).

If you want to force run several applications in a specific order, mark each of them as Force Run. Then give each Application object a numeric order by using the Order Icon Display option on the Icon page (Identification tab).

App Launcher

Adds the Application object's icon to the Application Launcher/Explorer window.

Start Menu

If the workstation is running Application Explorer, this option adds the Application object to the Windows Start menu. The Application object will be added to the top of the Start menu, unless you assign the Application object to a folder and use the folder structure on the Start menu. See the Application object's Folders page (Identification tab).

Desktop

If the workstation is running Application Explorer, this option displays the Application object's icon on the Windows desktop.

System Tray

If the workstation is running Application Explorer, this option displays the Application object's icon in the Windows system tray.

Quick Launch

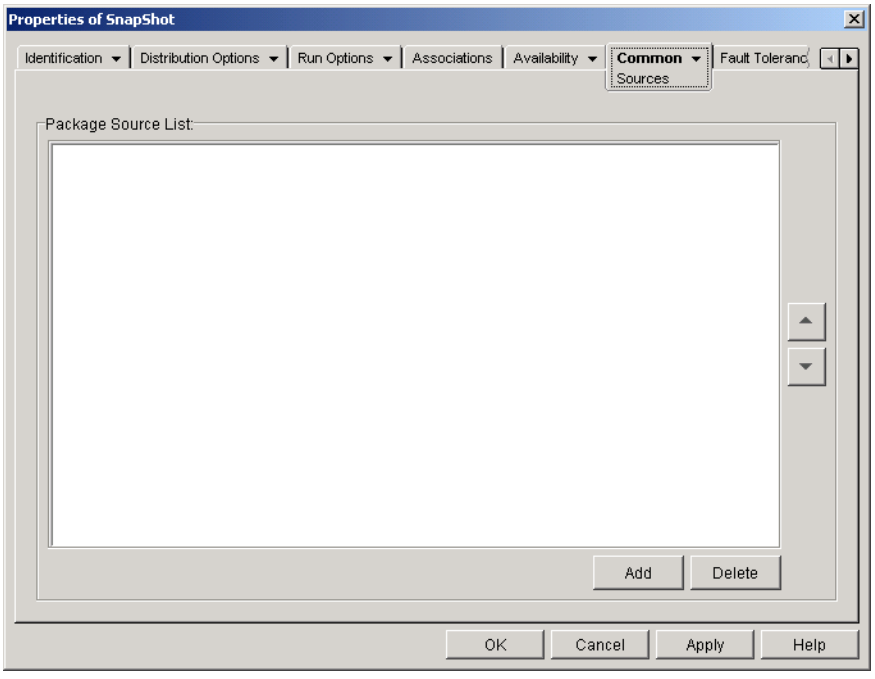
Displays the Application object's icon on the Windows Quick Launch toolbar.

Force Cache

Forces the application source files and other files required for installation to be copied to the workstation's cache directory. The user can then install or repair the application while disconnected from NDS. The files are compressed to save space on the workstation's local drive.

Sources Page

The Sources property page, shown below, specifies additional network locations that contain installation packages from which Application Launcher/Explorer can distribute the application. If the Application object was created from a .AOT or .AXT file, the installation packages must be snAppShot packages (.AOT, .AXT, and .FIL files). If the Application object was created from a .MSI file, the installation packages must be Microsoft Windows Installer packages (.MSI files). The source list is used only if the original source location is unavailable, in which case Application Launcher/Explorer begins with the first location in the list and continues down the list until an accessible package is found.



Before you can define additional source locations, you need to make sure to copy the original package to the new source locations. For snAppShot packages, copy the .AOT, .AXT, .FIL, and .TXT files. For Windows Installer packages, copy the administrative installation folder and all subfolders.

With Application objects that use a .MSI file rather than a .AOT or .AXT file, this source list can be extremely important. Because Windows Installer supports on-demand installations (installation of files as the user requests certain features or components), the source list can provide source resiliency for installations that occur after the initial installation. If the original installation source is no longer available and no source list has been established, the on-demand installation will fail. However, if you create additional source locations and define them in the source list, the on-demand installation will have a better chance of succeeding.

IMPORTANT: If you have used the SOURCE_PATH macro (Common > Macros page) in any of the Application object's property fields, you should verify that you used all uppercase letters and no lowercase letters. If the original source location is referenced through the SOURCE_PATH macro and Application Launcher/Explorer cannot access the location, it will use the package sources in this list only if the SOURCE_PATH macro is all uppercase.

Package Source List

The Package Source List displays the additional package source locations that have been defined for the application. When the application is distributed to a workstation, Application Launcher/Explorer will use these locations, in the order listed, if the original source location is unavailable.

When distributing applications that use the Windows Installer, Application Launcher/Explorer passes the source list to the Windows Installer, which then uses the list for the locations from which to install the application files.

Add

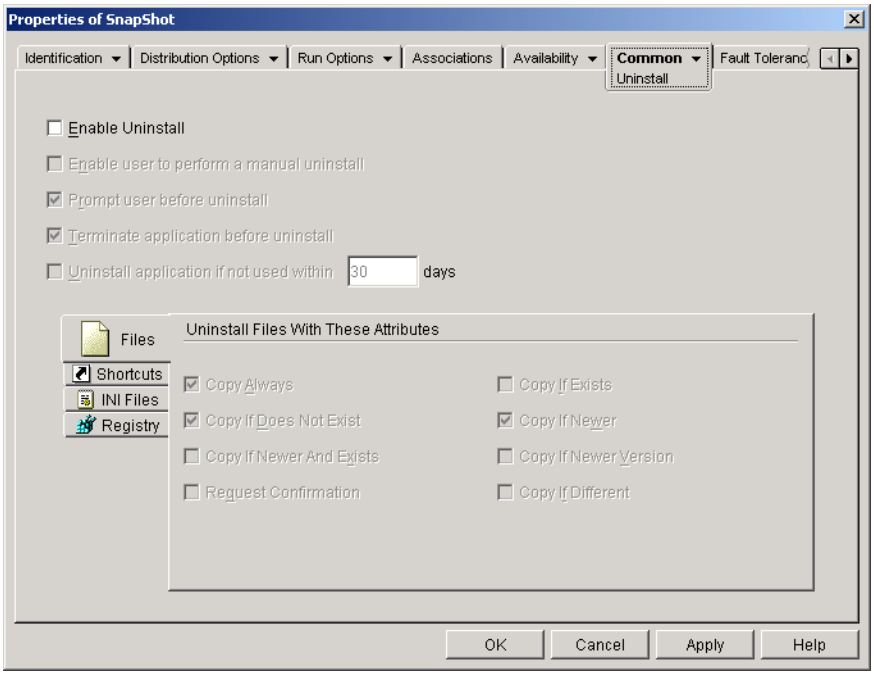
To add a source location to the list, click Add > browse to and select the directory that contains the installation package > click OK.

Delete

To remove a source location from the list, select the location > click Delete.

Uninstall Page

The Uninstall property page, shown below, enables the application to be uninstalled and determines the behaviors associated with uninstalling the application.



Enable Uninstall

Check this option to enable the application to be removed from the workstation. The other uninstall options are available only if this option is enabled.

Enable User to Perform a Manual Uninstall

Check this option to enable users to remove the application from their workstations. If this option is not enabled, only you or other administrators can remove applications.

Prompt User Before Uninstall

Check this option to prompt users before removing the application from their workstations. If users answer "No" to the prompt, the application will not be removed.

Terminate Application Before Uninstall

Check this option to ensure that Application Launcher/Explorer terminates the application (if the application is running) before it begins uninstalling the application files.

Uninstall Applications If Not Used Within *XX* Days

Check this option to automatically remove the application if the user has not run it within the specified number of days (the default is 30).

Files

Click Files > check the attributes you want to use to determine whether or not an application file is removed. The attributes correspond to the attributes listed on the Application Files page (Distribution Options tab). By default, the options are configured (Copy Always, Copy if Does Not Exist, Copy if Newer) to ensure that a file is removed only if it was installed when the application was installed and not at an earlier time by another application that also needs the file.

Shortcuts

Click Shortcuts > check the attributes you want to use to determine whether or not the application's shortcuts are removed. The attributes correspond to the attributes listed on the Shortcuts/Icons page (Distribution Options tab).

INI Files

Click INI Files > check the attributes you want to use to determine whether or not an INI setting is removed. The attributes correspond to the attributes listed on the INI Settings page (Distribution Options tab). By default, the options are configured (Create Always, Create if Exists, Create or Add to Existing Section) to ensure that a setting is removed only if it was created when the application was installed and not at an earlier time by another application that also needs the setting.

Registry

Click Registry > check the attributes you want to use to determine whether or not a registry setting is removed. The attributes correspond to the attributes listed on the Registry Settings page (Distribution Options tab). By default, the options are configured (Create Always, Create if Exists) to ensure that a setting is removed only if it was created when the application was installed and not at an earlier time by another application that still needs the setting.

Uninstall Keys/Values From These Registry Hives

This option allows you to select two specific registry hives, HKEY_LOCAL_MACHINE and HKEY_CURRENT_USER, to include or exclude when removing the registry settings that were added by Application Launcher/Explorer during distribution of the application to the workstation. The default settings cause Application Launcher/Explorer to remove settings from the HKEY_CURRENT_USER hive but not from the HKEY_LOCAL_MACHINE hive.

The purpose of this option is to help you ensure that no Windows system settings are removed during the uninstall. This is particularly important if you used snAppShot to capture the application's installation. When snAppShot captures an application's installation, it includes all settings that are changed during the installation. If the application's installation program causes the workstation to reboot during the installation process, these changes can include not only settings that apply to the application but also settings that apply to the Windows system. Removing Windows system settings may cause the workstation to encounter problems when starting up. It is strongly recommended that you remove these settings only if you are positive that they will not affect the workstation's ability to function properly.

NOTE: If you want to use this option, you should examine the registry settings that will be removed from the HKEY_LOCAL_MACHINE and HKEY_CURRENT_USER hives and delete any settings that apply to anything

other than the application. The registry settings are displayed on the Registry Settings page (Distribution Options tab).

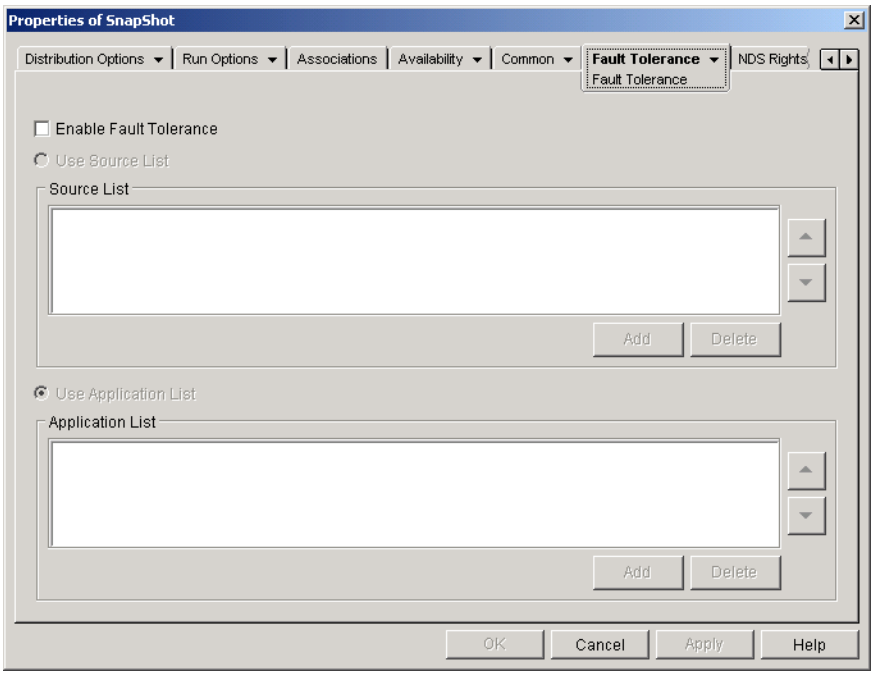
Fault Tolerance Tab

The Fault Tolerance tab includes the following pages to help you balance the workload required to host an application between multiple servers and provide access to backup applications in case of server failure:

- “Fault Tolerance Page” on page 183
- “Load Balancing Page” on page 184
- “Site List Page” on page 186

Fault Tolerance Page

The Fault Tolerance property page, shown below, specifies the installation package sources or Application objects that Application Launcher/Explorer will use as backups if this Application object becomes unavailable. Application Launcher/Explorer tries the package sources or Application objects in the order shown in the Source List or Application List, from top to bottom.



We recommend you use fault tolerance, rather than load balancing (Fault Tolerance > Load Balancing page) when servers are located at various sites throughout a large wide area network. However, the servers must reside in the same NDS tree. You can implement both methods if necessary. Application Launcher/Explorer will try load balancing first, then fault tolerance.

IMPORTANT: The Fault Tolerance page does not apply to Application objects that use Microsoft Windows Installer (.MSI) packages. For a .MSI Application object, you can provide source resiliency (fault tolerance) through the use of additional source locations for the installation package (Common > Sources page).

Enable Fault Tolerance

Check this option to enable fault tolerance. The other fault tolerance options are available only if this option is enabled.

Use Source List

Select this option to have Application Launcher/Explorer use a list of Package sources as the backup. You must have already created at least one installation package source (Common > Sources page).

Add

Click Add > browse to and select a package source > click OK to add it to the Source List.

Delete

Select a package source from the Source List > click Delete to remove it from the Source List.

Up-Arrow and Down-Arrow

Select a package source from the Source List > click the up-arrow to move the source up in the list or click the down-arrow to move it down in the list. Application Launcher/Explorer tries the sources in the order they are listed, from top to bottom.

Use Application List

Select this option to have Application Launcher/Explorer use a list of Application objects as the backup. You must have already created additional Application objects for the application, with the application files being stored on a different server or volume than this application. If the application is too busy or is not available, then Application Launcher/Explorer tries each Application object in the specified order.

Add

Click Add > browse to and select an Application object > click OK to add it to the Application List.

Delete

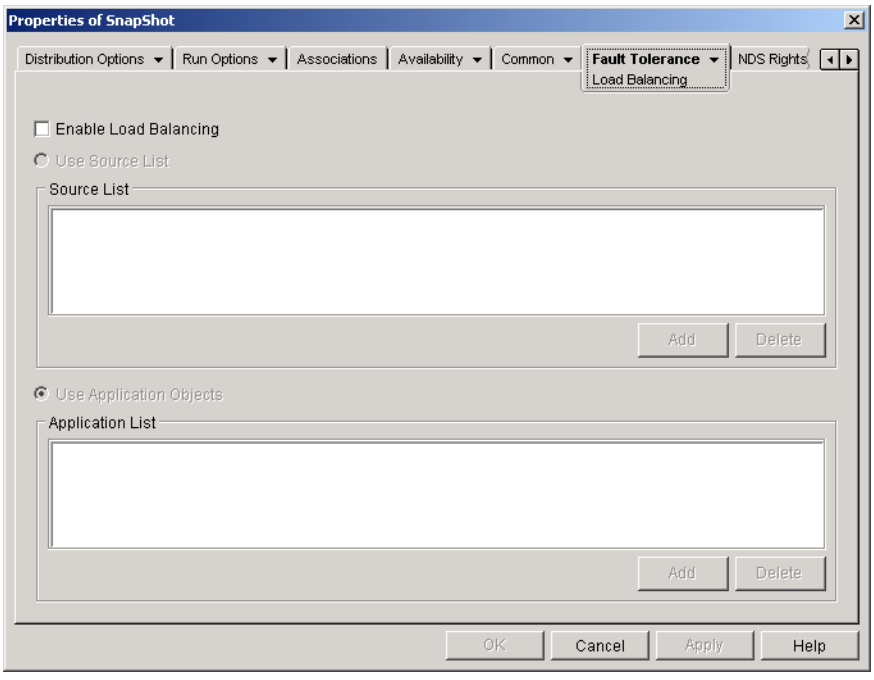
Select an Application object from the Application List > click Delete to remove it from the Application List.

Up-Arrow and Down-Arrow

Select an Application object from the Source List > click the up-arrow to move the Application object up in the list or click the down-arrow to move it down in the list. Application Launcher/Explorer tries the Application objects in the order they are listed, from top to bottom.

Load Balancing Page

The Load Balancing property page, shown below, lets you balance the workload required to support the application. With load balancing enabled, Application Launcher/Explorer will pull the application files from all servers offering the application, ensuring a more balanced workload across servers.



To use load balancing, you must first have multiple installation package sources or Application objects defined for the application, with the application source files located on different servers. When a user launches the application, Application Launcher/Explorer selects one of the package sources or Application objects to use. If the package source or Application object is unavailable, Application Launcher/Explorer selects another one.

We recommend you use load balancing when all the servers for the Application objects are located at a single site. If the servers are located at various sites throughout a large wide area network, we recommend you use fault tolerance (Fault Tolerance > Fault Tolerance page). You can implement both methods if necessary. Application Launcher/Explorer will try load balancing first, then fault tolerance.

Enable Load Balancing

Check this option to enable load balancing. The other load balancing options are available only if this option is enabled.

IMPORTANT: For Application objects that use Microsoft Windows Installer (.MSI) packages, the Enable Load Balancing option is the only option that is enabled on this page; the Use Source List and Use Application List options are disabled. To enable load balancing for a .MSI Application object, check this option and then use the Application object's Sources page (Common tab) to define the list of source locations where you've created additional installation packages for the application. Application Launcher/Explorer will randomly select source locations from the list to balance the workload.

Use Source List

Select this option to have Application Launcher/Explorer use a list of package sources for load balancing. You must have already created at least one package source (Common > Sources page).

Add

Click Add > browse to and select a package source > click OK to add it to the Source List.

Delete

Select a package source from the Source List > click Delete to remove it from the Source List.

Use Application List

Select this option to have Application Launcher/Explorer use a list of Application objects for load balancing. You must have already created additional Application objects for the application, with the application files being stored on a different server or volume than this application.

Add

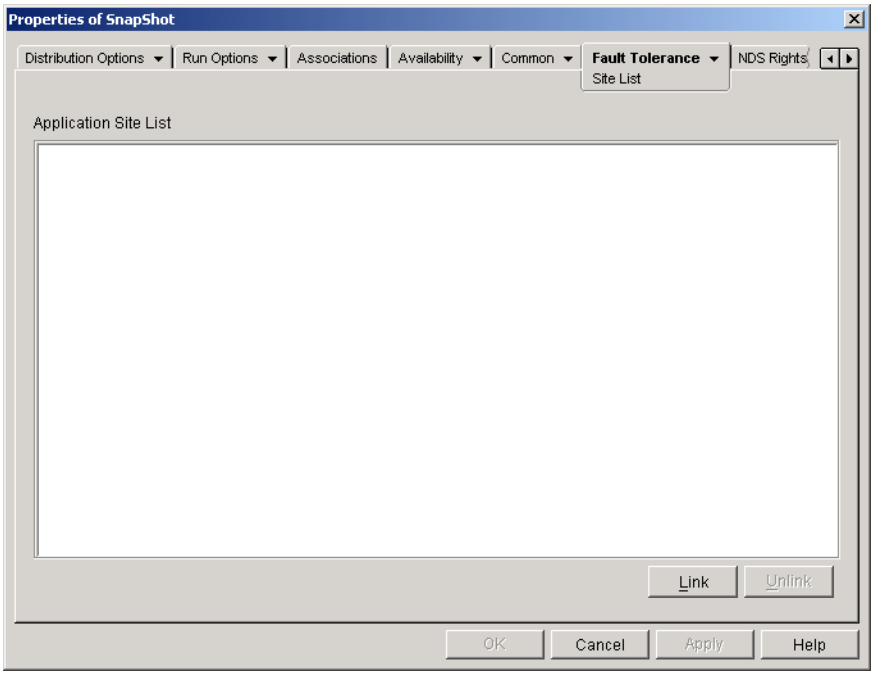
Click Add > browse to and select an Application object > click OK to add it to the Application List.

Delete

Select an Application object from the Application List > click Delete to remove it from the Application List.

Site List Page

The Site List property page, shown below, lists the other Application objects to which this Application object is linked. By linking identical (or similar) Application objects whose application source files are located on servers at different sites, you can create an application site list that gives users who travel from site to site fast access to their applications while reducing WAN traffic and associated costs.



For example, users at two different sites run a spreadsheet application from servers that are local to their sites. Different Application objects are used to distribute and launch the spreadsheet application from the two servers. If you link the two Application objects, any Site1 users who travel to Site2 will be able to run the application from the Site2 server the same way they would run it from their own Site1 server. The same would be true for Site2 users who travel to Site1.

You can link to one other Application object only. However, when you do so, the first Application object is automatically linked to any other Application objects that the second Application object is linked to. For example, you have three identical Application objects (App1, App2, and App3) at three different sites. You link App1 to App2, which creates the following site lists for each of the Application objects:

```
App1 linked to: App2
App2 linked to: App1
App3 linked to: (nothing)
```

Because you can link an Application object to only one other Application object, you now need to link App3 to either App1 or App2. Doing so creates the following site list for each of the Application objects:

```
App1 linked to: App2, App3
App2 linked to: App1, App3
App3 linked to: App1, App2
```

Link

Click Link > browse for and select the Application object you want to link to > click OK to add it to the Application Site List. The list will also include any other Application objects that the selected Application object is linked to.

Unlink

Click Unlink to remove the Application object's link to the Application objects displayed in the Application Site List.

15 Macros

You can use macros with many of the properties available on the Application object pages in ConsoleOne®. You can use any of the five types of macros listed below.

- Application object macros
- Special Windows* macros
- Login script macros
- NDS® attribute macros
- Environment variable macros.

Each macro type gives you various abilities. For example, Application object macros are basically variables to which you can assign values. By using an Application object macro, you have the flexibility to change the macro's value in one location and have it automatically changed anywhere you have used the macro. Special Windows macros, on the other hand, let you specify Windows locations, such as the Windows temporary directory, by specifying a variable name (for example, %*WINTEMP%) that exists on the workstation and defines the location on that workstation. This enables you to specify locations that may vary from workstation to workstation.

The following sections provide information about the five types of macros supported by Application objects, the precedence order, and the Application object properties where macros can be used.

Application Object Macros

An Application object macro is defined on the Application object's Macros page and can only be used with that Application object. The macro is simply a variable that has a value associated with it, as shown in the following two examples:

Variable	Value
SOURCE_PATH	\\server1\sys\public\zen\word
TARGET_PATH	c:\program files\word

In the examples, SOURCE_PATH defines the network location from which Novell® Application Launcher™/Explorer will distribute the application to the user's workstation, and TARGET_PATH defines the workstation location to which Application Launcher/Explorer will copy the files.

You can also create a macro that prompts the user to accept a default value you've assigned or to enter a different value. For example, you could use a macro that prompts the user with a default installation drive (such as C:) but lets the user change it to another drive (such as D:).

The following sections provide information about nesting other macros in Application object macros and instructions to help you define Application object macros:

- "Nesting Macros" on page 190
- "Defining an Application Object Macro" on page 190

Nesting Macros

When defining an Application object macro, you can embed other macros in the definition. In the following example, a special Windows macro, *WINDISK, is used when defining the TARGET_PATH macro:

```
%*WINDISK%\Program Files
```

Any time you use the TARGET_PATH macro in an Application object property field, Application Launcher/Explorer would substitute the current workstation's Windows drive letter for %*WINDISK% (for example, C:\TEMP).

When embedding another macro in the string, you must enclose the macro in % characters, as shown in the above example. You can embed special Windows macros, NDS attribute macros, environment variable macros, login script macros, and other Application object macros.

Defining an Application Object Macro

1. In ConsoleOne, right-click the Application object for which you want to define the macro > click Properties.
2. Click the Common tab > Macros to display the Macros page.
3. To define a macro consisting of a variable name and a value (a String Value macro), continue with "Defining a String Value (Non-Prompted) Macro" on page 190.

   or

   To define a macro that prompts the user to accept a default value or enter a different value, skip to "Defining a Prompted Macro" on page 191.

Defining a String Value (Non-Prompted) Macro

1. On the Macros page, click Add > String Value to display the Edit String Value dialog box.

2 In the Value Name box, type a name for the macro variable (for example, TARGET_PATH). Do not use spaces in the name.

3 In the Value Data box, type the value for the macro variable (for example, c:\program files\word).

4 Click OK to add the macro to the Macros list.

For information about using the macro in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Defining a Prompted Macro

1 On the Macros page, click Add > Prompted > Drive to create a macro that prompts the user for a drive or click String to create a macro that prompts the user for text input.

2 Fill in the following fields:

Macro Name: Enter any name that describes the macro. Do not use spaces in the name.

Prompt Text: Enter the text you want presented to the user. For example, if you are prompting for an installation drive you could enter the following: "This application will be installed to your C: drive. Enter a different drive letter if desired."

Default Value: For a prompted drive macro, select the drive that will be displayed as the default drive. For a prompted string macro, enter the text that will be displayed as the default text.

Minimum Disk Space in MB: Enter the minimum amount of free disk space required. The user will not be allowed to install to any drive that does not meet the minimum disk space requirement.

Maximum String Length in Chars (Prompted String Macro Only): Enter the maximum number of characters the user can enter as a response to a prompted string macro.

3 Click OK to add the macro to the Macros list.

For information about using the macro in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Special Windows Macros

A special Windows macro is one that defines Windows 95/98 and Windows NT*/2000/XP directories. The typical paths listed below are based on default installations and may or may not match your specific setup. On Windows 95/98 workstations, macros behave differently if User Profiles are enabled.

Suppose that you have installed Windows to drive D: (for example, D:\WINDOWS). However, an application installation expects Windows to be on drive C: (for example, C:\WINDOWS). Using the *WinDisk macro, you can substitute drive C: with the macro for the files that require it.

The following two sections describe the special Windows macros you can use.

- "Windows 95/98 and Windows NT/2000/XP Macros" on page 192
- "Windows 2000 Macros" on page 193

For information about using the macros in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Windows 95/98 and Windows NT/2000/XP Macros

The following macros apply to Windows 95/98 and Windows NT/2000/XP unless otherwise noted.

IMPORTANT: The asterisk character (*) is a required syntax for these macros. Don't confuse these asterisk characters with the Novell trademark asterisk. In addition, when using the macro in one of the Application object's property fields, you must enclose it in % characters (for example, %*WinDisk%).

Macro	Description
%*AppData %	File system directory that serves as a common repository for application specific data. Typically C:\WINNT\PROFILES*user name*\APPLICATION DATA. Used only by Windows NT version 4.
%*CommonDesktop%	File system directory that contains files and folders that appear on the desktop for all users. Typically C:\WINNT\PROFILES\ALL USERS\DESKTOP. If not available, the *DESKTOP value will be used.
%*CommonPrograms%	File system directory that contains the directories for the common program groups that appear on the Start menu for all users. Typically C:\WINNT\PROFILES\ALL USERS\START MENU\PROGRAMS. If not available, the *PROGRAMS value will be used.
%*CommonStartMenu%	File system directory that contains the programs and folders that appear on the Start menu for all users. Typically C:\WINNT\PROFILES\ALL USERS\START MENU. If not available, the *STARTMENU value will be used.
%*CommonStartup%	File system directory that contains the programs that appear in the Startup folder for all users. The system starts these programs whenever any user logs on to Windows NT or starts Windows 95/98. Typically this directory is C:\WINNT\PROFILES\ALL USERS\START MENU\PROGRAMS\STARTUP. If not available, the *STARTUP value will be used.
%*CommonWinDesktop%	Windows NT common desktop directory (C:\WINNT\PROFILES\ALL USERS\DESKTOP). This is a Novell Application Launcher 2.0 macro that is allowed for backward compatibility.
%*Cookies%	Files system directory that contains the user's cookies. Typically C:\WINDOWS\COOKIES or C:\WINNT\PROFILES*username*\COOKIES.
%*Desktop%	File system directory used to physically store file objects on the desktop (not to be confused with the desktop folder itself). Typically this directory is C:\WINDOWS\DESKTOP or C:\WINNT\PROFILES*username*\DESKTOP.
%*Favorites%	File system directory that serves as a common repository for the user's favorite items. Typically this directory is C:\WINDOWS\FAVORITES or C:\WINNT\PROFILES*username*\FAVORITES.
%*Fonts%	Virtual folder containing fonts. Typically C:\WINDOWS\FONTS or C:\WINNT\FONTS.
%*History%	File system directory that contains the user's history of visited Internet addresses. Typically C:\WINDOWS\HISTORY or C:\WINNT\PROFILES*username*\HISTORY.
%*NetHood%	File system directory containing objects that appear in the network neighborhood. Typically C:\WINDOWS\NETHOOD or C:\WINNT\PROFILES*username*\NETHOOD.
%*Personal%	File system directory that serves as a common repository for documents. Typically C:\MYFILES or C:\WINNT\PROFILES*username*\PERSONAL.
%*PrintHood%	File system directory that serves as a common repository for printer links. Typically C:\WINNT\PROFILES*username*\PRINTHOOD. Only used by Windows NT.
%*Programs%	File system directory that contains the user's program groups (which are also file system directories). Typically C:\WINDOWS\START MENU\PROGRAMS or C:\WINNT\PROFILES*username*\START MENU\PROGRAMS.

Macro	Description
%*Recent%	File system directory that contains the user's most recently used documents. Typically C:\WINDOWS\RECENT or C:\WINNT\PROFILES*username*\RECENT.
%*SendTo%	File system directory that contains Send To menu items. Typically C:\WINDOWS\SENTO or C:\WINNT\PROFILES*username*\SENDTO.
%*StartMenu%	File system directory containing Start menu items. Typically C:\WINDOWS\START MENU or C:\WINNT\PROFILES*username*\START MENU.
%*Startup%	File system directory that corresponds to the user's Startup program group. Typically C:\WINDOWS\START MENU\PROGRAMS\STARTUP or C:\WINNT\PROFILES*username*\START MENU\PROGRAMS\STARTUP.
%*TempDir%	Windows temporary directory (C:\WINDOWS\TEMP).
%*Templates%	File system directory that serves as a common repository for document templates. Typically C:\WINDOWS\SHELLNEW or C:\WINNT\SHELLNEW.
%*WinDesktop%	Windows desktop directory (C:\WINDOWS\DESKTOP or C:\WINNT\PROFILES*username*\DESKTOP for Windows NT). This is an Application Launcher 2.0 macro that is allowed for backward compatibility.
%*WinDir%	Windows directory. Typically C:\WINDOWS or C:\WINNT.
%*WinDisk%	Drive letter (plus colon) for the Windows directory. Typically C:.
%*WinSysDir%	Windows system directory. Typically C:\WINDOWS\SYSTEM or C:\WINNT\SYSTEM32.
%*WinSysDisk%	Drive letter (plus colon) for the Windows system directory. Typically C:.

Windows 2000 Macros

The following macros apply to Windows 2000 only.

IMPORTANT: The asterisk character (*) is a required syntax for these macros. Don't confuse these asterisk characters with the Novell trademark asterisk. In addition, when using the macro in one of the Application object's property fields, you must enclose it in % characters (for example, %*WinDisk%).

Macro	Description
%*AdminTools%	File system directory that contains the administrative tools that appear in the Control Panel when a specific user logs in to Windows 2000. Typically C:\DOCUMENTS AND SETTINGS*username*\START MENU\PROGRAMS\ADMINISTRATIVE TOOLS.
%*CommonAdminTools%	File system directory that contains the administrative tools that appear in the Control Panel for all users who log in to Windows 2000. Typically C:\DOCUMENTS AND SETTINGS\ALL USERS\START MENU\PROGRAMS\ADMINISTRATIVE TOOLS.
%*CommonAppData%	File system directory that contains the application-specific data for all users who log in to Windows 2000. Typically C:\DOCUMENTS AND SETTINGS\ALL USERS\APPLICATION DATA.
%*CommonDocuments%	File system directory that contains the documents shared by all users who log in to Windows 2000. Typically C:\DOCUMENTS AND SETTINGS\ALL USERS\DOCUMENTS.
%*CommonTemplates%	File system directory that contains the document templates shared by all users who log in to Windows 2000. Typically C:\DOCUMENTS AND SETTINGS\ALL USERS\TEMPLATES.

Macro	Description
%*MyPictures%	File system directory that contains a specific user's graphic files. Typically C:\DOCUMENTS AND SETTINGS*username*\MY DOCUMENTS\MY PICTURES.
%*ProgramFiles%	File system directory that contains the program files. Typically C:\PROGRAM FILES.
%*ProgramFilesCommon%	File system directory that contains the program files shared by multiple applications. Typically C:\PROGRAM FILES\COMMON.
%*UserProfile%	File system directory that contains the logged-in user's profile. Typically C:\DOCUMENTS AND SETTINGS*username*.

Login Script Macros

Application Launcher/Explorer supports many, but not all, login script variables.

- "Supported Login Script Macros" on page 194
- "Unsupported Login Script Macros" on page 195

For information about using the macros in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Supported Login Script Macros

The following is a list of supported login script variables and what they mean. Alternate variable names are shown in parentheses.

Macro	Description
%COMPUTER_NAME%	The name of the computer. For example: work_pc.
%DAY%	Numeric day of the month. For example: 01, 10, 15.
%FILESERVER% (%FILE_SERVER%)	Name of the NetWare file server or NDS monitored connection. For example: APPS_PROD.
%FULL_NAME%	Full name attribute of the User object. This is supported by virtue of Application Launcher/ Explorer's support for NDS attributes from the User object.
%HOUR24% (%24HOUR%)	Time of the day according to a 24-hour clock. For example: 02, 05, 14, 22.
%HOUR% (%HOURS%)	Hour of the day. For example: 0 = 12, 13 = 1.
%LAST_NAME%	Last name of the current user (also known as the user's NDS Surname attribute). For example: Jones.
%LOGIN_NAME%	First eight bytes of the user's NDS object name. For example: jsmith.
%MINUTE% (%MINUTES%)	Current minute. For example: 02, 59.
%MONTH%	Current month number. For example: 01 for January.
%NDAY_OF_WEEK%	Numeric day of the week. For example: 1 for Sunday, 2 for Monday.
%NETWORK% (%NETWORK_ADDRESS%)	Workstation network address. For example: 01010120.

Macro	Description
%OS_VERSION%	Version of the OS. For example: v5.00 (Win3*x* shows the DOS version, Win 95/98 and Win NT/2000 shows the Windows version).
%OS	OS type. For example: MSDOS, WIN95/98, WINNT, WIN2000. (Win3 shows MSDOS.)
%PLATFORM%	Platform running. For example: WIN, W95/98, WNT, W2000.
%PHYSICAL_STATION% (%P_STATION%)	MAC address. For example: 0000C04FD92ECA.
%REQUESTER_CONTEXT%	Context of the requester for the selected tree.
%SECOND% (%SECONDS%)	Number of seconds. For example: 03, 54.
%SHORT_YEAR%	Short year number. For example: 97, 00.
%WINVER%	Windows version. For example: v3.11, v4.00.
%WORKSTATION_ID%	The name of the workstation object.
%WORKSTATION_TREE%	The name of the tree in which the workstation is located.
%WORKSTATION_DN%	The distinguished name and context of the workstation object.
%YEAR%	Full year number. For example: 2000, 2001.

Unsupported Login Script Macros

The following is a list of login script macros that Application Launcher/Explorer does not support:

ACCESS_SERVER
AM_PM
DAY_OF_WEEK
DIALUP
ERROR_LEVEL
GREETING_TIME
LOCATION
LOGIN_ALIAS_CONTEXT
LOGIN_CONTEXT
MACHINE
MONTH_NAME
NEW_MAIL
OFFLINE
PASSWORD_EXPIRES
REQUESTER_VERSION
SHELL_VERSION
SMACHINE
STATION
USERID

NDS Attribute Macros

Application Launcher/Explorer supports macros that pull information from the attributes of the currently logged-in user, the current Application object, or from the attributes of other NDS objects.

The following sections explain the macro syntax and provide examples:

- "Syntax" on page 196
- "Examples" on page 196

For information about using the macros in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Syntax

NDS attribute macros use the following syntax:

`%object_name.container;NDS_attribute%`

Element	Description
%	Flags the text as a macro. The entire macro must be enclosed in % characters.
.object_name.container;	Indicates the NDS object from which to read the attribute. To use an attribute from the currently logged in user, leave this element out. For example, %CN% would return the common name of the currently logged in user. To use an attribute from the Application object, replace *.object_name.container* with an asterisk (*). For example, %*;DN% would return the distinguished name of the Application object.
NDS_attribute	Defines the attribute to be read. You can use the ConsoleOne Schema Manager (available from the Tools menu) to view an NDS object's available attributes.

Examples

The following table provides examples of NDS attribute macros.

Macro	Description
%CN%	Returns the common name of the currently logged-in user.
%DN%	Returns the distinguished name of the currently logged-in user.
%Given Name%	Returns the first name of the currently logged-in user.
%Surname%	Returns the last name of the currently logged-in user.
%Full Name%	Returns the full name of the currently logged-in user.

Macro	Description
%Email Address%	Returns the e-mail address of the currently logged-in user.
%*;DN%	Returns the distinguished name of the Application object (the one in which the macro is being used).
%*;App:Caption%	Returns the application icon title given the Application object.
*;App:Path%	Returns the path to the application's executable as defined for the Application object.
%*;App:GUID%	Returns the Application object's global unique identifier (GUID).
%.JSmith.Novell;Description%	Returns the description for the JSmtih User object located in the Novell container.
%.ABurrough.Novell;Email Address%	Returns the e-mail address for the ABurrough User object located in the Novell container.

Environment Variable Macros

Application Launcher/Explorer supports all valid Windows 95/98 and Windows NT/2000/XP environment variables. The value of the variable must not exceed the length of the Application object name; otherwise, the variable fails.

Here are a few examples:

- NWLANGUAGE
- TEMP
- PATH

When using an environment variable, you must enclose it in % characters (%PATH%).

For information about using the macros in a valid Application object property, see "Application Object Properties Where Macros Can Be Used" on page 198.

Macro Precedence

To resolve conflicts with macro names, Application Launcher/Explorer uses the following order of precedence:

- Application object macros
- Special Windows macros
- Login script macros
- NDS attribute macros
- Environment variable macros.

The macro types are listed in order of precedence. For example, Application object macros take precedence over special Windows macros, special Windows macros take precedence over login script macros, and so forth.

Application Object Properties Where Macros Can Be Used

You can use macros when defining the following Application object properties:

- Path to Executable (Run Options tab > Applications page)
- Command Line (Run Options tab > Applications page)
- Working Directory (Run Options tab > Applications page)
- Drive Mapping Path (Common tab > Drives/Ports page)
- Capture Port Path (Common tab > Drives/Ports page)
- Key, Value Name, and Value Data strings (Distribution Options tab > Registry Settings page)
- Section, Value Name, and Value Data strings (Distribution Options tab > INI Settings page)
- Source File, Target File, Directory Name (Distribution Options tab > Application Files page)
- Find File, Find Next File, Add string (Distribution Options tab > Text Files page)
- All properties (Distribution Options tab > Icons/Shortcuts page)

When entering a macro in a property field, you must enclose the macros in % characters (for example, %TARGET_PATH% or %*WINDISK%). This enables Application Launcher/Explorer to recognize and treat the macro as a macro.

Refreshing Macro Information

When Application Launcher/Explorer starts, it caches the macro information defined for each Application object associated with the logged in user or workstation. The Novell Client does this as well. As a result of this, if you change information associated with a macro, the change will not be reflected on a user's workstation until he or she logs out of NDS and logs in again.

For example, if you are using the %DN% (distinguished name) NDS attribute macro in a folder name and you move a User object from one NDS container to another, the change will not be reflected on the user's workstation until he or she logs out of the Novell Client™ and logs in again.

16 Application Launcher Tools

ZENworks® for Desktops (ZfD) provides several tools that may be helpful as you manage applications for your users. These tools, located on the Tools > Application Launcher Tools menu in ConsoleOne®, are explained in the following sections:

Export Application Object

This tool enables you to export an Application object's properties to a new .AOT or .AXT file. You can perform a default export, which exports all general properties, INI settings, registry settings, text file changes, shortcuts, environment variables, and application files, or you can perform a custom export, which enables you to choose which settings you want exported.

1. In ConsoleOne, select the Application object.
2. Click the Tools menu > Application Launcher Tools > Export Application Object.
3. Select the export option you want > click Next > follow the prompts to complete the export.

Show Inherited Applications

This tool enables you to see the applications that have been associated with a user or workstation, including applications associated with groups or containers that the user or workstation belong to. The applications are listed by mode of delivery, such as Force Run, App Launcher, Desktop, Start Menu, and System Tray.

1. In ConsoleOne, select a User object or Workstation object.
2. Click the Tools menu > Application Launcher Tools > Show Inherited Applications.

Search and Replace

This tool lets you search and replace text strings in an Application object's general settings, registry settings, INI settings, copy files settings, Icon settings, and text file settings. As settings

are found that match your search criteria, you are given the choice of whether or not to replace the text string.

1. In ConsoleOne, select the Application object.
2. Click the Tools menu > Application Launcher Tools > Search and Replace.
3. In the Search For box, type the text string you are searching for.
4. In the Replace With box, type the text string you want to use in place of the text string you are searching for.
5. Check the Match Case box to require the search results to match the case (uppercase and lowercase) of the text string you entered in the Search For box.
6. If you want to limit the Application object settings that are searched, click Options > deselect any settings you don't want searched > click OK to return to the Search and Replace dialog box.
7. To start the search, click Find Next.

   The dialog box expands to display the search results. If a setting is found that matches the search criteria, the setting's text is displayed in the Text Found box.
8. To replace the setting's text with the text listed in the Replace With box, click Replace.

   or

   To replace the text for all settings that match the criteria, click Replace All.

   or

   To skip replacing the setting's text, click Find Next.
9. Repeat Step 8 until all settings have been searched.

Sync Distribution GUIDs

This tool enables you to synchronize the GUIDs (global unique identifiers) of two or more Application objects. Synchronizing GUIDs causes all Application objects to be distributed and installed whenever one Application object is. This can be useful, for example, when you want to distribute a suite of applications to users.

1. In ConsoleOne, select the Application objects whose GUIDs you want to synchronize. Control-click to select multiple objects.
2. Click the Tools menu > Application Launcher Tools > Sync Distribution GUIDs.

Generate New GUIDs

This tool generates a new GUID for an Application object. If you've synchronized the GUIDs of several Application objects, you can use this tool unsynchronize the GUIDs so that distributing one of the Application objects will not distribute all of them.

This tool requires careful use. When an Application object is distributed to a workstation, its GUID is stored in the Windows registry. Novell® Application Launcher™/Explorer uses the GUID to determine whether or not the application has been distributed to the workstation. After the new GUID is generated, Application Launcher/Explorer may re-distribute the application because the GUID in the Windows registry will not match the new GUID for Application object.

1. In ConsoleOne, select the Application objects whose GUIDs you want to change. Control-click to select multiple objects.
2. Click the Tools menu > Application Launcher Tools > Generate New GUIDs.

AOT/AXT File Tools

This tool converts a .AOT file to a .AXT file or a .AXT file to a .AOT file.

1. In ConsoleOne, click the Tools menu > Application Launcher Tools > AOT/AXT File Tools.
2. To convert a .AOT file to a .AXT file, click AOT -> AXT.

   or

   To convert a .AXT file to a .AOT file, click AXT -> AOT.
3. In the Open dialog box, browse for and select the file you want to convert > click Open.
4. In the Save As dialog box, type a name for the new file > click Save As. The correct extension (.AOT or .AXT) will be added automatically.

Create Virtual CD

This tool lets you create a cache of applications that can be added to removable media (CD, Jaz* drive, Zip* drive, and so forth). The media can then be given to users who are disconnected from the network so that they can install the applications from the CD. For detailed information and instructions, see “Distributing Applications to Disconnected Workstations” on page 80.

A Documentation Updates

This section lists updates to the Application Management part of the *Administration* guide that have been made since the initial release of Novell® ZENworks® for Desktops 3.2. The information will help you to keep current on documentation updates and, in some cases, software updates (such as a Support Pack release).

The information is grouped according to the date when the *Administration* guide was updated and republished:

October 31, 2002 (ZfD 3.2 Support Pack 1)

Location	Change
"Setting Configuration Options" on page 37	Under step 5, added information about the new OnDemand UsageServer setting for Novell Application Launcher™/Explorer.
Chapter 9, "Configuring Application Fault Tolerance and Load Balancing," on page 83	Added a new section about using application fault tolerance, load balancing, and site lists.

Location	Change
“Icons/Shortcuts Page (.AOT/.AXT Application Object Only)” on page 122 and “Registry Page” on page 124 and “Application Files Page (.AOT/.AXT Application Object Only)” on page 127 and “INI Settings Page” on page 130 and “Text Files Page (.AOT/.AXT Application Object Only)” on page 132 and “Options Page” on page 138	Clarified the information about the Distribute Always and Track Distribution Per User settings found on the various Distribution pages of an Application object.
“Pre-Install Schedule Page (.AOT/.AXT Application Object Only)” on page 136 and “Schedule Page” on page 162	Clarified information about how the Range of Days > Time for Selected Range setting works. The selected times are used for one day or multiple days. If you select all seven days, the times are ignored and the application is available 24 hours a day for all seven days.

May 15, 2003

Location	Change
Global	Changed Windows NT/2000 to Windows NT/2000/XP to reflect support for Windows XP.
“Application Launcher/Explorer Command Line Switches” on page 46	Corrected the syntax for using the colon (nal : or nalexpld :) startup switch to suppress the initial splash screen. There must be a space between the executable name and the colon.
“Order Icon Display (Also Determines Force Run Priority)” on page 118	Corrected information regarding this field. It does not determine icon display order in Application Launcher/Explorer. It only determines the execution order of applications marked as Force Run.
GUID under “Options Page” on page 138	Corrected information about the GUID setting located on an Application object’s Options page (Distribution Options tab > Options page). The GUID does not change when the version number changes.
“Path to Executable File” on page 141	Under the Parameters heading, noted that the Parameter field’s character limit is 250.

August 15, 2003

Location	Change
“Imaging Page” on page 177	Provided more information about how application add-on images are applied during imaging of a workstation. Also explained the NALCACHE directory rights that non-administrative users need in order for Novell Application Launcher/Explorer to access application’s delivered as add-on images.

IV Workstation Imaging

The following sections provide information on ZENworks® for Desktops (ZfD) Workstation Imaging procedures and features that you might need to use generally or from time to time as required.

17 Preparing Images

ZENworks® for Desktops (ZfD) provides tools for creating and compressing images of computer hard disks as well as images of specific add-on applications or file sets. ZfD also provides tools for customizing such images and for making images available to auto-imaging operations through NDS®. The following sections explain how to perform these tasks.

Creating a Workstation (Base) Image

A *base* image is an image of all the partitions and data on a source computer's storage devices, such as hard disks and Jaz* drives. Normally, such an image is prepared with the intent to completely replace the contents of a target computer's storage devices.

The overall process to create a base image is:

1. Boot the source computer from an imaging device or method.

   The boot device or method can be PXE, diskettes, a CD, or a hard-disk partition.

2. Run the ZfD imaging engine to take an image of the computer.

   You can do this manually or automatically. In manual mode, you interrupt the bootup process and issue an imaging command at the Linux* prompt. In automatic mode, you set a flag in the computer's Workstation object in NDS and then let the bootup process proceed without interruption.

The instructions you should follow to complete this process depend on the boot device and imaging mode you want to use, as summarized in the table below.

Boot device or method / Imaging mode	For instructions, see
diskettes / manual	Manually Taking an Image of a Workstation in Testing Basic Imaging Operations in Workstation Imaging in *Getting Started*
CD, partition, or PXE / manual	Preparing an Imaging Boot Device or Method in Setting Up Workstations for Imaging in Workstation Imaging in *Deployment*
any device / automatic	Triggering an Unattended Imaging Operation in Testing Basic Imaging Operations in Workstation Imaging in *Getting Started*

Creating an Add-On Image

An *add-on* image is an archived collection of files that will be applied to an existing Windows* installation on a target computer. The existing partitions and files on the target computer are left intact, except for any files that the add-on image might update.

An add-on image typically corresponds to an application or utility, or simply to a set of data files or configuration settings. There are two ways to create an add-on image, each resulting in a different kind of add-on image:

- Produce the add-on image from an Application object

  You do this in ConsoleOne® by using the Imaging property page (on the Common tab) of the Application object. For details, click Help on that property page.

  An add-on image created in this manner is not fully installed on the target computer until after the computer reboots from being imaged and Application Launcher/Explorer starts up and runs the new Application object. Deploying the image is essentially another way to distribute an Application object.

- Drag files into a new image archive using Image Explorer

  You do this by starting Image Explorer, dragging files and folders from an existing Windows installation into the new image archive, and saving the archive to a file with a .ZMG extension. For more information, see "Image Explorer (IMGEXP.EXE)" on page 219.

  Generally, an add-on image created in this manner doesn't require any post-processing on the target computer. It is simply a set of files that are copied to the appropriate locations on the hard disk, much like what happens when you unzip a WinZip archive. One exception is that the add-on image can contain Windows registry (.REG) files that will be applied to the registry automatically when the computer reboots after being imaged, if the imaging agent is installed on the computer. For more information, see "Customizing an Image" on page 210.

Customizing an Image

After you have created a base or add-on image as explained in the previous sections, you can customize it using the Image Explorer utility. Specifically, you can:

- Compress the image

  You can compress an image (including images created by previous versions of ZfD) by 40-60% of the original file size. There are three compression options. Optimize for Speed takes the least amount of time but creates the largest compressed image file. This option is used by default when an image is created. Optimize for Space creates the smallest image file but may take a significant amount of time. Balanced is a compromise between compression time and image file size.

  (You can also use the options on the ZENworks Imaging Configuration property page for the workstation object in ConsoleOne to specify compression options if you do not want the default, Optimize for Speed.)

- Purge deleted files

  Excluded or hidden files and folders can be completely removed from an open image. This saves space in the image if you no longer want to include the files.

- Exclude individual files and folders from the image

In doing this, you create variants of the image by specifying which of ten possible *filesets* (variants) to exclude a given file or folder from. The variants exist merely as internal attributes of the same image archive.

WARNING: Do not exclude .BPB files from a base image or the workstation won't be able to boot the new operating system after receiving the image.

- Add files and folders to the image

  By default, any file or folder you add is included in all variants. To change this, you must explicitly exclude the file or folder from one or more variants.

- Add Windows registry (.REG) files

  The registry settings contained in the .REG files that you add are applied after the image is laid down and the target computer reboots to Windows, if the imaging agent has been installed on the computer.

  As with any other file or folder that you add, a .REG file is included in all variants of the image unless you explicitly exclude it from one or more variants.

For information on starting Image Explorer, see "Image Explorer (IMGEXP.EXE)" on page 219. For information on how to complete the above tasks after you have started the utility, see the online help in the utility.

Making an Image Available for Auto-Imaging

When you boot a computer from an imaging device or method and allow the bootup process to proceed in auto-imaging mode, the imaging operation that is performed on the computer is determined by policies and settings that you define in NDS.

In order to make an image available to such operations, you must expose it as a Workstation Image object in NDS. Otherwise, when you define imaging policies and settings in NDS, you won't have any way to refer to the image. Creating a Workstation Image object also allows you to combine a base image and one or more add-on images into a single entity that can be laid down on target computers. You can specify a standard image file to put down, or you can create a script to further customize your imaging operation. You can also specify that a particular variant of an image be used. The sections that follow give instructions for performing these tasks.

- "Creating a Workstation Image Object" on page 211
- "Associating an Add-On Image with a Base Image" on page 212
- "Specifying to Use a Variant of an Image" on page 213

Creating a Workstation Image Object

1. Create the base image that the Workstation Image object will refer to. For instructions, see "Creating a Workstation (Base) Image" on page 209.

   Although it isn't typical, you can create a Workstation Image object that refers only to one or more add-on images. However, if you want a base image to be laid down in the same operation as the add-on images, you should include both types of images in the Workstation Image object.

2. Copy the image file to a ZfD imaging server that is accessible as a server object in your NDS tree.

3 In ConsoleOne, open the NDS tree and browse to the container where you want to create the Workstation Image object.

4 Right-click the container > click New > Object > select Workstation Image from the list of object classes > click OK.

5 Enter a name for the new object.

Example: `Dell NT4 Image`

6 Click Define Additional Properties > OK.

7 Click Use Standard Imaging.

or

Click Use Scripted Imaging > specify the script you want to use. See the online help for examples of how you can use scripts. Skip to Step 10.

8 Under Base Image File, click the Browse button next to the field > select the imaging server where the image resides > select or specify the path and filename of the image > click OK.

For details on selecting or specifying the path and filename, click Help in the Image File Location dialog box.

If the Workstation Image object will consist only of add-on images, leave the Base Image File field blank, and skip to Step 5 of "Associating an Add-On Image with a Base Image" on page 212.

9 If you are using PXE but formerly booted from imaging (Linux) partitions on workstations, you can delete the imaging partition at the same time you put down an image. To do so, select the Delete the ZENworks Imaging Partition, If It Exists, From the Workstation check box. You can delete the partition only when the workstation is booted from an imaging boot device or method other than the Linux imaging partition.

10 Click OK to save the Workstation Imaging object.

Associating an Add-On Image with a Base Image

1 Create the add-on image that you will associate with the base image. For instructions, see "Creating an Add-On Image" on page 210.

2 Copy the image file to a ZfD imaging server that is accessible as a server object in your NDS tree.

You might want to copy the add-on image to the same location as the base image.

3 In ConsoleOne, open the NDS tree and browse to the Workstation Image object that refers to the base image. If you haven't created this object yet, do so as instructed in "Creating a Workstation Image Object" on page 211.

4 Right-click the object > click Properties.

5 Under Add-on Image Files, click the Add button > select the imaging server where the add-on image resides > select or specify the path and filename of the image > click OK.

For details on selecting or specifying the path and filename, click Help in the Image File Location dialog box.

You can associate more than one add-on image with a base image. The add-on images will be laid down after the base image in the order listed on this page.

6 Click OK to save the Workstation Imaging object.

Specifying to Use a Variant of an Image

As explained in "Customizing an Image" on page 210, you can exclude individual files and folders from any of 10 possible *filesets* (variants) of an image. The variants exist merely as internal attributes of the same image archive.

Because creating an image of a workstation can take a fair amount of time, it is more efficient in some cases to just create an image of a few workstations and customize those images to get all the variants you need. Even though the variants do not all exist as separate, physical image files, you can access them as though they were. How you do this depends on whether you are performing a manual or automated imaging operation, as explained below.

Type of imaging operation	How to specify the variant to use
Automatic (NDS-based)	In the Workstation Image object, specify the number of the variant in the Use File Set field. All NDS policies and settings that specify that Workstation Image object will use the specified variant. You can create multiple Workstation Image objects that point to the same base image but to different variants.
Manual (command-line or menu)	Use the `s` parameter on the `img restore` command. For example, to specify variant number 3: `img restorel dellnt4.zmg s3` or You can type **`img`** at the bash prompt to display a menu > select Restore an Image > Local Image. Specify s*fileset* (for example, s3) in the Advanced Parameters field. For details, see "Imaging Engine (img: Command Line and Menu)" on page 224.

18 Multicasting Images

ZENworks® for Desktops (ZfD) Imaging software includes an imaging multicast capability. The following sections explain what this is, why you might want to use it, and the overall procedure for using it.

What Is Multicasting?

To *multicast* an image is to take an image of one computer (the *master*), immediately send it over the network to multiple other computers (the *participants*), and lay it down simultaneously on those computers.

As with all imaging operations involving a base image, the image is taken of all the partitions on the hard disks and other storage devices (such as Jaz* drives) of the master computer. Before the image is laid down on the participating computers, all existing partitions are removed from the hard disks and writable storage devices of those computers.

To conduct a multicast session, you can set up an automatic session by defining the session in ConsoleOne®, or you can physically visit each computer.

You can specify an image file or a workstation as the session master. Multicasting an image file from an imaging proxy server is new in ZfD 3.2. In previous versions of ZfD, the master had to be a Linux* workstation, which restricted multicasting to exact "cloning" of the workstation.

NOTE: For multicasting to work properly, the routers and switches on the network must have multicast features configured. Otherwise, multicast packets might not be routed properly.

Why Use Multicast?

Multicasting is the way to use ZfD imaging services for mass reimaging with the least amount of overhead. It is useful if you have one computer with a clean software configuration that you want to duplicate on several other machines without needing to prepare an image or CD, and without needing to install or configure any ZfD software on a server or on the target computers.

If you are setting up a multicast session through ConsoleOne, you have the option of preparing an image and specifying it as the master. This allows you to customize the image you want to multicast as needed.

With multicasting, all you need is a physical network with modern routers and switches. (If you will be setting up multicasting by visiting each computer, you will also need three ZfD imaging boot diskettes, an imaging boot CD, or the computers must be PXE-enabled.) The computers that

will be imaged must be physically connected to the network. They can be computers with existing operating systems of any kind, or they can be new computers with no operating system installed.

Limitations

One significant limitation of using multicast without installing any ZfD software is that it results in a set of computers that have duplicate network identities—the IP addresses, Computer (NETBIOS) names, Workgroup memberships, and Security Identifiers (Windows NT/2000 only) are all the same and will cause conflicts if deployed on the network without change.

For a handful of computers, this might not be a problem. But for a larger number, if the computers have Windows*, we recommend that you install the ZfD imaging agent on them before doing the multicast. (You can use an Application object to do this easily. See Installing the Imaging Agent to Safeguard Workstation Identity Data in Setting Up Workstations for Imaging in Workstation Imaging in *Deployment*.) The imaging agent saves the computer's network identity settings before the multicast session and restores them afterwards.

Multicast Procedure

There are a couple of ways to conduct a multicast session. You can:

- Define an automatic session and the participating computers in ConsoleOne
- Physically visit each computer yourself and start the multicast sessions one at a time

Defining an Automatic Session

1. (Optional) Install the ZfD imaging agent on each of the participating computers.

   See "Why Use Multicast?" on page 215 for the reasons and for further instructions.
2. In ConsoleOne, right-click the Server object > click Properties > the ZENworks Imaging tab.
3. Click Add > type a name for the multicast session > click OK.
4. On the Multicast Session Settings page, specify the Master Image Source.

   You can specify an image file or a master workstation.

   A workstation cannot be the master if it is being used as a master in another multicast session or if it explicitly participates in any other session.
5. Decide how many participating workstations you want to have booted up before the multicast session begins. Specify this number in the Clients Have Joined text box.

   The default if you do not specify a number is 5 workstations.
6. If not enough workstations have booted up to fulfill the Clients Have Joined requirement, the multicast session will begin if a participating workstation boots up and certain amount of time passes without another participating workstation booting up. Specify this amount of time in the Minutes Have Elapsed Since a New Client Has Joined text box.

   The default if you do not specify a time is 15 minutes.
7. To delete the session after it has finished, select the last check box.
8. On the Multicast Session Participation page, click Add under Include the Following Workstations to explicitly add the workstation objects that you want to include in this multicast session.

   or

To create rules to select the workstations you want to participate in this multicast session, click Add under Include Machines Which Meet Any of These Criteria.

Click Help on the Participation page for more information.

9. Click OK to return to the ZENworks Imaging Multicast Sessions page.
10. The check box next to the multicast session name is automatically selected, showing that the session is enabled. If you want to disable a multicast session, deselect the check box next to the session name.
11. If multiple multicast sessions are defined that use rules to select participating workstations, it is possible that a workstation could qualify to participate in more than one session. If this occurs, the first enabled session in this list for which the workstation qualifies takes precedence over the other enabled sessions. If you want to change the position of a session in the list, select the multicast session name > click Move Up or Move Down.
12. Click OK.

Physically Visiting Each Computer

1. (Optional) Install the ZfD imaging agent on each of the participating computers.

   See "Why Use Multicast?" on page 215 for the reasons and for further instructions.
2. Create a set of ZfD imaging boot diskettes or an imaging boot CD for each person who will assist with the multicast session, or enable PXE on the participating computers.

   If you don't know how to do this, see Creating Imaging Boot Diskettes in Preparing for Basic Imaging Operations in Workstation Imaging in *ZENworks for Desktops 3.2 Getting Started Guide*, or Preparing an Imaging Boot Device or Method in *ZENworks for Desktops 3.2 Deployment Guide*.
3. At each computer, including the master computer, access a Linux prompt by using the imaging boot diskettes, imaging boot CD, or if it is PXE-enabled, boot it up.
4. Depending on the method you used in Step 3, enter **`manual`** at the boot prompt or select to start in Maintenance Mode from the PXE menu.
5. To start the multicast session, you have two choices:

   - You can enter the following command at the bash prompt of every computer:

     `img session` ***`name`***

     where *name* is any string that uniquely identifies this multicast session from other multicast sessions that might be in progress on the network. Use the same session name on each of the participating computers in this multicast session. You can specify any multicast session, including one that originates from the proxy server (as long as you specify the session name used by the proxy server).

     Example: `img session doug`

     The `img session` command can take other parameters that allow you to designate the master computer and the imaging start time beforehand. See "Imaging Engine (img: Command Line and Menu)" on page 224 for details.
   - You can type **`img`** at the bash prompt to display a menu > select Multicast Session > select Client if this is a participating computer or Master if this is the session master. Fill in the Session Name, Number of Clients (applies only to session master), and Timeout (applies only to session master) fields. See "Imaging Engine (img: Command Line and Menu)" on page 224 for details.

6 At the master computer, type **m** > press Enter.

7 At the master computer, after all the other computers have registered as participants, type **g** > press Enter.

The imaging engine begins creating the image of the master computer and the image is sent to and laid down on each participating computer. Any problems are reported back and displayed on the master computer.

8 At each participating computer, when the imaging is done, do the following to boot the computer with the new operating system:

8a At the Linux prompt, type **lilo.s** > press Enter.

8b Press Ctrl+Alt+Delete.

HINT: If the computer doesn't boot to the new operating system (that is, if the Linux prompt reappears), enter the **lilo.s** command again and reboot the computer a second time.

19 Imaging Utilities and Options

The following sections provide reference information on ZENworks® for Desktops (ZfD) Imaging utilities, commands, configuration settings, and log formats.

Image Explorer (IMGEXP.EXE)

Use the Image Explorer utility at a Windows* workstation to view or customize workstation images or to create add-on images.

IMGEXP.EXE is located in the ZENWORKS\IMAGING folder in your ZfD installation (on the imaging server).

Using the Image Explorer

To start the Image Explorer as a standalone utility (from Windows), double-click the IMGEXP.EXE file. There are no command line parameters. To start the utility from ConsoleOne®, click Tools > ZENworks Utilities > Imaging > Image Explorer.

After starting the utility, you can create a new add-on image or open an existing workstation image. You can compress an image. You can browse and view the Windows partitions, folders, and files in the open image. You can customize the image by adding or excluding individual files and folders and by adding Windows registry (.REG) files that will be applied after the image is laid down. You can associate these customizations with any of ten possible variants of the image. You can purge deleted and hidden files from an image. For information on how to perform these tasks, see the online help in the utility.

WARNING: Do not exclude .BPB files from a base image or the workstation won't be able to boot the new operating system after receiving the image.

NOTE: Non-Windows partitions, such as NetWare® partitions, are visible when you open an image, but their contents are not.

Imaging Agent (ZISWIN.EXE)

The imaging agent is an extension to the Windows bootup procedure on a workstation. It runs before any network communications are established. It enables you to:

- Make an existing Windows workstation safe for reimaging

  When you install the imaging agent on an existing Windows workstation, it saves certain workstation-unique data (such as the IP address and Computer name) to an area on the hard disk that is safe from reimaging. After the workstation is reimaged and Windows reboots, the agent restores the data from the image-safe area so the workstation can communicate on the network using the same identity as before.

- Automatically assign a network identity to a brand new workstation

  A new workstation (with no Windows operating system) doesn't have a network identity established yet. You can define network identity information for such a workstation in an NDS® policy and apply it when the workstation receives its first Windows image. In this scenario, the Windows image is laid down (including the imaging agent) on the workstation and the identity information from the NDS policy is written to the image-safe area on the hard disk. When the workstation reboots, the imaging agent reads the data from the image-safe area and applies it to the Windows installation, thus establishing the workstation's network identity automatically.

Before you install the imaging agent on a workstation, the files that comprise it are available in the ZENWORKS\IMAGING folder in your ZfD installation (on the imaging server). After you install the imaging agent on a workstation, it is located either in the Windows system folder or in NOVELL\ZENIS on the drive where Windows is installed.

Installing the Imaging Agent

To install the imaging agent so that it runs automatically each time Windows starts, follow the instructions in Setting Up Workstations for Imaging in Workstation Imaging in *Deployment*.

The data that the imaging agent saves to (or restores from) the image-safe area includes the following:

- Whether a static IP address or DHCP is used
- If a static IP address is used:
  - IP address
  - Subnet mask
  - Default gateway (router)
- Computer (NETBIOS) name
- Workgroup that the workstation belongs to, if any
- If the workstation has been registered in NDS:
  - Distinguished name of the Workstation object
  - Context of the Workstation object
  - NDS tree that the Workstation object belongs to

On a workstation that has just received a new Windows NT*/2000 base image, in addition to restoring the above data, the agent also locates and modifies all instances of the Security Identifier

(SID). This ensures that the workstation has a SID that is unique from other workstations that might receive the same image.

IMPORTANT: The imaging agent does not save or restore any Windows NT/2000 Domain information. If you change a workstation's domain and then restore an image, the workstation will receive whatever domain is embedded in the new image.

Imaging Boot Disk Creator (ZIMGBOOT.EXE)

Use the Imaging Boot Disk Creator at a Windows workstation to create or update imaging boot diskettes, so you can boot computers to perform imaging tasks. Also use this utility to create a PXE boot disk to be used with a computer that cannot be PXE enabled.

IMPORTANT: You can update imaging diskettes only in the sense that the same physical diskettes can be reused. When updating the second and third diskettes or the optional language diskette, you must reformat the diskette before updating it. The first diskette can be reused without reformatting.

ZIMGBOOT.EXE is located in the ZENWORKS\IMAGING folder in your ZfD installation (on the imaging server).

Starting the Imaging Boot Disk Creator

To start the boot disk creator as a standalone utility (from Windows), double-click the ZIMGBOOT.EXE file. There are no command line parameters. To start the utility from ConsoleOne, click Tools > ZENworks Utilities > Imaging > Create or Modify Boot Diskette.

HINT: If the Imaging Boot Disk Creator fills up too much of your screen, change your screen resolution to a setting greater than 800 X 600.

For the overall process to create imaging boot diskettes, see Creating Imaging Boot Diskettes in Workstation Imaging in *Getting Started*. When creating the diskettes, you can configure various aspects of the imaging bootup process, including:

- How to communicate on the IP network, if necessary
- How automated the imaging bootup process should be
- Which imaging server to contact during automated operations
- How large the imaging (Linux*) partition on the hard disk should be, if one will be created
- Which language support (English or otherwise) to load for the keyboard

For details on these and other configuration options, see the online help in the utility. The configuration settings you make in the utility are saved to the SETTINGS.TXT file on the third imaging diskette. You can edit this file after creating the diskettes if needed. For details on the format of this file, see "Imaging Bootup Parameters (SETTINGS.TXT)" on page 222.

If you need to create imaging diskettes to boot with a non-English keyboard but the language you need isn't listed in the utility, see "Imaging Bootup Languages (ZIMGLANG.INI)" on page 224.

Using ZIMGBOOT.EXE to Add Linux Drivers

Use the Add Linux Drivers function to specify the Linux drivers you want to place on the third boot diskette (if space allows) or on an additional Linux drivers diskette.

Using this function, you can search for and add the network path to Linux driver files that you have created or downloaded. The dialog box helps you to build a drivers list and categorize it by driver type (SCSI, Block, Network, PCMCIA, and Miscellaneous). You can also remove unwanted

drivers from the list. This master list of driver files can be added to a diskette that you can specify later.

The Add Linux Drivers function also lets you specify the drivers you want to load by default. You do this by selecting the name of a driver on the master list and then clicking the Load button. This moves the driver name to the default load list, where you can change the load order of the default drivers and further specify their individual loading parameters.

When your load list is ready, you can use a function in ZIMGBOOT.EXE to copy the additional Linux drivers to a diskette. All of the driver files are stored in different subdirectories of the \DRIVERS directory on the diskette:

- Network drivers are stored in \DRIVERS\NET
- PCMCIA drivers are stored in \DRIVERS\PCMCIA
- Block drivers are stored in \DRIVERS\BLOCK
- SCSI drivers are stored in \DRIVERS\SCSI
- Miscellaneous drivers are stored in \DRIVERS\MISC

These drivers can also be added to a bootable CD. For more information, see Preparing a Bootable CD in Preparing an Imaging Boot Device or Method in Setting Up Workstations for Imaging in *ZENworks for Desktops 3.2 Deployment Guide*.

Obtaining Linux Drivers

To obtain a Linux driver for your particular hardware, you should visit the Web site of the hardware vendor and check for a download site.

There are also some other Web sites where you can obtain drivers:

- Network drivers can be downloaded from the Scyld Computing Corporation* (http://www.scyld.com). Click Network Drivers.
- PCMCIA drivers can be downloaded from the Linux PCMCIA Information Page (http://pcmcia-cs.sourceforge.net).

You can also get additional Linux drivers at the Novell® ZENworks Cool Solutions Web Community (http://www.novell.com/coolsolutions/zenworks/features/a_linux_drivers_zw.html).

To learn more about drivers, including the loading parameters you need to specify, see the Linux Documentation Project (http://www.linuxdoc.org) and visit the following HOWTO (http://www.linuxdoc.org/HOWTO/HOWTO-INDEX/howtos.html) sites:

- Hardware
- PCMCIA
- SCSI
- Ethernet

Imaging Bootup Parameters (SETTINGS.TXT)

The SETTINGS.TXT file contains parameters that control how the imaging boot-up process occurs.

SETTINGS.TXT is installed to the root of the imaging boot device (CD, hard-disk partition, the third diskette, or on the PXE server).

SETTINGS.TXT Parameters

SETTINGS.TXT is a plain text file that contains various parameters, each on a separate line. Each parameter has the general format of `PARAMETER=value`. Lines that begin with a pound sign (#) are comments and are ignored during the imaging bootup process.

The format and function of each parameter in the SETTINGS.TXT file are described in the table below.

Parameter	Specifies
PROMPT	Whether to prompt for each configuration setting when you boot a computer from the imaging device. If you leave this parameter commented out or set it to No, the computer boots using the configuration settings specified in SETTINGS.TXT and you can't override the settings during bootup unless you type **`config`** at the boot prompt before the Linux operating system begins to load. If you set this parameter to Yes, you are automatically prompted for each configuration setting during bootup.
MANUALREBOOT	Whether you must reboot a computer manually after it was booted from the imaging device in automatic mode. (If the computer was booted from the imaging device in manual mode, you must always reboot the computer manually.) If you boot a computer from the imaging device and you let the bootup process proceed in automatic mode, the imaging engine starts up and checks the imaging server to see if an imaging operation should be performed on the computer. If so, it performs the imaging operation and then quits. If not, it quits without doing anything. What happens next depends on how you set this parameter. If you leave it commented out or set it to No, you are prompted to remove the imaging device (if necessary) and press any key to reboot the computer to the native operating system. If you set this parameter to Yes, the computer doesn't reboot automatically but instead displays the Linux prompt, allowing you to perform additional imaging-related tasks using the Linux menu or at the command line. This is helpful if you want to do things like check the current partition information or the image-safe data before booting to the native operating system.
PARTITIONSIZE	The number of megabtyes to allocate to the imaging (Linux) partition if you choose to create one locally on a computer when you boot the computer from the imaging device. The default size is 15 MB, which is the smallest you should make the partition. The maximum size allowed is 2048 MB (2 GB). If you plan to store an image in the Linux partition, such as to enable the computer to be restored to a certain state without connecting to the network, you might want to specify a larger size on this parameter. Example: `PARTITIONSIZE=500`
IPADDR	The IP address used by a computer to communicate on the network when you boot the computer from the imaging device, if a static IP address is needed. Example: `IPADDR=137.65.95.126` If you want DHCP to be used, leave this and the next two parameters commented out.
NETMASK	The subnet mask to be used by the computer, if the computer is using a static IP address. Example: `NETMASK=255.255.252.0` If DHCP is being used, leave this parameter commented out.
GATEWAY	The IP address of the gateway (router) to be used by the computer, if the computer is using a static IP address. Example: `GATEWAY=137.65.95.254` If DHCP is being used, leave this parameter commented out.

Parameter	Specifies

PROXYADDR	The IP address or full DNS name of the imaging (proxy) server to connect to when you boot a computer from the imaging device in auto-imaging mode.
	
	Examples:
	`PROXYADDR=137.65.95.127`
	`PROXYADDR=imaging.xyz.com`
	
	This parameter is used to set the PROXYADDR environment variable in Linux when the computer is booted from the imaging device. The imaging engine then reads this variable to determine which server to contact if it's running in automatic mode. Whether it's running in automatic or manual mode, the imaging engine attempts to log the imaging results to the server specified in this variable.

LANGDISK	Whether to prompt for a language diskette when you boot a computer from the imaging device. Set this parameter to Yes only if the computer has a non-English keyboard and you have created a language diskette to support that keyboard as explained in the online help for the Imaging Boot Disk Creator (ZIMGBOOT.EXE) utility. If you need to support a language that's not listed in the Imaging Boot Disk Creator utility, see "Imaging Bootup Languages (ZIMGLANG.INI)" on page 224.

Imaging Bootup Languages (ZIMGLANG.INI)

The ZIMGLANG.INI file defines the non-English keyboards that are supported for the imaging bootup process. You can create language diskettes for each of these languages using the Imaging Boot Disk Creator (ZIMGBOOT.EXE) utility. You can add support for additional languages to this file as explained in Setting Up Workstations for Imaging in Workstation Imaging in *Deployment*.

ZIMGLANG.INI is located in the ZENWORKS\IMAGING folder in your ZfD installation (on the imaging server).

Using ZIMGLANG.INI

This is a standard Windows INI format file. Each section of the file defines the keyboard support for a single language, including the keyboard mappings, fonts, and Unicode mappings to use. For example, the German keyboard is defined like this:

```
[German]
keymap=keymaps/de.kmap.gz
Font=consolefonts/iso01.f16.psf.gz
ACM=consoletrans/iso01.acm.gz
```

You can add support for additional languages to this file as explained in Setting Up Workstations for Imaging in Workstation Imaging in *Deployment*.

Imaging Engine (img: Command Line and Menu)

After booting a computer from an imaging device, use the img command at the Linux bash prompt to do any of the following:

- Take an image of the computer's hard disks
- Lay down an image on the computer's hard disks
- View or manipulate the computer's hard disk partitions
- View the computer's hardware configuration or image-safe data

- Display a menu from which you can also perform all of these tasks

The imaging engine is installed to the bin folder on the imaging boot device. If the imaging boot device is diskettes or a CD, the bin folder is actually archived in the root.tgz file, which is expanded during the imaging bootup process.

Because the imaging engine is a Linux application, the command syntax is case-sensitive. The overall syntax is:

`img [mode]`

where *mode* is any of the modes described in the sections below.

NOTE: Each mode can be abbreviated to the first letter of its name. For example, `img dump` can be abbreviated `img d`.

- "Help Mode" on page 225
- "Auto Mode" on page 226
- "Make Mode" on page 226
- "Restore Mode" on page 229
- "Dump Mode" on page 233
- "Partition Mode" on page 233
- "ZENPartition Mode" on page 234
- "Information Mode" on page 235
- "Session (Multicast) Mode" on page 236

Displaying the Menu for img Commands

To access a menu from which to perform all of these tasks, enter **`img`** with no parameters.

Help Mode

Use Help mode to get information about the `img` command if you don't have this documentation available.

To use the Help mode:

1. Enter **`img`** to display a menu > select Help > a mode name.

   or

   Enter the following:

   `img [help [mode]]`

   where *mode* is the mode whose command syntax you want help with.

Example	Explanation
`img help`	Displays a short description of each mode.
`img help m`	Displays information on how to use the make mode.
`img help p`	Displays information on how to use the partition mode.

Auto Mode

Use Auto mode to image the computer automatically, based on any applicable NDS policies and settings. The imaging engine runs in this mode if you let the imaging bootup process proceed without interruption, or if you type the command below at the Linux prompt.

To use the Auto mode:

1. Enter **`img`** to display a menu > select Auto.

   or

   Enter the following:

   ```
   img auto
   ```

In this mode, the imaging engine queries the imaging server specified in the PROXYADDR environment variable for any work to do. The imaging server checks the relevant NDS policies and settings to determine what imaging tasks should be performed (if any), such as taking or laying down an image. It then instructs the imaging engine to perform those tasks. If any tasks involve storing or retrieving images on other imaging servers, the imaging server refers the imaging engine to those servers to complete those tasks. After the imaging engine has completed its work, it communicates the results to the original imaging server, and the results are logged on that server.

For information on configuring the NDS policies and settings that control what happens in this mode, see Setting Up Imaging Services in Workstation Imaging in *Deployment*.

Make Mode

Use the Make mode to take an image of the computer and store it in a specified location. Normally, all partitions on hard disks and other storage devices (such as Jaz* drives) are included in the image, but there are some exceptions noted below.

The image size will correspond roughly to the size of the data in the Windows partitions plus the entire size of any non-Windows partitions (such as NetWare partitions). Linux partitions and Compaq* configuration partitions are always excluded. The data from Windows partitions is stored in an intelligent, file-by-file format so you can customize it later using the Image Explorer (IMGEXP.EXE) utility. Non-Windows partitions are stored in a raw, bit-by-bit format that cannot be customized.

The syntax of this mode depends on whether you will store the image locally or on an imaging (proxy) server, as explained in the subsections below:

- “Make Locally” on page 226
- “Make on Proxy” on page 228

Make Locally

Use the Make Locally mode to take an image of the computer and store it in a partition on a local (writable) device, such as a hard disk or Jaz drive. For more information, see Setting Up Disconnected Imaging Operations in Setting Up Imaging Services in Workstation Imaging in *Deployment*.

To use the Make Locally mode:

1. Enter **`img`** to display a menu > select Make an Image > Local Image. Select the partition to store the image in, or Local Linux File System to store the image in the local ZfD imaging (Linux) partition. Type the image path and filename. If you are using compression, select a

compression option. (Optimize for Speed takes the least amount of time but creates the largest image file. Optimize for Space creates the smallest image file but may take a significant amount of time. Balanced is a compromise between compression time and image file size.) Specify any advanced parameters, such as x*partition*. If you want, specify additional information in the Description (a description of the image), Machine Name (the computer on which the image is being stored), Author (the name of the person entering this information), and Comments (any additional comments) fields.

or

Enter the following:

`img makel[`*`pNumber`*`] [comp=`*`comp level`*`] `*`filepath`*` [x`*`partition`*`]`

Parameter	Specifies
makel[*pNumber*]	The partition number (as displayed by `img dump`) of the local partition to store the image in. It must be a primary FAT16 or FAT32 partition. This partition is excluded from the image that's created. If you omit the partition number from this parameter, the image is stored in the local ZfD imaging (Linux) partition.
[comp=*comp level*]	*comp level* is the amount of compression used when creating the image. Specify any number from 0-9. 0 means no compression. 1 is the same as Optimize for Speed and is used by default if you do not specify this parameter. 6 is the same as Balanced. 9 is the same as Optimize for Space. See the paragraph in Step 1 for more information.
filepath	The image filename, including a .zmg extension and the complete path from the root of the partition. The directories in the path must exist. If the file already exists, it will be overwritten.
x*partition*	The partition number (as displayed by `img dump`) of a local partition to exclude from the image. You can repeat this parameter as needed to exclude multiple partitions. If you omit this parameter, all partitions are included in the image except the one where the image will be stored.

Example	Explanation
`img makel8 /imgs/dellnt.zmg`	Takes an image of all partitions except the one in slot 8 and saves the image to imgs/dellnt.zmg in the partition in slot 8. (Assumes slot 8 contains a primary FAT16 or FAT32 partition.)
`img makel /imgs/dellnt.zmg`	Takes an image of all partitions and saves it to imgs/dellnt.zmg in the ZfD imaging (Linux) partition. (Assumes the ZfD partition has been installed.)
`img makel /imgs/dellnt.zmg x2 x3`	Takes an image of all partitions except those in slots 2 and 3 and saves the image to imgs/dellnt.zmg in the ZfD imaging (Linux) partition. (Assumes the ZfD partition has been installed.)

Make on Proxy

Use the Make on Proxy mode to take an image of the computer and store it on an imaging (proxy) server. For more information, see Manually Taking an Image of a Workstation in Testing Basic Imaging Operations in Workstation Imaging in *Getting Started*.

To use the Make on Proxy mode:

1. Enter **`img`** to display a menu > select Make an Image > Proxy Image. Type the IP address or DNS name of your imaging server. Type the UNC path and filename where the new image is to be stored on the imaging (proxy) server. If you are using compression, select a compression option. (Optimize for Speed takes the least amount of time but creates the largest image file. Optimize for Space creates the smallest image file but may take a significant amount of time. Balanced is a compromise between compression time and image file size.) Specify any advanced parameters, such as x*partition*. If you want, specify additional information in the Description (a description of the image), Machine Name (the computer on which the image is being stored), Author (the name of the person entering this information), and Comments (any additional comments) fields.

   or

   Enter the following:

   `img makep address [comp=comp level] filepath [xpartition]`

Parameter	Specifies
address	The IP address or DNS name of the imaging server to store the image on.
[comp=*comp level*]	*comp level* is the amount of compression used when creating the image. Specify any number from 0-9. 0 means no compression. 1 is the same as Optimize for Speed and is used by default if you do not specify this parameter. 6 is the same as Balanced. 9 is the same as Optimize for Space. See the paragraph in Step 1 for more information.
filepath	The image filename, including a .zmg extension and the complete path in UNC style. The directories in the path must exist. If the file already exists, the imaging server won't overwrite it unless you enable this behavior in the imaging server's policy in NDS. If no folders are specified in the path, the image is created at the root of the volume or drive where the ZfD imaging server software is installed. **IMPORTANT:** Because Linux doesn't recognize backslashes, you must use forward slashes in the UNC path or enclose the entire path in quotes.
x*partition*	The partition number (as displayed by `img dump`) of a local partition to exclude from the image. You can repeat this parameter as needed to exclude multiple partitions. If you omit this parameter, all partitions are included in the image.

Example	Explanation
`img makep 137.65.95.127 //xyz_server/sys/imgs/dellnt.zmg`	Takes an image of all partitions and saves it to sys/imgs/dellnt.zmg on xyz_server. (Assumes 137.65.95.127 is the IP address of xyz_server.)

Example	Explanation
`img makep img.xyz.com //xyz_server/sys/imgs/dellnt.zmg x2 x3`	Takes an image of all partitions except those in slots 2 and 3 and saves the image to sys/imgs/dellnt.zmg on xyz_server. (Assumes img.xyz.com is the DNS name of xyz_server.)

Restore Mode

Use the Restore mode to retrieve an image from a specified location and lay it down on the computer.

Normally, if the image to be laid down is a base image (one created previously by the imaging engine), all existing partitions except Linux and Compaq configuration partitions are removed from all local writable devices (such as hard disks and Jaz drives) before the new image is laid down. When the image is laid down, the sizes of the original partitions from which the image was taken are preserved if possible. If there's insufficient space, the last partition is shrunk to fit unless this would result in data loss, in which case the imaging engine denies the requested operation. If there's extra space left after all partitions in the image have been restored to their original sizes, that space is left unpartitioned.

If the image to be laid down is an add-on image (one produced from an Application object or created by the Image Explorer (IMGEXP.EXE) utility), or if it's a base image and you specify the a*partition*:p*partition* parameter, none of the existing physical partitions are removed. Instead, the appropriate partitions are merely updated with the files from the image. The update process does not remove any existing files or overwrite any existing files of the same names if they are newer.

The syntax of this mode depends on whether you will retrieve the image from a local device or from an imaging (proxy) server, as explained in the subsections below:

- "Restore from Local" on page 229
- "Restore from Proxy" on page 231

Restore from Local

Use the Restore from Local mode to retrieve an image from a local device and lay it down on the computer. For more information, see Setting Up Disconnected Imaging Operations in Setting Up Imaging Services in Workstation Imaging in *Deployment*.

To use the Restore from Local mode:

1. Enter **`img`** to display a menu > select Restore an Image > Local Image. Select Local Linux File System if the image is stored in the local ZfD imaging (Linux) partition, or select the partition where the image is stored. Type the image path and filename. Specify any advanced parameters, such as s*fileset* or a*partition*:p*partition*.

   or

   Enter the following:

   `img restorel[`*`pNumber`*`] `*`filepath`*` [s`*`fileset`*`] [a`*`partition`*`:p`*`partition`*`]`

Parameter	Specifies
restorel[*pNumber*]	The partition number (as displayed by `img dump`) of the local partition to retrieve the image from. It must be a primary FAT16 or FAT32 partition. This partition will not be changed by the imaging operation. If you omit the partition number from this parameter, the image is retrieved from the local ZfD imaging (Linux) partition.
filepath	The filename of the image to retrieve, including the .zmg extension and the complete path from the root of the partition.
s*fileset*	The number of the image fileset (variant) to lay down. Valid values are 1 through 10. For information on creating variants of an image, see Chapter 17, "Preparing Images," on page 209. If you omit this parameter, fileset 1 is used.
a*partition*:p*partition*	A mapping between a partition in the image archive (a*partition*) and a target physical partition on the local machine (p*partition*). Use this parameter to selectively restore a specific part of the image to a specific local partition. **IMPORTANT:** If you use this parameter, none of the existing local partitions are removed, and only the target local partition is updated. The update process does not remove any existing files or overwrite any existing files of the same names if they are newer. If you want to remove all existing files from the target partition before updating it, first use `img pd` and `img pc` to delete and recreate the partition. For a*partition*, use the partition number displayed for the source partition in the Image Explorer (IMGEXP.EXE) utility. For p*partition*, use the partition number displayed by `img dump` for the target partition. The target partition must be a Windows partition. You can repeat this parameter as needed to request multiple selective restorations in a single operation. In doing so, you can apply multiple parts of the image to a single local partition, but you can't apply the same part of an image to multiple local partitions in a single operation.

Example	Explanation
`img restorel8 /imgs/dellnt.zmg`	Removes all existing local partitions except the one in slot 8, retrieves the image from imgs/dellnt.zmg in slot 8, and lays down the partitions and contents of that image on the available local writable devices. (Assumes there's sufficient local space and that slot 8 contains a primary FAT16 or FAT32 partition.)
`img restorel /imgs/dellnt.zmg`	Removes all existing local partitions, retrieves the image from imgs/dellnt.zmg in the ZfD imaging (Linux) partition, and lays down the partitions and contents of that image on the available local writable devices (assuming there's sufficient space).
`img restorel /imgs/dellnt.zmg s2`	Removes all existing local partitions, retrieves the image from imgs/dellnt.zmg in the ZfD imaging (Linux) partition, and lays down the partitions and contents of variant 2 of that image on the available local writable devices (assuming there's sufficient space).

Example	Explanation
`img restorel /imgs/dellnt.zmg a2:p1 a3:p1`	Retrieves the image from imgs/dellnt.zmg in the ZfD imaging (Linux) partition, updates local partition 1 with the data from partitions 2 and 3 of that image, and leaves the other local partitions unchanged. (Assumes there's sufficient space in local partition 1.)

Restore from Proxy

Use the Restore from Proxy mode to retrieve an image from an imaging (proxy) server and lay it down on the computer. For more information, see Manually Putting an Image on a Workstation in Testing Basic Imaging Operations in Workstation Imaging in *Getting Started*.

To use the Restore from Proxy mode:

1. Enter **`img`** to display a menu > select Restore an Image > Proxy Image. Type the IP address or DNS name of the imaging (proxy) server. Type the UNC path and filename where the image is to be retrieved from. Specify any advanced parameters, such as s*fileset* or a*partition*:p*partition*.

   or

   Enter the following:

   `img restorep address filepath [sfileset] [apartition:ppartition]`

Parameter	Specifies
address	The IP address or DNS name of the imaging server to retrieve the image from.
filepath	The filename of the image to retrieve, including the .zmg extension and the complete path in UNC style. **IMPORTANT:** Because Linux doesn't recognize backslashes, you must use forward slashes in the UNC path or enclose the entire path in quotes.
s*fileset*	The number of the image fileset (variant) to lay down. Valid values are 1 through 10. For information on creating variants of an image, see Chapter 17, "Preparing Images," on page 209. If you omit this parameter, fileset 1 is used.

Parameter	Specifies
a*partition*:p*partition*	A mapping between a partition in the image archive (a*partition*) and a target physical partition on the local machine (p*partition*). Use this parameter to selectively restore a specific part of the image to a specific local partition. **IMPORTANT:** If you use this parameter, none of the existing local partitions are removed, and only the target local partition is updated. The update process does not remove any existing files or overwrite any existing files of the same names if they are newer. If you want to remove all existing files from the target partition before updating it, first use the Partition Mode to delete and recreate the partition. For a*partition*, use the partition number displayed for the source partition in the Image Explorer (IMGEXP.EXE) utility. For p*partition*, use the partition number displayed by `img dump` for the target partition. The target partition must be a Windows partition. You can repeat this parameter as needed to request multiple selective restorations in a single operation. In doing so, you can apply multiple parts of the image to a single local partition, but you can't apply the same part of an image to multiple local partitions in a single operation.

Example	Explanation
`img restorep 137.65.95.127 //xyz_server/sys/imgs/dellnt.zmg`	Removes all existing local partitions, retrieves the image from sys/imgs/dellnt.zmg on xyz_server, and lays down the partitions and contents of that image on the available local writable devices. (Assumes there's sufficient local space and that 137.65.95.127 is the IP address of xyz_server.)
`img restorep img.xyz.com //xyz_server/sys/imgs/dellnt.zmg s2`	Removes all existing local partitions, retrieves the image from sys/imgs/dellnt.zmg on xyz_server, and lays down the partitions and contents of variant 2 of that image on the available local writable devices. (Assumes there's sufficient local space and that img.xyz.com is the DNS name of xyz_server.)
`img restorep img.xyz.com //xyz_server/sys/imgs/dellnt.zmg a2:p1`	Retrieves the image from sys/imgs/dellnt.zmg on xyz_server, updates local partition 1 with the data from partition 2 of that image, and leaves the other local partitions unchanged. (Assumes there's sufficient space in local partition 1 and that img.xyz.com is the DNS name of xyz_server.)

Dump Mode

Use the Dump mode to view information about the storage devices and partitions on the computer.

To use the Dump mode:

1. Enter **`img`** to display a menu > select Dump > select No Geometry or Show Geometry.

   or

   Enter the following:

   `img dump [geo]`

Parameter	Specifies to
dump	List the existing partitions on all local writable devices, such as hard disks and Jaz drives. For each partition, the type, size, and slot number of the partition are given. **NOTE:** Linux and Compaq configuration partitions are not listed.
geo	Display additional information about the geometry (cylinders, heads, and sectors) and capacity of each storage device, including read-only devices such as CD drives.

Example	Explanation
`img dump`	Lists the current partitions on all local writable devices.
`img dump geo`	Lists all storage devices, their geometry and capacity, and the current partitions on the writable devices.

Partition Mode

Use the Partition mode to create, delete, or activate (make bootable) a partition on the computer.

To use the Partition mode:

1. Enter **`img`** to display a menu > select Partition > select an operation. See the table below for more information.

   or

   Enter the following:

   `img p`*`operation`*

   where *operation* is one of the following:

Operation	Specifies to
c*pNumber type* [*size*] [cluster=*clusterSize*]	Create a new partition, where: ◆ *pNumber* is the number of the partition slot (as displayed by `img dump`) to create the partition in ◆ *type* is FAT12, FAT16, FAT32, NTFS, or Extended If you are creating an extended partition, you can create a logical drive inside of the extended partition. See the next table for an example. ◆ *size* is a valid size for the partition type in MB If you omit this parameter, the largest valid size for the partition type is used, given the available unpartitioned space on the drive. ◆ *clusterSize* is the cluster size for an NTFS partition. This parameter is not valid for any other partition type. Don't use this parameter unless you have a specific reason to do so. It must be a power of 2 (2, 4, 8, 16, ...128). If you omit this parameter, the imaging engine uses a reasonable cluster size for the NTFS partition size. The new partition is also formatted enough to be recognizable by other operating systems, but you must put a base image in the partition before Windows can store any files in it.
d*pNumber*	Delete the partition from slot number *pNumber*. Use `img dump` to get the slot number.
a*pNumber*	Activate (make bootable) the partition in slot number *pNumber*. Use `img dump` to get the slot number.

Example	Explanation
`img pc1 fat16`	Creates a FAT16 partition in slot 1 using all the available unpartitioned space on the drive.
`img pc5 fat32 5671`	Creates a FAT32 partition in slot 5 using 5,671 MB on the drive.
`img pd3`	Deletes the partition from slot 3.
`img pa5`	Activates (makes bootable) the partition in slot 5. (Assumes a partition exists in that slot.)
`img pc2 extended 2500`	Creates an extended partition with a 2000 NTFS logical drive and a 500 MB FAT16 logical drive.
`img pc2 NTFS 2000 cluster=1`	
`img pc2 fat16 500`	

ZENPartition Mode

Use the ZENPartition mode to enable, disable, or remove the installed ZfD imaging partition.

To use the ZENPartition mode:

1. Enter **`img`** to display a menu > select ZENPartition > read the text that displays > select Continue > select an operation > OK.

   or

   Enter the following:

   `img zenPartition` ***`operation`***

   where *operation* is `enable`, `disable`, or `remove`.

2. Enter **`lilo.s`** to make this change effective.

IMPORTANT: If you remove an installed ZfD imaging partition, you must immediately restore a base image with a valid non-LILO MBR (Master Boot Record). If you do not, the computer will not be able to boot properly.

Information Mode

Use the Information mode to view the following:

- Information about the hardware devices on the computer

  This information is detected during the imaging bootup process. If the imaging engine runs in auto-imaging mode, this information is sent to the imaging server to help determine which image to put on the computer, if necessary.

- The data currently stored in the image-safe area on the computer

  This data is saved by the imaging agent during each Windows session to ensure that it can be restored after the computer is reimaged. If the computer is new and doesn't have Windows yet, an initial set of data is supplied from an NDS policy via the imaging server to the imaging engine when the first base Windows image is laid down.

- Name of the base image that was last laid down on the computer

To use the Information mode:

1. Enter **`img`** to display a menu > select Information > select All, Hardware, or ZISD. See the table below for details.

   or

   Enter the following:

   `img info [zisd]`

Parameter	Specifies to
info	List the detected hardware devices on the computer, including: ◆ CPU chipset ◆ Video adapter ◆ Network adapter ◆ MAC address ◆ Sound card ◆ Hard drive controller ◆ Hard disk capacity ◆ RAM

Parameter	Specifies to
zisd	List the data currently stored in the image-safe area on the computer. The items that comprise this data are listed in "Imaging Agent (ZISWIN.EXE)" on page 220. In addition to the image-safe data, the last base image that was laid down on the computer is also listed.

Example	Explanation
`img info`	Lists the detected hardware devices on the computer.
`img info zisd`	Lists the ZfD image-safe data currently stored on the computer and the last base image that was laid down.

Session (Multicast) Mode

Use the Session (Multicast) mode to take an image of one computer and lay it down on multiple other computers simultaneously over the network in a single operation without NDS or ZfD server involvement. For more information, see Chapter 18, "Multicasting Images," on page 215.

For multicasting to work, each participating computer must boot from an imaging device and run the imaging engine in this mode, as explained below. The computer from which the image is taken is called the *master*, and the computers that receive the image are called *participants*.

NOTE: For multicasting to work properly, the routers and switches on the network must have multicast features configured. Otherwise, multicast packets might not be routed properly.

To use the Session (Multicast) mode:

1. Enter **`img`** to display a menu > select Multicast Session > select Master or Client. Fill in the Session Name, Number of Clients, and Timeout fields. See the table below for details.

   or

   Enter the following:

   `img session` ***`name`*** **`[master|client] [clients=`**`count`**` [t=`**`minutes`**`]]`**

Parameter	Specifies
name	The name of the multicast session. Each computer joining the session uses the same value for this parameter. You can specify any multicast session, including one that originates from the proxy server (as long as you specify the session name used by the proxy server). **NOTE:** The name must be unique among concurrent multicast sessions. It is hashed by the imaging engine to produce a Class D (temporary) IP address for the multicast session. To facilitate troubleshooting (wire sniffing), all ZfD imaging multicast addresses start with 231. For example, the session name `doug` produces the multicast address 231.139.79.72.
master|client	That this computer is the session master or a session client. If you omit this parameter, the imaging engine waits for a user on one of the computers to press `m` to designate that computer as the master.

Parameter	Specifies
clients=*count*	The number of participating computers that must register with the master before imaging will begin. The option only applies for session masters. If you omit this parameter, the imaging engine waits for the master user to press `g` before starting the imaging process. Once imaging has begun, any participating computers attempting to register are denied.
t=*minutes*	The number of minutes the master computer will wait for the next participant to register before starting the imaging process without reaching *count* registered participants. The option only applies for session masters. If you omit this parameter, the imaging process won't start until *count* is reached or the master user presses `g`. After that, any participants attempting to register are denied.

Example	Explanation
`img session doug`	Starts a multicast session named `doug`. Each successive computer that issues this same command before the imaging begins joins the session. Imaging doesn't start until one of the users presses `m` to designate himself as master and presses `g` to start the imaging.
`img session doug m`	Starts a multicast session named `doug` and designates this computer as the master. Each successive computer that issues `img session doug` before the imaging begins joins the session as a participant. Imaging doesn't start until the master user presses `g`.
`img session doug c=5`	Starts a multicast session named `doug`. Each successive computer that issues `img session doug` before the imaging begins joins the session. Imaging doesn't start until one of the users presses `m` to designate himself as master and five other computers register with the master as participants.
`img session doug c=5 t=20`	Starts a multicast session named `doug`. Each successive computer that issues `img session doug` before the imaging begins joins the session. Imaging doesn't start until one of the users presses `m` to designate himself as master and either five other computers register with the master as participants or more than 20 minutes elapses between any consecutive participant registrations, whichever occurs first.

Imaging Server (IMGSERV.NLM or .DLL or .DLM)

The imaging server is a software component of the ZfD server. It enables imaging clients (computers that are booted from an imaging device) to connect with the network to receive imaging services, including:

- Storage or retrieval of an image on a server
- Automatic imaging based on an NDS policy or setting
- Logging of the results of an imaging operation

The imaging server modules are located on a NetWare server in SYS:\SYSTEM or on a Windows server in the folder where NDS is installed (such as C:\NOVELL\NDS).

Using the Imaging Server

In most environments, the imaging server starts automatically when you reboot the server after installing ZfD. With NDS eDirectory™ 8.5 on Windows, you must start the imaging server manually as follows: from the folder where NDS is installed, double-click NDSCONS.EXE > select the IMGSRV.DLM service > click Start. You might also want to click Startup to configure the service to start automatically each time the server reboots.

Once the imaging server has started, you can view information about the status and results of the imaging requests that it has received from imaging clients. A statistical summary of these requests is shown on the server console (NetWare) or in a window accessible from the system tray (Windows). The statistics shown on this screen are explained below. All statistics are reset to zero if you restart the imaging server.

Statistic	Specifies
Update Requests	The number of imaging requests of any kind that have been received by the imaging server since it was started. This includes requests that failed, were denied, or were referred to other imaging servers (see Client Referrals below). Information about each of these requests, such as the source, type, date/time, and results, is logged on the imaging server as explained in "Imaging Server Log (ZIMGLOG.XML)" on page 238.
Images Sent	The number of images that the imaging server has sent to imaging clients since the imaging server was started. This includes only images that were retrieved from this imaging server. See Client Referrals below for more information.
Images Received	The number of new images that have been received and stored on the imaging server since it was started. This includes images that were received through client referrals as explained below.
Client Referrals	The number of client requests that have been referred (redirected) by the imaging server to other imaging servers since this imaging server was started. Such referrals are made only when the client is running in auto-imaging mode and the imaging server determines from NDS that the image to be created or retrieved is on a different imaging server. **IMPORTANT:** If a client is running in manual imaging mode and it requests to store or retrieve an image on a different imaging server, the request is denied and an error is returned to the client. Referrals are currently supported only when the client is running in auto-imaging mode.

Imaging Server Log (ZIMGLOG.XML)

ZIMGLOG.XML is a chronological record of all the imaging requests that have been received by the imaging server since it was installed and first started, including requests merely to log information about imaging operations serviced elsewhere. For each imaging request, the imaging server logs information such as the source, type, date/time, and results of the request.

ZIMGLOG.XML is created on a NetWare server in SYS:\SYSTEM or on a Windows server at the root of the drive where NDS is installed (such as C:\).

Viewing the Log File

This is an XML format file. The oldest imaging request is logged at the top of the file and the most recent at the bottom. The file continues to grow unless you trim it manually (using a text editor) or delete it. It isn't cleared if you restart the imaging server.

Each imaging operation is entered in the log as a group of lines. For example, the log file shown below has two entries: one describing a successful *upload* operation and another describing a failed *download* operation. (An *upload* is the taking of a client image and storing it on the imaging server or other available (local) medium. A *download* is the retrieval of a client image from the imaging server or local medium and laying it down on the client.)

```
<ZENImageLog>

<CN=CV7PB00:C0:4F:DC:2A:B5.O=sales>
<Tree>XYZ</Tree>
<Status>Success</Status>
<Operation>Upload</Operation>
<ImageType>Base Image</ImageType>
<ImagePath>\\XYZ_SERVER\sys\imgs\dell_nt.zmg</ImagePath>
<Timestamp>Thur Nov 22 13:10:05 2001
</Timestamp>
</CN=CV7PB00:C0:4F:DC:2A:B5.O=sales>


<CN=CV7PB00:C0:4F:DC:2A:B5.O=sales>
<Tree>XYZ</Tree>
<Status>Failure</Status>
<ErrorMessage>Unable to find an image to download</ErrorMessage>
<Operation>Download</Operation>
<Timestamp>Thur Nov 22 13:13:17 2001
</Timestamp>
</CN=CV7PB00:C0:4F:DC:2A:B5.O=sales>

</ZENImageLog>
```

The table below describes the various XML elements that comprise the log entries shown above. Each element has an opening and closing tag, such as <tree> and </tree>. The outermost element contains all the other elements in the entry.

XML Element	Specifies
Outermost_Container	The distinguished NDS name of the workstation that requested the imaging operation. This name is read by the imaging engine from the workstation's image-safe data. If the workstation name isn't found (for example, if the workstation hasn't been registered as an object in NDS), the name of the imaging server that serviced the request is given instead (for example, XYZ_SERVER).
Tree	The NDS tree containing the workstation or server specified in the *Outermost_Container* element.
Status	Whether the requested imaging operation succeeded or failed.
ErrorMessage	The reason why the requested imaging operation failed, if applicable.

XML Element	Specifies
Operation	Whether the requested imaging operation was an upload or download attempt. An *upload* is the taking of a client image and storing it on the imaging server or other available (local) medium. A *download* is the retrieval of a client image from the imaging server or local medium and laying it down on the client. **NOTE:** Occasionally, you might see an entry in the log that omits the Operation element. Such an entry is typically a follow-up to the previous operation. For example, you might see an entry indicating that a download operation was successful, but the next entry (time-stamped a few seconds later and specifying no operation) might indicate that the imaging server failed to get image-safe data from NDS. In this case you could assume that the client that just received the download didn't have its own image-safe data, and so the imaging server was trying to get that data from NDS to apply it to the client.
ImageType	Whether the image that was created or retrieved is a base image or an add-on image. With a base image, all existing partitions and data are removed before the image is laid down. With an add-on image, the existing partitions are left intact and are merely augmented with additional data.
ImagePath	The full path and filename of the image that was created, retrieved, or requested.
Timestamp	The time when the results of the requested imaging operation were logged by the imaging server, including the week day, month, date, 24-hour time (including seconds), and year.

20 Supported Ethernet Cards

The following sections list the Ethernet cards that are supported by ZENworks® for Desktops (ZfD) for performing network-connected imaging operations on workstations and laptop computers. If your workstation or laptop computer doesn't have one of these cards, you must supply your own Ethernet driver as explained in "Using ZIMGBOOT.EXE to Add Linux Drivers" on page 221.

Ethernet Cards for a Workstation

The following Ethernet cards are supported for standard desktop (non-laptop) workstations:

- 3C501
- Etherlink* II, 3c503, 3c503/16
- Etherlink plus 3c505
- Etherlink-16 3c507
- Etherlink III, 3c509 / 3c509B
- 3c515
- 3c590/3c595, 3c592/3c597, 3c900/3c905/3c905B
- AMD* Lance (7990, 79C960/961/961 A, Pcnet-ISA), AT1500, HP-J2405A, HP-Vectra* On Board Ethernet, NE1500, NE2100
- AT2450, AMD 79C965 (Pcnet-32), AMD 79C970/970A (Pcnet-PCI), AMD 79C971, AMD 79C974
- HP* 27245A
- HP EtherTwist*, PC Lan+ (27247, 27252A)
- HP 10/100 VG Any Lan Cards (27248B, J2573, J2577, J2585, J970, J973)
- Ether Express
- Ether Express Pro/10
- Ether Express Pro 10/100 B
- NE 1000, NE 2000
- NE2000-PCI
- Racal* Interlan ni5010, ni5210, ni6210
- SMC* ultra, SMC EtherEZ(8146)

- SMC Ultra32
- SMC 9000/ SMC 91c92/4
- SMC 91c100

Ethernet Cards for a Laptop Computer (PCMCIA)

The following Ethernet cards are supported for laptop (PCMCIA) computers:

Driver	Cards
3c589_cs	◆ 3Com* 3c589, 3c589B, 3c589C, 3c589D ◆ 3Com Megahertz 3CCE589E, 3CXE589D, 3CXE589EC ◆ Farallon* EtherWave, EtherMac
fmvj18x_cs (x86, ppc)	◆ CONTEC C-NET(PC)C ◆ Eagle NE200 Ethernet ◆ Eiger Labs EPX-10BT, EPX-ET 10BT, EPX-ET 10TZ ◆ Fujitsu* FMV-J181, FMV-J182A, FMV-J183 ◆ Fujitsu Towa LA501, FMV-1080, FM50N-183 ◆ Hitachi* HT-4840-11 EtherCard ◆ NextCom NC5310 ◆ RATOC REX-9822, REX-5588A/W, REX-R280 ◆ TDK LAC-CD02x, LAK-CD021, LAK-CD022A, LAK-CD021AX, LAK-CD021BX
nmclan_cs	◆ New Media EthernetLAN ◆ New Media LiveWire* (*not* LiveWire+)

Driver	Cards
pcnet_cs (A-D)	◆ Accton* EN2212, EN2216 EtherCard ◆ Accton SOHO BASIC EN220 ◆ Addtron Ethernet ◆ AIBrain EPCM-T ◆ Allied Telesis CentreCOM CE6001, LA-PCM, LA-PCM V2 ◆ AmbiCom AMB8002, AMB8002T, AMB8010 ◆ AnyCom ECO Ethernet ◆ Apollo* RE450CT ◆ Argosy EN210 ◆ Arowana RE 450 Ethernet ◆ Asante* FriendlyNet (newer cards seem not to work) ◆ AST 1082 Ethernet ◆ Atelco ethernet ◆ Billionton LNT-10TB, LNT-10TN ◆ California Access LAN Adapter ◆ CeLAN EPCMCIA ◆ CNet CN30BC, CN40BC Ethernet ◆ Compex/ReadyLINK Ethernet Combo ◆ Compex LinkPort Ethernet ◆ COMPU-SHACK BASEline Ethernet ◆ Connectware LANdingGear Adapter ◆ Corega Ether PCC-T, PCM-T ◆ CyQ've ELA-010 10baseT ◆ Danpex EN-6200P2 Ethernet ◆ Datatrek NetCard ◆ Dayna* Communications CommuniCard E ◆ Digital* DEPCM-AA, PCP78-AC Ethernet ◆ Digital EtherWORKS* Turbo Ethernet ◆ D-Link* DE-650, DE-660 ◆ DynaLink L10C Ethernet

Driver	Cards
pcnet_cs (E-K)	◆ Edimax Technology Ethernet Combo ◆ EFA InfoExpress 205, 207 Combo ◆ Eiger Labs EPX-ET10T2 Combo ◆ ELECOM Laneed LD-CDWA, LD-CDX, LD-CDNIA, LD-CDY, LD-CDF ◆ EP-210 Ethernet ◆ Epson* Ethernet ◆ EtherPRIME Ethernet ◆ Explorer NE-10000 Ethernet ◆ EZLink 4109 Ethernet ◆ Fiberline FL-4680 ◆ Gateway 2000* Ethernet ◆ Genius ME3000II Ethernet ◆ Grey Cell Ethernet ◆ GVC NIC-2000P Ethernet Combo ◆ Hamlet LM560 ◆ Hawking PN650TX ◆ Hypertec HyperNet ◆ IBM* CreditCard Ethernet Adapter ◆ IC-Card Ethernet ◆ Infotel IN650ct Ethernet ◆ IO DATA PCLA/T, PCLA/TE ◆ Katron PE-520 Ethernet ◆ KingMax Technology EN10-T2 Ethernet ◆ Kingston* KNE-PCM/M, KNE-PC2, KNE-PC2T ◆ KTI PE-520 Plus

Driver	Cards
pcnet_cs (L-R)	◆ LANEED LD-CDW Ethernet ◆ LanPro EP4000A ◆ Lantech Ethernet ◆ Level One EPC-0100TB ◆ Linksys EtherCard, EC2T Combo ◆ Logitec* LPM-LN10T, LPM-LN10BA, LPM-LN20T Ethernet ◆ Longshine ShineNet LCS-8534TB Ethernet ◆ Macnica ME-1 Ethernet ◆ Maxtech PCN2000 Ethernet ◆ Melco LPC-TJ, LPC-TS, LPC-T, LPC2-T ◆ Microdyne* NE4200 Ethernet ◆ Midori LANNER LT-PCMT ◆ NDC Instant-Link ◆ NEC* PC-9801N-J12 ◆ Network General Sniffer* ◆ New Media LanSurfer ◆ Novell*/National NE4100 InfoMover* ◆ OvisLink Ethernet ◆ Panasonic* CF-VEL211P-B ◆ Planet SmartCOM 2000, 3500, ENW-3501-T, ENW-3502-T ◆ Pretec Ethernet ◆ PreMax PE-200 Ethernet ◆ Proteon* Ethernet ◆ Psion Gold Card Ethernet ◆ Relia RE2408T Ethernet ◆ Reliasys 2400A Ethernet ◆ RPTI EP400, EP401, 1625B Ethernet

Driver	Cards
pcnet_cs (S-Z)	◆ SCM* Ethernet (*not* SMC) ◆ Sky Link Express ◆ SMC 8022 EZCard-10 ◆ Socket Communications EA LAN Adapter ◆ Socket Communications LP-E Ethernet ◆ Socket Communications LP-E CF+ Ethernet ◆ SOHOware ND5120-E Ethernet ◆ SuperSocket RE450T ◆ Surecom Ethernet ◆ SVEC PN605C ◆ Thomas-Conrad* Ethernet ◆ TRENDnet Ethernet ◆ Trust Ethernet Combo ◆ UNEX NexNIC MA010 ◆ Volktek NPL-402CT Ethernet
smc91c92_cs	◆ Farallon* Enet ◆ Megahertz XJ10BT, XJ10BC, CC10BT Ethernet ◆ New Media BASICS Ethernet ◆ OSITECH* Four of Diamonds ◆ SMC 8020BT EtherEZ (*not* EliteCard)
xirc2ps_cs	◆ Compaq* Ethernet Adapter ◆ Xircom* CreditCard CE2, CE IIps, RE-10
3c574_cs Fast Ethernet (10/100baseT) adapters	◆ 3Com 3c574TX, 3CCFE574BT, 3CXFE574BT, 3CCSH572BT, 3CXSH572BT

Driver	Cards
pcnet_cs Fast Ethernet (10/100baseT) adapters	◆ Abocom LinkMate FE1000 ◆ AnyCom ECO Ethernet 10/100 ◆ Apollo Fast Ethernet ◆ COMPU-SHACK FASTline 10/100 ◆ Corega FastEther PCC-TX ◆ D-Link DFE-650 ◆ EXP ThinLan 100 ◆ Fiberline Fast Ethernet ◆ Hamlet FE1000 10/100 ◆ IO DATA PCET/TX ◆ KTI KF-C16 ◆ Laneed LD-10/100CD ◆ Level One FPC-0100TX ◆ Linksys PCMPC100 EtherFast, PCM100H1 HomeLink 10/100 ◆ Logitec LPM-LN100TX ◆ Melco LPC2-TX ◆ Microcom* TravelCard 10/100 ◆ Micronet EtherFast Adapter ◆ NetGear FA410TXC ◆ New Media LiveWire 10/100 ◆ Planex FNW-3600T ◆ ZONET Fast Ethernet
smc91c92_cs Fast Ethernet (10/100baseT) adapters	◆ Argosy EN220 ◆ Dynalink L100C ◆ Lantech FastNet/TX ◆ Ositech Seven of Diamonds ◆ Melco/SMC LPC-TX ◆ WiseCom WC-PC400
xirc2ps_cs Fast Ethernet (10/100baseT) adapters	**NOTE:** Some of these cards seem to misbehave at either 10baseT, 100baseT, or both. The driver doesn't seem to know how to configure the transceiver correctly. ◆ Accton Fast EtherCard-16 ◆ Compaq Netelligent 10/100 ◆ Intel EtherExpress PRO/100 16-bit ◆ Toshiba IPC5008A, Advanced Network 10/100 ◆ Xircom CreditCard CE3-100, CE3B, RE-100
3c575_cb Fast Ethernet (10/100baseT) adapters	◆ 3Com 3c575TX, 3CCFE575BT, 3CXFE575BT, 3CCFE575CT, 3CXFE575CT

Driver	Cards
epic_cb Fast Ethernet (10/100baseT) adapters	◆ Ositech Seven of Spades CardBus
tulip_cb Fast Ethernet (10/100baseT) adapters	◆ Accton EN2220 CardBus ◆ Allied Telesyn AT-2800 ◆ AmbiCom AMB8100 ◆ Apollo FE2000 ◆ Asante FriendlyNET CardBus ◆ Compex Linkport TX ◆ D-Link DFE-660TX ◆ Genius MF3000 (some might not work) ◆ Kingston KNE-CB4TX ◆ Laneed LD-10/100CB ◆ LevelOne FPC-0101TX 10/100Mbps CardBus ◆ Linksys PCMPC200 EtherFast CardBus ◆ OvisLink LFS PCM 32 ◆ SMC EZ CardBus 10/100 Ethernet (some might not work) ◆ SVEC FD606 10/100 Ethernet ◆ TDK NetworkFlyer LAK-CB100X, LAK-CB100AX CardBus ◆ UMAX Technologies UMAX250

V Remote Management

ZENworks® for Desktops (ZfD) Remote Management gives you the ability to manage remote workstations (called managed workstations) from the management console. Remote Management gives you the ability to do the following:

- Remotely wake up a powered-off managed workstation
- Assume control of a managed workstation
- Execute files found on a managed workstation
- Reboot a managed workstation
- Transfer files between the management console and a managed workstation
- Chat with the user at a managed workstation
- Diagnose problems on a managed workstation
- Ping the Remote Management Agent on a managed workstation
- Blank the managed workstation screen during a Remote Control session
- Lock the keyboard and mouse controls at the managed workstation during a Remote Control session
- Suppress the wallpaper displayed on the desktop of the managed workstation during a Remote Control or Remote View session
- Configure the time-out period for a Remote Control or a Remote View session

Remote Management can save you and your organization time and money. For example, you or your organization's help desk can analyze and remotely fix workstation problems without having to visit the user's workstation, which reduces problem resolution times and increases productivity.

The following sections will help you understand and use ZfD Remote Management:

- Chapter 21, “Understanding Remote Management Components,” on page 251
- Chapter 22, “Managing Remote Workstations,” on page 261
- Chapter 23, “Diagnostic Information,” on page 277
- Chapter B, “Documentation Updates,” on page 285

21 Understanding Remote Management Components

You can use ZENworks® for Desktops (ZfD) to remotely manage Windows* 95, Windows 98, Windows NT*, or Windows 2000 workstations from the management console.

The following sections provide information that will help you understand the functionality of Remote Management components:

Understanding Remote Management Agents

The Remote Management Agent is a ZfD component that is installed on a managed workstation so that the administrator can remotely manage that workstation.

The Remote Management Agent starts automatically when the managed workstation boots up. When you initiate a Remote Management session with a managed workstation, the Remote Management Agent uses NDS® to verify if you have the Remote Management rights. On successful verification the Remote Management session proceeds.

How the Remote Management Agent Uses Protocols

You can use the Remote Management policy to specify the preferred protocol (IP or IPX™) that the agent should use to communicate with the management console during a remote session. If you select a protocol that is not available on that managed workstation, the agent will attempt to use the available protocol. The management console attempts to contact the agent using the network

addresses stored within the Workstation object in NDS. It will cycle once through the network addresses trying to communicate with the agent on the managed workstation. For IP addresses in the workstation, the management console attempts to contact the agent using IP. For IPX addresses stored in the Workstation object, the management console attempts to contact the agent using IPX. However, for the management console to communicate with the managed workstation using IPX, ensure that the IP and IPX stacks are installed on the managed workstation. If the IPX stack only is installed, the management console will not be able to communicate with the managed workstation using IPX.

Understanding Remote Management Security

In order for the Remote Management Agent to accept a Remote Management request, the managed workstation must be registered into NDS and be imported as an NDS Workstation object. The Remote Management Agents use NDS authentication to verify that the user requesting to remotely access the managed workstation is authorized to do so. The effective policy settings based on which the administrator performs Remote Management sessions on the managed workstation are taken from the NDS Workstation object and the User object of the user logged in to the managed workstation.

The ZfD management console runs under ConsoleOne®. The Remote Management Agents are NDS authentication-aware and policy-aware and will not allow unauthorized Remote Management sessions to occur.

Understanding Remote Wake Up

Remote Wake Up lets you remotely power up a powered down node in your network (providing that the network card on the node is Wake on LAN* enabled). This feature lets the administrator manage nodes during off-hours to minimize the downtime users experience for system maintenance and upgrades. It also facilitates power savings while keeping systems available for maintenance. For more information, see “Managing a Remote Wake Up Session” on page 263.

Understanding Remote Control

Remote Control lets you control a managed workstation from the management console (ConsoleOne) to provide user assistance and to help resolve workstation problems.

Remote Control establishes a connection between the management console and the managed workstation. With remote control connections, the administrator can go beyond viewing the managed workstation to taking control of it. For more information, see “Managing a Remote Control Session” on page 264.

Understanding Remote View

Remote View lets you view the desktop of the managed workstation from the management console.

Remote View lets you connect with a managed workstation so you can view the managed workstation instead of controlling it. This will help you troubleshoot problems that the user encountered. For example, you can observe how the user at a managed workstation performs certain tasks to ensure that the user performs a task correctly. For more information, see “Managing a Remote View Session” on page 271.

Understanding Remote Execute

Remote Execute lets you run any executable on the managed workstation from the management console. An application can be remotely executed by specifying its executable name in the Remote Execute window (if the program is in the path of the managed workstation) or by entering the complete path of the application (if it is not in the path of the managed workstation). For more information, see “Running an Application on the Managed Workstation” on page 272.

You can determine the value of the path from the Environment window launched from the Diagnostic feature of ZfD. For more information, see “Environment Information” on page 278.

Understanding Remote Diagnostics

Remote Diagnostics helps you shorten problem resolution times and assist users without requiring a technician to physically visit the troubled workstation. This increases user productivity by keeping desktops up and running. Diagnostic information of managed workstations is available over IP only; diagnostics of workstations with pure IPX is not supported. For more information, see “Diagnostic Information” on page 277.

Diagnostics provide real-time information so the network manager can diagnose workstation problems. The following table lists the diagnostic information that is available on Windows 95/98 and Windows NT/2000 managed workstations:

Diagnostic Information	Windows 95/98 managed workstations	Windows NT/2000 managed workstations
Windows Memory	Available	Available
Environment	Available	Available
Event Log	Not Available	Available
WIN32 Processes	Available	Not Available
WIN32 Modules	Available	Not Available
Device Drivers	Not Available	Available
Services	Not Available	Available
NetWare Connections	Available	Available
Novell Client™	Available	Available
Network Protocols	Available	Available
Name Space Providers	Available	Available
Network Drives	Available	Available
Network Open Files	Available	Available
Print Capture	Available	Available

Understanding File Transfer

File Transfer lets you perform file operations between the management console and a managed workstation. To be able to transfer files between the management console and the managed workstation, ensure that the Remote Management Agent is installed on the managed workstation.

Using File Transfer, you can move or copy files between the management console and a managed workstation. You can also rename and delete files, and create directories on the management console and on the managed workstation. From the File Transfer window, you can view the properties of files and directories on the management console and the managed workstation, including size of the file, and the date and time of file creation. File Transfer also lets you open files with the associated application on the management console. For more information, see "Managing a File Transfer Session" on page 274.

IMPORTANT: The File Transfer program does not allow access to non-fixed drives on the managed workstation.

Understanding Chat

Chat is a real-time messaging tool that lets the management console user communicate with a user at the managed workstation. Only a management console user logged in as an administrator can initiate a Chat session. To chat with the user at the managed workstation, you need to ensure that the Remote Management Agent is installed on the managed workstation.

When the management console user initiates a Chat session with the user at the managed workstation, the user at the managed workstation will be prompted for permission to initiate the Chat session. The Chat session begins when the user at the managed workstation provides the permission to initiate the Chat session. During the Chat session, you can copy and paste text in the message area. Either the management console user or the user at the managed workstation can close the Chat session. For more information, see "Managing a Chat Session" on page 275.

Understanding the Audit Log

The Windows NT and Windows 2000 event logging mechanism allows applications running on the managed workstation to record events as log files. You can use the Event Viewer to view the event logs. The Event Viewer maintains Application, Security, and System log files. The events for Remote Management sessions are stored in the Application log file. The managed workstation on which the Remote Management Agent is installed, maintains this log information as an audit log. For more information, see "Viewing the Audit Log of Remote Management Sessions" on page 276.

IMPORTANT: ZENworks 2 stored audit information of Remote Management events in the Security log file. ZfD stores the audit information in the Application log file. You can save the information of previous events using the Save As option from the File menu of the Event Viewer.

The audit log maintains the list of events for each Remote Management session and stores the following details:

- The success or failure of the authentication process
- The permission required status
- The start time or end time of the remote control and remote view session
- The name of the user attempting to remotely manage the workstation
- The domain name and address of the management console accessing the managed workstation

- The remote operation performed on the managed workstation
- The name of the user logged in to the managed workstation
- The event success or failure status, and details for the failure

The following sections contain additional information:

- "Details of Events in the Audit Log" on page 255
- "Event Log Messages for Remote Management Sessions" on page 256

Details of Events in the Audit Log

The following table explains the information stored by each event during a Remote Management session:

Parameter	Description
Date	Date of the event occurrence.
Time	Time stamp of the event occurrence.
User	Name of the user logged in to the managed workstation.
Computer	Name of the computer on which the event occurred.
Event ID	Unique ID assigned to the event.
Source	The source name for the Remote Management audit log is Remote Management Agent.
Type	The type of the event indicates if the particular event was a success, failure, information, warning, or error.
Category	The category lists the different events for the application. The details of an event are in the detailed message for the event. The events for Remote Management Agent are: ◆ Ping Event ◆ Authentication Event ◆ Permission Event ◆ Session Start Event ◆ Session Terminate Event

Parameter	Description
Operation	The various operations that a management console user can perform on the managed workstation are: ◆ Remote Control ◆ Remote View ◆ Remote Diagnostics ◆ File Transfer ◆ Chat ◆ Remote Execute ◆ Remote Reboot ◆ Ping All events, excluding the Ping event, record the domain name of the administrator who is remotely accessing the managed workstation.
Console Address	IP or IPX address of the workstation that the administrator uses to remotely access the managed workstation.
Console DN	Domain name of the workstation that the administrator uses to remotely access the managed workstation.
Local User	Domain name of the user logged in to the managed workstation.
Workstation DN	Domain name of the managed workstation.
Event Message	The message for the event.

Event Log Messages for Remote Management Sessions

Informational and error messages will be recorded for the following events during a Remote Management session:

- "Ping Event" on page 256
- "Authentication Event" on page 257
- "Permission Event" on page 257
- "Session Start Event" on page 257
- "Session Terminate Event" on page 257

You can view the details of events that occurred during a Remote Management session from the Description box in the Event Detail window. For more information about event details, see "Viewing the Audit Log of Remote Management Sessions" on page 276.

Ping Event

The Ping event records if the management console user could verify that the Remote Management Agent is up and running. The following table describes the Ping Event messages.

Type	Message
Success	Ping was successful

Type	Message
Failure	The managed workstation is being managed by another remote operator

Authentication Event

The Authentication event records if the Remote Management Agent could authenticate the remote user for that operation. The following table describes the Authentication Event messages:

Type	Message
Success	Authentication was successful
Failure	◆ The Remote Management Agent was unable to find the workstation in NDS. Ensure that the workstation is correctly registered. ◆ The remote operator does not have permissions to manage this workstation. ◆ The agent was unable to read NDS for authentication. ◆ The operation is disabled in a policy associated with the workstation of the User object. ◆ There is invalid NDS Authentication information. ◆ An unknown management console tried to establish a Remote Management session.

Permission Event

The Permission event records if the remote user was granted permission for the specified operation. The following table describes the Permission Event messages:

Type	Message
Information	Permission was requested by the remote operator.
Success	The remote user granted permission for the requested operation.
Failure	◆ The remote user did not grant permission for the requested operation. ◆ The remote user did not grant permission for the requested operation within the specified time interval.

Session Start Event

The Session Start event records the time when a particular session was started. The following table describes the Session Start Event messages:

Type	Message
Information	Session started.

Session Terminate Event

The Session Terminate event details the time at which the session was disconnected, and the reason for terminating the session. The following table describes the Session Terminate Event messages:

Type	Message
Information	Session terminated normally.
Warning	• Remote View session terminated because a mouse or keyboard event was received. • Session terminated because too many negative acknowledgments were outstanding. Check the NetWare® connection. • Session timed out because the management console did not respond.
Error	Remote reboot operation failed, Windows Error Message.

Monitoring Login and Logout events

ZfD takes full advantage of the security functionality of NDS. NDS functionality ensures secure Remote Management sessions when users log out or new users log in to the management console or the managed workstation during a Remote Management session. A remote Management session will terminate, restart, or continue based on the Remote Management security settings for the new user as explained in the following table.

Action	Scenario
Session Continue	• When the remote management security settings for the new user on the managed workstation are similar to the settings for the current user. • When a new user logs in to the managed workstation and the Audible Signal or Visible Signal settings are different, the session will continue with newer settings.
Session Terminate	• When a new user logs in to the management console. • When a new user logs in to the managed workstation and the Remote Control option is disabled.
Session Restart	• When a new user logs in to the managed workstation and the Screen Blank or Lock Controls settings are different, the session will restart with newer settings. • When a new user logs in to the managed workstation and if permission for a remote session is required from the user at the managed workstation.

Specifying the Timeout Value for Establishing a Remote Control or Remote View Session

If the administrator has the rights to access the managed workstation, the administrator can specify the maximum duration of time to wait for connecting with the managed workstation to start a Remote Control or a Remote View session. The default timeout value is 5 minutes. The administrator can change the default timeout value and choose a value between the range of 1 minute and 30 minutes.

When the administrator initiates a Remote Control or Remote View session, the management console attempts to establish connection with the managed workstation. If the Remote Management Agent is up and running on the managed workstation and if the network link between

the management console and the managed workstation is up, the connection for Remote Control or Remote View will be established and the session will proceed.

To specify the timeout value for establishing a Remote Control or Remote View session:

1. From the management console, right-click the User object for the management console user.
2. Click Properties > Remote Management
3. Click the General tab.
4. In the Remote Control/View Timeout for Console User text field, specify the maximum duration for the management console to try and establish a Remote Control or Remote View session with the managed workstation.

   IMPORTANT: The timeout value set in the User object or associated policy for the User object is applicable to the management console user, not to the managed workstation user. All other security settings in the Remote Management property page are applicable only to the managed workstation user.

22 Managing Remote Workstations

The following sections provide information that will help you effectively manage Remote Management sessions:

Using the Remote Management Agents

You will be able to access managed workstations if you have installed the Remote Management Agent on the managed workstation. For more information, see "Understanding Remote Management Agents" on page 251.

The following sections explain how you can use the Remote Management Agent during remote sessions:

Pinging the Remote Management Agent from the Management Console

You can ping the Remote Management Agent on the managed workstation before you begin a Remote Management session. The Ping window displays the response received from the Remote Management Agent based on the packets sent from the management console, which helps you determine if the Remote Management Agent is loaded on the managed workstation.

To ping the managed workstation from the management console:

1. Right-click the managed workstation from the management console.

2 Click Actions > Ping Remote Management Agent.

The following table explains the results displayed in the Ping window:

Statistic	Explanation
Total Packets Sent	Total number of packets sent by the management console to the Remote Management Agent on the managed workstation
Packets Received	Total number of packets received by the management console from the Remote Management Agent
Packets Per Second	Number of packets sent by the management console to the Remote Management Agent per second
Response Ratio	Number of packets received by the management console from the Remote Management Agent in response to the packets sent by the management console

Shutting Down the Remote Management Agent

You can shut down the Remote Management Agent during a remote session. When you shut down the Remote Management Agent, the remote session stops. To start another remote session, you will need to reload the Remote Management Agent. For more information, see "Reloading the Remote Management Agent" on page 262.

To shut down the Remote Management Agent from a Windows* 95/98 managed workstation:

1 Right-click the Remote Management icon.

2 Click Shut Down Agent.

To shut down the Remote Management Agent from a Windows NT*/2000 managed workstation:

1 From the Control Panel, click Services.

2 Select Remote Management.

3 Click Stop.

IMPORTANT: You will be able to stop the Remote Management Agent on Windows NT/2000 only if you have the rights to stop the Windows NT/2000 service.

Reloading the Remote Management Agent

During ZfD installation, the Remote Management Agent is installed on the managed workstation and started automatically when the managed workstation starts up. If you shut down the Remote Management Agent during a remote session, the remote session stops. To start another remote session, you need to reload the Remote Management Agent on the managed workstation.

To reload the Remote Management Agent on Windows 95/98:

1 Run ZENRC32.EXE from the \NOVELL\ZENRC\ directory.

To reload the Remote Management Agent on Windows NT/2000:

1 From the Control Panel, click Services.

2 Select Remote Management.

3 Click Start.

IMPORTANT: You will be able to load the Remote Management Agent on Windows NT/2000 only if you have the rights to start the Windows NT/2000 service.

Uninstalling the Remote Management Agent using the Novell Application Launcher

To uninstall the Remote Management Agent, you should have administrator rights.

You can uninstall the agent by adding the Remote Management Uninstall Application object to the Novell Application Launcher™ and associating the Application object with the managed workstation.

IMPORTANT: For Windows NT/2000 managed workstations, you must associate the Application object with the Workstation object or Container of the Workstation object. You will not be able to launch the Application object if you associate it with a User object.

To uninstall the Remote Management Agent using the Application Launcher:

1. From the management console, right-click a managed workstation.
2. Click Details > Applications
3. Click Add > Remote Management Uninstall.
4. Select an association for Remote Management Uninstall, from the options explained in Installing the Remote Management Agent using the Application Launcher in Remote Management in *Getting Started*.

Managing a Remote Wake Up Session

The Remote Wake Up feature supports Magic Packet* technology. When a powered off node that is enabled for Wake on LAN* receives the magic packet, the system will boot up.

You can use ZfD to remotely wake up Windows 95, Windows 98, Windows NT 4.0, and Windows 2000 nodes.

For an administrator to be able to wake up a remote node, the following requirements must be met:

- The remote node has a network card that supports Wake on LAN. Additionally, ensure that you have enabled the Wake on LAN option in the BIOS setup of the managed workstation.

  NOTE: Remote Wake Up may not work properly on Windows 98 workstations having network cards that support Wake on LAN.

- The remote node is in a soft-off power state. In the soft-off state, the CPU is powered-off and a minimal amount of power is utilized by its network interface card. Unlike the hard-off state, in the soft-off state the power connection to the machine remains switched on when the machine is shut down.

  NOTE: Some operating systems like Windows NT and Windows 2000 do not put the machine in the soft-off state even after the corresponding shut down command is executed. When a user selects the Shut Down option from the System Menu of Windows NT/2000, the machine is not shut down automatically, but the user is prompted to either reboot or shut down the machine. For Remote Wake Up to work, the user should manually shut down the machine upon this prompt.

- The remote node has been scanned at least once by the Workstation Inventory scanner that ships with ZfD.
- The Wake on LAN Status Agent is properly installed on the remote node.

  HINT: The Wake on LAN Status Agent is installed on the managed workstation during Remote Management Agent installation.

- The routers connecting the management console and the remote node are configured to forward subnet-oriented broadcasts.
- The network link between the management console and the remote node is established.

To wake up a remote node:

1. Right-click the Workstation Object from the management console.
2. Click Actions > Remote Wake Up.

Managing a Remote Control Session

ZfD lets you remotely control a managed workstation. For more information, see "Understanding Remote Control" on page 252. You can effectively manage a Remote Control session by performing the following tasks with the Viewing window control options, the Viewing window toolbar buttons, and the Remote Management icon options:

Starting a Remote Control Session

Before you start a Remote Control session with the managed workstation, make sure that the appropriate Remote Management Agent is loaded on the managed workstation.

To start a Remote Control session:

1. Right-click the managed workstation from the management console.
2. Click Actions > Remote Control.

You can configure the timeout value for establishing a Remote Control session. For more information, see "Specifying the Timeout Value for Establishing a Remote Control or Remote View Session" on page 258.

Enabling the Wallpaper on the Managed Workstation

When an administrator initiates a Remote Control or Remote View session with the managed workstation, any wallpaper displayed on the desktop of the managed workstation will be suppressed. This feature reduces the response time from the managed workstation for requests from the management console because less traffic is generated over the network while the wallpaper is suppressed.

You can configure the control parameter for this option to change the default settings and enable the display of the wallpaper on the managed workstation. When you terminate the Remote Control or Remote View session, the suppressed wallpaper will be restored.

NOTE: On Windows 95/98 managed workstations, the Suppress Wallpaper option is enabled only if you log in to the workstation as a Windows User.

To enable the display of suppressed wallpaper on the managed workstation:

1. Click the Remote Management icon at the top-left corner of the Viewing window > click Configure.
2. Deselect the Suppress Wallpaper control option.

Controlling the Display of the Viewing Window

You can control the display of the managed workstation by using the Viewing window control options.

To enable control options:

1. Click the Remote Management icon at the top-left corner of the Viewing window.
2. Click Configure.
3. Select the control options you want to enable for the remote session.

The following table explains the options you can use to control the display of the Viewing window.

Option	Description
Warn me on Screen Blanking	Informs the user at the management console before the managed workstation screen is blanked.
Accelerator Keys Enabled	Enables the accelerator keys on the management console so that default accelerator key sequences are always available during the remote session. For details, see “Using the Viewing Window Accelerator Keys” on page 266.
System Key Pass Through	Passes Alt-key sequences on the management console to the managed workstation. During a Remote View session, the System Key Pass-Through option is not enabled.
Suppress Wallpaper	Suppresses any wallpaper displayed on the managed workstation.
Force 16 Color Viewing	Forces the use of 16-color palette on the managed workstation during a Remote Management session. This enhances the Remote Management performance. Use this option only if you are performing a Remote Management session over a slow WAN.

Option	Description
Compression Type	Choose the preferred compression on the basis of the network bandwidth/speed. Select Default if the network bandwidth/speed is high, probably over a LAN environment. Select Fast if the network bandwidth/speed is high, probably over a high speed LAN environment. **IMPORTANT:** Selecting Fast compression over a high network bandwidth/speed may slow down the response time compared to that of the Default compression for certain Remote Control operations. In such situations, select Default compression. Select Best if the network bandwidth/speed is slow, probably over a WAN or dial-up environment.

Enhancing the Remote Control Performance Over a WAN or a Slow Link

The performance of Remote Control, especially on a WAN, has been enhanced through using improved compression.

Performance during a Remote Control session over a WAN or a slow link varies depending on the network traffic. For better response time, try one or more following strategies:

- Enable the Force 16 Color Viewing option in the Control Parameters dialog box.
- Disable the Give User Visible Signal option in the Remote Management Property page.
- Enable the Suppress Wallpaper option on the managed workstation in the Control Parameters dialog box.
- Assign color settings on the management console higher than the managed workstation or assign the same color settings for the management console and the managed workstation.

Using the Viewing Window Accelerator Keys

You can use accelerator keys to control the display of the Viewing window. Default accelerator key sequences are assigned to each accelerator key option. The Accelerator Keys dialog box displays the default key sequence in the edit field of each accelerator key option. You can define a custom accelerator key sequence to change the default sequence. For more information, see "Defining a Custom Accelerator Key Sequence" on page 267.

To open the Accelerator Keys dialog box:

1. Click the Remote Management icon at the top-left corner of the Viewing window.
2. Click Accelerator Keys.

The following table explains the Accelerator Key options you can use to control the display of the Viewing window:

Option	Default Keystroke	Description
Full Screen Toggle	Ctrl+Alt+M	Applicable only if the color resolution settings on the management console and managed workstation are similar. Sizes the Viewing window to the size of your screen without window borders.
Refresh Screen	Ctrl+Alt+R	Refreshes the Viewing window.
Restart Viewer	Ctrl+Alt+T	Re-establishes connection with the managed workstation.
System Key Pass	Ctrl+Alt+S	Passes Alt-key sequences on the management console to the managed workstation.
Accelerator Keys	Ctrl+Alt+H	Enables the use of accelerator key sequences.
Stop Viewing	Left-Shift+Esc	Closes the Viewing window.
Reboot	Ctrl+D	Restarts the Windows 95/98/NT/2000 workstations.
App Switcher	Ctrl+T	Switches application on managed workstations.
Start	Ctrl+S	Opens the taskbar with the Start button on Windows 95/98/ NT/2000 workstations.
MouseLock	Ctrl+B	Locks the keyboard and mouse controls at the managed workstation.
Navigate	Ctrl+N	Displays the different areas of the desktop of the managed workstation.
ScreenBlank	Ctrl+L	Blanks the screen at the managed workstation.

To enable the Accelerator Keys option:

1. Click the Remote Management icon at the top-left corner of the Viewing window.
2. Click Configure.
3. Select Accelerator Keys Enable.

Defining a Custom Accelerator Key Sequence

Default keystrokes assigned to the accelerator key options are displayed in the edit field to the right of each accelerator key option. You can change the accelerator key sequence and define a custom accelerator key sequence if you do not want to use the default keystroke.

To define a custom accelerator key sequence:

1. Click the Remote Management icon at the top-left corner of the Viewing window.
2. Click Accelerator Keys.
3. Click the edit field of the accelerator key option where you want to define a custom accelerator key sequence.
4. Press the new accelerator key sequence.

IMPORTANT: The shift keys are left-right sensitive, and are indicated in the Control Options dialog box as Lshift and Rshift.

Using the Toolbar Buttons on the Viewing Window

The following table describes the toolbar options in the Viewing window:

Button	Default Keystroke	Key Function
Blank/Unblank Screen 	Ctrl+L	Displays only if the Allow Blanking User's Screen option is enabled in the security settings. Blanks the screen at the managed workstation. When the administrator selects this option, the screen of the managed workstation will be blacked out and the operations performed by the administrator on the managed workstation will not be visible to the user at the managed workstation. Not supported over certain display adapters. Refer to the ZfD 3.2 Readme for the list of display adapters that do not support this feature.
Lock/Unlock Keyboard-Mouse 	Ctrl+B	Locks the keyboard and mouse controls at the managed workstation. When the administrator selects this option, the user at the managed workstation will not be able to use the keyboard and mouse controls of the managed workstation.
Start 	Ctrl+S	Sends the Ctrl+Esc keystroke to the managed workstation. Opens the taskbar with the Start button on Windows 95/98/ NT/2000 workstations.
App Switcher 	Ctrl+T	Sends the Alt-tab key sequences to the managed workstation. Switches application on managed workstations. If this option is on, you will need to press only the Tab key on the management console to select applications, and then switch the button off.
Control+Alt+Del/ Reboot 	Ctrl+D	Sends the Ctrl+Alt+Del keystroke to the managed workstation. This button is labeled Reboot if the managed workstation is Windows 95/98. Restarts the Windows 95/98 workstations. This button is labeled Control+Alt+Del if the managed workstation is Windows NT/2000. Displays the Security window on Windows NT/2000.

Button	Default Keystroke	Key Function
System Key Pass Through 	Ctrl+Alt+S	Sets the system key pass to On or Off. Passes Alt-key sequences on the management console to the managed workstation. Certain key sequences such as Ctrl+Esc, Alt+Tab, Ctrl+Alt+Del, and Alt+PrintScreen are not allowed even when the System Key Pass-Through is set to On. However, you can use the toolbar buttons on the Viewing window for the Ctrl+Esc, Alt+Tab, and Ctrl+Alt+Del keystrokes.
Navigate 	Ctrl+N	Represents the desktop of the managed workstation on the management console. Displays the different areas of the desktop of the managed workstation. You can move the red frame on the Viewing window to focus on a particular area of the managed workstation desktop.

IMPORTANT: During a Remote View session, only the Navigate button is displayed in the Viewing window.

You can change the default key sequence and define a custom key sequence if you do not want to use the default key sequence. For more information, see "Defining a Custom Accelerator Key Sequence" on page 267

Using the Remote Management Icon

You can manage a remote session from the managed workstation using the Remote Management icon  options. The Remote Management icon will be displayed in the taskbar of the Windows 95, Windows 98, Windows NT 4.0, and Windows 2000 workstations.

This icon indicates that the Remote Management Agent is loaded on the managed workstation. If the Remote Management Agent is loaded and the Remote Management icon is not displayed in the taskbar, Task List, or the desktop, it indicates that you have disabled the display option in the Remote Management Policy settings. After the Remote Management Agent is loaded, an administrator with sufficient rights can start a remote session on the managed workstation.

The user at the managed workstation can right-click the Remote Management icon and choose from the following options:

Option	Description
Terminate Session	Disconnects and closes the remote session on the managed workstation and displays a message on the management console indicating that the remote session is closed.
Shut Down Agent	Shuts down the Remote Management Agent on the managed workstation. To start another remote session, the Remote Management Agent should be reloaded on the managed workstation. For details, see "Reloading the Remote Management Agent" on page 262. This option is not enabled for Windows NT/2000 managed workstations. The Remote Management Agent runs as a service on Windows NT/2000 and can be shut down from the Windows NT/2000 Services dialog box.

Option	Description
Information	Displays information such as who is accessing the managed workstation for the remote session, security settings, and the protocol in use for the remote session. For details, see "Obtaining Information About Remote Management Sessions" on page 270. You can right-click or double-click the Remote Management icon to view the Information window.
Help	Displays the Remote Management Agent help file.

Obtaining Information About Remote Management Sessions

Using the Information window, the user at the managed workstation can view details, such as who is accessing the managed workstation for a remote session, the security settings, and the protocol in use for the remote session.

To view information about remote sessions:

1. Right-click the Remote Management icon.
2. Click Information.

Once you have opened the Information window, you can view different kinds of information about remote sessions on the managed workstation. See the following sections for details:

- "Obtaining General Information" on page 270
- "Obtaining History Information" on page 270
- "Obtaining Security Information" on page 271

Obtaining General Information

The following table explains the general information you can obtain about Remote Management sessions from the Information window:

Parameter	Description
Status	Displays the name of the administrator who is performing a remote session on the managed workstation, with the date and time the managed workstation was accessed.
Protocol	Displays the protocol that the Remote Management Agent uses to communicate with the management console during a remote session.
Optimization	Displays if optimization is enabled or disabled for the Remote Management session. The Remote Management Agent performance will be optimized if the video card on the managed workstation is compatible with the performance enhancement driver that is installed during Remote Management Agent installation.

Obtaining History Information

The following table explains the history information you can obtain about Remote Control and Remote View sessions from the Information Window:

Parameter	Description
Operation	Displays a list of the last ten remote sessions.
Initiator	Displays the name of administrator who initiated the remote session.
Start Date/Time	Displays the date and time when the remote session was initiated.

Obtaining Security Information

The Security Information dialog box displays information based on the following categories of remote sessions:

- Remote Control
- Remote View
- File Transfer
- Remote Execute
- Others (Chat and Diagnostics)

The administrator can use the Remote Management Policy pages to change the settings for each parameter.

Stopping a Remote Control Session from the Managed Workstation

To stop a Remote Control session from the managed workstation:

1. Right-click the Remote Management icon.
2. Click Terminate Session.

Managing a Remote View Session

You can use ZfD to remotely view the managed workstation. For more information, see "Understanding Remote View" on page 252. The following sections explain the tasks you can perform to effectively manage a Remote View session:

- "Starting a Remote View Session" on page 271
- "Controlling the Display of the Viewing Window During a Remote View Session" on page 272
- "Stopping a Remote Control Session from the Managed Workstation" on page 271

Starting a Remote View Session

To start a Remote View session:

1. Right-click the managed workstation from the management console.
2. Click Actions > Remote View.

You can configure the timeout value for establishing a remote view session. For more information, see "Specifying the Timeout Value for Establishing a Remote Control or Remote View Session" on page 258.

Controlling the Display of the Viewing Window During a Remote View Session

When you initiate a Remote View session, a representation of the desktop of the managed workstation will be displayed on your screen in a separate window called the Viewing window. The following table lists the control options and toolbar button that you can use during a Remote View session. For a description of the options and button, see "Controlling the Display of the Viewing Window" on page 265 and "Using the Toolbar Buttons on the Viewing Window" on page 268.

Options	Option Name
Control Options	Warn me on Screen Blanking
	Accelerator Keys Enabled
	Force 16 Color Viewing
Toolbar Button	Navigate

Stopping a Remote View Session from the Managed Workstation

To stop a Remote View session from the managed workstation:

1. Right-click the Remote Management icon.
2. Click Terminate Session.

Running an Application on the Managed Workstation

You can remotely run executables on the managed workstation using the Remote Execute feature of ZfD. For more information, see "Understanding Remote Execute" on page 253.

To execute an application program on a managed workstation:

1. Right-click the managed workstation from the management console.
2. Click Actions > Remote Execute.
3. Enter the command line in the Remote Execute window.

   Specify the complete path of the application if the application is not in the path of the managed workstation.

   If you do not specify the extension of the file you want to execute at the managed workstation, Remote Execute will append the .EXE extension.
4. Click Execute.

Enter the name of the application or the parameter within double quotes if the application or parameter has a space character. Following are a few examples:

```
"My Wordpad"

"C:\Program Files\Accessories\My Wordpad"

"C:\Program Files\Accessories\MyWordpad" "C:\myfile.txt"

"C:\Program Files\Accessories\My Wordpad" C:\myfile.txt

Wordpad
```

Viewing Diagnostic Information for a Managed Workstation

You can view diagnostic information that will help you analyze problems at the managed workstation. For more information, see “Understanding Remote Diagnostics” on page 253.

To view diagnostic information:

1. Right-click the managed workstation from the management console.
2. Click Actions > Diagnostics.

   2a To view the Windows Memory window, expand the Diagnostics folder > Operating System folder > Memory folder > click Windows Memory.

   For more information, see “Windows Memory Information” on page 278.

   2b To view the Environment window, expand the Diagnostics folder > Operating System folder > click Environment.

   For more information, see “Environment Information” on page 278.

   2c To view the Event Log window, expand the Diagnostics folder > Operating System folder > click Event Log > Security, System, or Application.

   Click an event row in the Event Log table to view a description of the event.

   For more information, see “Event Log Information” on page 278.

   2d To view the Device Drivers window, expand the Diagnostics folder > Operating System folder > click Device Drivers.

   For more information, see “Device Drivers Information” on page 279.

   2e To view the Services window, expand the Diagnostics folder > Operating System folder > click Services.

   For more information, see “Services Information” on page 279.

   2f To view the WIN32 Processes window, expand the Diagnostics folder > Operating System folder > click WIN32 Processes.

   For more information, see “WIN32 Processes Information” on page 280.

   2g To view the WIN32 Modules window, expand the Diagnostics folder > Operating System folder > click WIN32 Processes.

   Double-click a row entry to view the associated WIN32 Modules.

   For more information, see “WIN32 Modules Information” on page 280.

   2h To view the NetWare Connections window, expand the Diagnostics folder > Network folder > click NetWare Connections.

   For more information, see “NetWare Connections Information” on page 280.

   2i To view the Network Protocols window, expand the Diagnostics folder > Network folder > click Network Protocols.

   For more information, see “Network Protocols Information” on page 281.

   2j To view the Name Space Providers window, expand the Diagnostics folder > Network folder > click Name Space Providers.

   For more information, see “Name Space Providers Information” on page 282.

2k To view the Network Drives window, expand the Diagnostics folder > Network folder > click Network Drives.

For more information, see "Network Drives Information" on page 282.

2l To view the Network Open Files window, expand the Diagnostics folder > Network folder > click Open Files.

For more information, see "Network Open Files Information" on page 283.

2m To view the Novell Client window, expand the Diagnostics folder > Network folder > click Novell Client.

For more information, see "Novell Client Information" on page 281.

2n To view the Print Capture window, expand the Diagnostics folder > Network folder > click Print Capture.

For more information, see "Print Capture Information" on page 284.

HINT: You can use the Edit menu options to copy all or selected diagnostic information from the diagnostics windows to a text editor for later analysis.

Managing a File Transfer Session

ZfD lets you transfer files between the management console and a managed workstation. For more information, see "Understanding File Transfer" on page 254. Before you begin a File Transfer session, ensure that you have uninstalled any third-party File Transfer service from the managed workstation.

The following sections explain how you can use File Transfer and the options that are available for working with files from the File Transfer window:

Starting a File Transfer Session

To start a File Transfer session:

1. Right-click the managed workstation from the management console.
2. Click Actions > File Transfer.

Using File Transfer Window Controls

The left pane of the File Transfer window shows the files in the current folder on the management console and the right pane shows the files on the managed workstation. The following table explains the function of the File Transfer controls:

Menu Option	Toolbar Option	Description
File > Open		Opens the selected file in Notepad or Wordpad at the management console. Opens the folder with the list of files at the management console.

Menu Option	Toolbar Option	Description
File > Open with		Opens the file at the management console with the specified application.
File > New Folder		Creates the folder with the specified name.
File > Delete		Deletes the selected files. Deletes the folder if the folder selected from the management console is empty.
File > Rename		Renames the selected file.
File > Properties		Displays the properties of a selected file or folder, such as size of the file and the date and time of last modification.
File > Upload		Moves files from the management console to the managed workstation.
File > Download		Moves files from the managed workstation to the management console.
File > Exit		Closes the File Transfer window.
Edit > Cut		Transfers the selected files to the Clipboard.
Edit > Copy		Copies the selected files to the Clipboard.
Edit > Paste		Pastes the selected files from the Clipboard to the current location.
Edit > Select All		Selects all the files in the current pane.
Edit > Cancel All		Deselects all the files in the current pane.
View Refresh		Updates the display in the Operator Station pane and Target Station pane
Help		Displays help for this window.
Up One Level Folder button		Moves one level up in the directory tree. Right-click the file or folder to view the list of available menu options.
Operator Station Pane		The left pane of the File Transfer window shows the files in the current folder on the management console.
Target Station Pane		The right pane of the File Transfer window shows the files in the current folder on the managed workstation.

Managing a Chat Session

The Chat feature lets you communicate with the user at the managed workstation. For more information, see "Understanding Chat" on page 254. The following sections explain how you can manage Chat sessions using the Chat window:

- "Chatting with a User at the Managed Workstation" on page 276

- “Editing the Messages in the Chat Window on the Management Console” on page 276

HINT: Ensure that the Remote Management Agent that ships with ZfD is installed on the managed workstation. If you have installed an earlier version of the Remote Management Agent, you will be prompted to upgrade the agent before the Chat program loads.

Chatting with a User at the Managed Workstation

To chat with the user at the managed workstation:

1. Right-click the recipient’s managed workstation from the management console.
2. Click Actions > Chat.

   To proceed with the Chat session, the user at the managed workstation must accept the Chat session.
3. Type a message.
4. Click File > Exit to exit the Chat window.

Editing the Messages in the Chat Window on the Management Console

To clear the contents of the text boxes during a Chat session:

- To clear the contents of the Input text box, click Edit > Clear Input.
- To clear the contents of the Response text box, click Edit > Clear Response.
- To clear the contents of the both text boxes, click Edit > Clear All.

To insert existing text into Chat window text boxes:

- To copy the selected text to the Windows Clipboard, click Edit > Copy.
- To add copied text to a text box, Click Edit > Paste.

Viewing the Audit Log of Remote Management Sessions

ZfD records log information on a Windows NT/2000 managed workstation. For more information, see “Understanding the Audit Log” on page 254.

To view the audit log of Remote Management sessions:

1. Click Start > Programs > Administrative Tools > Event Viewer.
2. Click Log > Application.
3. Double-click the event associated with the source Remote Management Agent.

   HINT: To view only the events pertinent to the Remote Management Agent, choose Remote Management Agent from the source drop-down list in the Filter dialog box.

ZfD provides remote diagnostics of workstations. Remote diagnostics displays the event log information of Windows NT/2000 managed workstations. You can also view the audit log for Remote Management using the Event Log window. For more information, see “Event Log Information” on page 278.

23 Diagnostic Information

You can diagnose the managed workstation and obtain information that will help you analyze problems at the managed workstation. For more information, see “Understanding Remote Diagnostics” on page 253.

You can view real-time managed workstation diagnostic information from the management console. For more information, see “Viewing Diagnostic Information for a Managed Workstation” on page 273.

Before you begin to obtain diagnostic information, ensure that the Remote Management Agent is installed on the managed workstation. During Remote Management Agent installation, the Diagnostic Agent is also installed on the managed workstation, which runs automatically when the managed workstation boots up. When the management console user requests diagnostic information from the managed workstation, the Diagnostic Agent on the managed workstation procures the requested information and provides it to the Remote Management Agent, which then makes it available to the management console.

The following sections describe the diagnostic information you can obtain using ZfD:

Windows Memory Information

On Windows* 95/98 and Windows NT*/2000 managed workstations, the Windows Memory window displays the percentage of memory in use, physical memory, paging details, and free space details.

The following table describes the fields in the Windows Memory window:

Field	Description
Memory Load (%)	Percentage of memory utilization. Zero percentage memory indicates memory usage is nil; 100% indicates that all the available memory is in use.
Total Physical Memory (MB)	Total physical memory in MB.
Free Physical Memory (MB)	Amount of available physical memory in MB.
Total Paging File Size (MB)	Total number of MB that can be stored in the paging file. This number does not indicate the actual physical size of the paging file on the managed workstation.
Free Space in Paging File (MB)	Number of MB available in the paging file.
Total Address Space (MB)	Total number of MB described in the user mode portion of the virtual address space of the calling process.
Free User Bytes (MB)	Number of MB in unreserved and uncommitted memory of the user address space of the calling process.

Environment Information

The Environment window displays the variables set at the managed workstation. You can view the Environment information on Windows 95/98 and Windows NT/2000 managed workstations.

The following table describes the fields in the Environment window:

Field	Description
Variables	Environment variable name.
Value	Value of the variable or the path.

Event Log Information

Event logging in Windows NT/2000 provides a standard, centralized way for applications and the operating system to record important software and hardware events. Event logging provides a means to merge events from various sources into a single informative story. The event log diagnostics help the administrator view the System, Security, and Application event logs. You can view the Event Log Information on Windows NT/2000 managed workstations.

The following table describes the fields in the Event Log window:

Field	Description
Event Generated Date	Date on which the entry was submitted (MM/DD/YYYY).
Event Generated Time	Time at which the entry was submitted (HH:MM:SS).
Event ID	Identifies the event specific to the source that generated the event log entry.
Event Generated Type	Classification of the type as Error, Warning, Information, Success, or Failure.
Event Generated Category	Subcategory for the event. This subcategory is source specific.
Source Name	Name of the source (application, service, driver, subsystem) that generated the entry.
Description	Details of the event.
Computer Name	Name of the computer that generated the event.

Device Drivers Information

The Device Drivers window displays information about the device drivers installed on Windows NT/2000 managed workstations. You can use the information in this window to determine whether the workstation has the required drivers loaded and their status.

The following table describes the fields in the Device Driver window for Windows NT/2000 managed workstations:

Field	Description
Name	Name of the device driver.
State	Indicates if the device driver is Stopped or Running.

Services Information

The Services window indicates which services are available on Windows NT/2000 managed workstations, and lists the state of each service.

The following table describes the fields in the Services window:

Item	Description
Service Name	List of services available on the workstation.
State	Indicates if the service is Stopped or Running.

WIN32 Processes Information

Diagnostic information about processes is available on Windows 95/98 managed workstations.

To view the WIN32 modules associated for a particular Windows 32-bit process, double-click the row entry in the WIN32 Processes window.

The following table describes the fields in the WIN32 Processes window:

Field	Description
Path	Path and filename of the executable file for the process.
PID	Processor identifier.
PPID	Parent process identifier.
No. of Threads	Number of execution threads started by the process.
Usage Count	Number of references to the process. A process exists as long as its usage count is non-zero. When the usage count becomes zero, the process terminates.

WIN32 Modules Information

The WIN32 Modules window displays the list of modules associated with a specified process on Windows 95/98 managed workstations.

The following table describes the fields in the WIN32 Modules window:

Field	Description
Module ID	Module identifier in the context of the owning process.
Global Usage Count	Global usage count on the module.
Process Usage Count	Module usage count in the context of the owning process.
Module Path	Location of the module.
Module Size (KB)	Size of the module in KB.

NetWare Connections Information

The NetWare Connections window displays information about all current connections for the Novell® Client™. It also indicates the current server and current tree.

The following table describes the fields in NetWare Connections window:

Field	Description
Server Name	Names of the servers and trees the workstation is connected to.
User Name	Username for each connection.
Connection Number	User's connection number on the server.

Field	Description
Authentication State	Connections are either NDS® or bindery connection.
NDS Tree	NDS Directory tree for each connection to a server that is running NetWare®4 or later.
Transport Type	The transit protocol in use between the server and the workstation.
Address	The internal address of the server.
Resource Type	Identifies the primary server.

Novell Client Information

The Novell Client window displays information about the installed Novell Client and its settings.

The following table describes the fields in the Novell Client window:

Field	Description
Preferred server	NetWare server that is used for NDS authentication of the user when the Novell Client for the Windows workstation software is started.
Preferred tree	Directory tree that the client first attaches to when the Novell Client for the Windows workstation software is started.
Name context	Current position or context in the NDS tree structure. This setting is applicable only to client workstations connecting to a NetWare 4 or NetWare 5 network.
First Network Drive	Network drive that is selected when you connect to a NetWare server.
Client Version	Novell Client 32™ version number.

Network Protocols Information

The Network Protocols window displays the information about the active network protocols on a managed workstation using WinSock. The WinSock architecture also allows for simultaneous access to multiple transport protocols. WinSock contains the Windows Open System Architecture (WOSA) compliant architecture, which allows applications to access protocols including TCP/IP.

The following table describes the fields in the Network Protocols window:

Field	Description
Properties	Specifies characteristics of the protocol.
Address Family	Defines the structure of protocol addresses that are in use by the protocol.

Field	Description
Socket Type	Name represents the different socket types by the BSD socket interface. It can have the following values: ◆ Stream ◆ Datagram ◆ Raw Socket ◆ Seq. Packet ◆ RDM Socket ◆ Unknown
Protocol ID	Protocols identifier.
Message Size (Bytes)	Specifies the maximum message size (in bytes) supported by the protocol. This is the maximum size of a message that can be sent from or received by the host. For protocols that do not support message framing, the actual maximum size of a message that can be sent to a given address may be less than this value. If the protocol is stream-oriented, the concept of message size is not relevant. If the protocol is message-oriented, there is no maximum message size.
Protocol Name	Name of the protocol that is supported, such as TCP/IP, UDP/IP, or IPX™.

Name Space Providers Information

The Name Space Providers window displays information about the Name Space Provider registered with WinSock Name Resolution and Registration APIs. WinSock 2 includes a new set of API functions that standardize how the applications access and use the various network naming services. This information will not be displayed for workstations with WinSock 1.1.

The following table describes the fields in the Name Space Providers Information window:

Field	Description
Name space	Specifies the name space (SAP, DNS, SLP).
Connected	Displays whether the Name Space Provider is enabled on the workstation.
Version	The name space version identifier.
Service Provider	Displays the string for the name space provider.

Network Drives Information

The Network Drives window displays information about mapped drives, drive capacity, volume label, file system information, sector size, and cluster size.

The following table describes the fields in the Network Drives window:

Field	Description
Drive Letter	Mapped drive letter.

Field	Description
Path	NetWare path of the volume or directory to which the drive is mapped. For example, if the directory ZENWORKS on SYS: volume of server ZEN_KYOTO is mapped to drive Q, the path displays ZEN_KYOTO\SYS:ZENWORKS.
File System	File system type for the mapped NetWare directory or volume.
Effective Rights	◆ Read For a folder, grants the right to open files in the folder and read the contents or run the programs. For a file, grants the right to open and read the file. ◆ Write For a folder, grants the right to open and change the contents of files in the folder. For a file, grants the right to open and write to the file. ◆ Create For a folder, grants the right to create new files and folders in the folder. For a file, grants the right to create a file and to salvage a file after it has been deleted. ◆ Delete Grants the right to delete the folder or file. ◆ Modify Grants the right to change the attributes or name of the folder or file, but does not grant the right to change its contents. Changing the contents requires the Write right. ◆ File Scan Grants the rights to see the folder or file with the DIR or NDIR command. ◆ Ownership Grants the ownership rights of the file, folder, or volume. If the corresponding rights are not given to the user, Effective Rights displays hyphen (-).
Long Name Size (Bytes)	Maximum length in characters of a filename component supported by the specified file system. For example, for a FAT file system supporting long names, the value is 255. The value for a DOS file system is 11.
Sector Size (Bytes)	Sector size in bytes.
Sectors Per Cluster	Number of sectors per cluster.
Total Clusters	Size of the volume in clusters.
Free Clusters	Number of clusters currently free for allocation. This number includes the space that is reclaimed from the sub-allocation file system and also clusters freed from deleted files.

Network Open Files Information

The Open Files window displays the names of open files on a file server. It lists the files opened in the network mapped drives, with the server name and connection ID.

The following table describes the fields in the Network Open Files window:

Field	Description
File Name	Name of the file.
Volume Name	Name of the Volume.
Server Name	Name of the file server.
User	The NetWare name under which the user's workstation is logged in to the file server.
Connection ID	Connection ID on which the file is opened.

Print Capture Information

The Print Capture window displays information about the captured queues, print options for each parallel port on the managed workstation, and current status of each port.

The following table describes the fields in the Print Capture window:

Field	Description
Printer Device Name	LPT device. Number of LPT ports for which captures can be managed.
Port State	Specifies whether the LPT device is captured.
Captured Queues	Captured print queue name.

B Documentation Updates

This section contains information about documentation content updates made for Remote Management administration since the initial release of ZENworks® for Desktops (ZfD) 3.2. The information will help you to keep current on updates to the documentation and, in some cases, the ZfD software (such as with a ZfD Support Pack release).

The information is organized according to the date the documentation updates were published. Within a dated section, the updates are alphabetically listed according to the names of the main table of contents sections for Remote Management administration.

The documentation is provided on the Web in two formats: HTML and PDF. Both formats are kept current with the documentation changes listed in this section.

The documentation was updated on the following dates:

- June 18, 2002

June 18, 2002

Updates were made to the following section:

- Managing a Remote Wake Up Session

Managing a Remote Wake Up Session

The following update was made in this section:

Location	Change
Managing a Remote Wake Up Session	Clarificaton made regarding the type of scanner that needs to be run on the remote node: "The remote node has been scanned at least once by the Workstation Inventory scanner that ships with ZfD."

VI Workstation Inventory

Inventory management involves collecting hardware and software inventory information from managed workstations. This inventory information is scanned and stored in a database, which the network administrator can access to manage the workstations.

Novell® ZENworks® for Desktops (ZfD) lets you gather complete hardware and software inventory information in to a centralized database. The network administrator can query the inventory information of the managed workstations from ConsoleOne®.

The following sections will help you understand and use ZfD Workstation Inventory:

24 Understanding Workstation Inventory

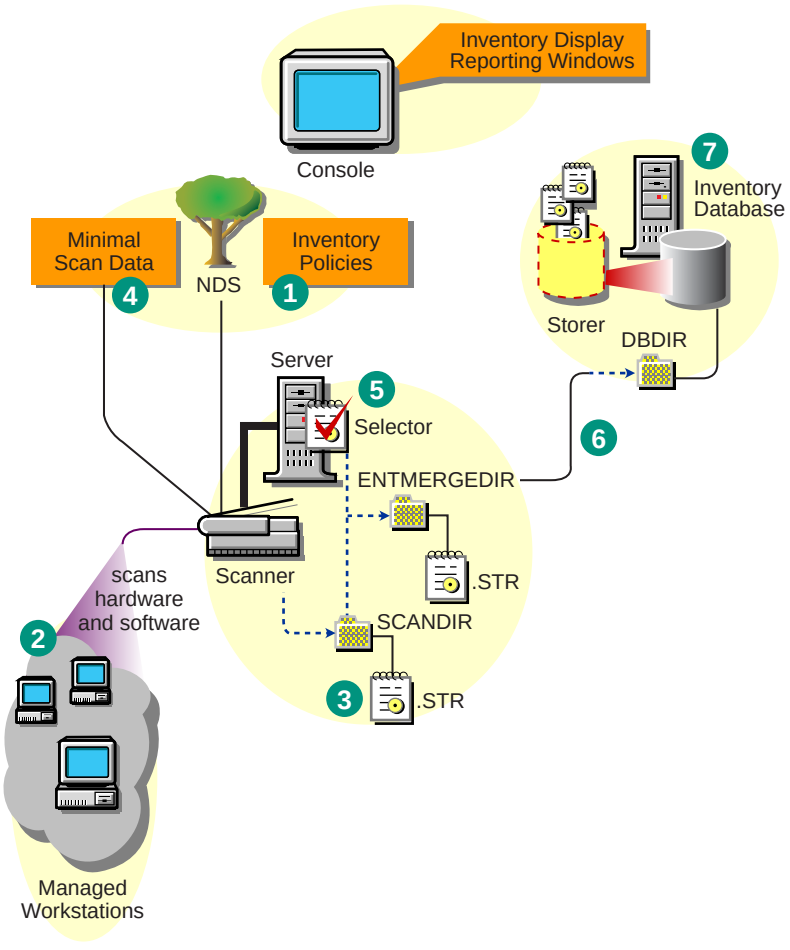
The following sections describe the Novell® ZENworks® for Desktops (ZfD) Workstation Inventory components and processes:

Understanding the Inventory Scanning Cycle

ZfD Workstation Inventory consists of the following components:

- Scanner
- Selector
- Sender
- Receiver
- Storer
- Inventory database

The following illustration depicts the scanning components and the inventory scanning cycle, which is explained below:



The Scanners collect the workstation hardware and software information based on the Inventory policy settings for scheduling and collecting the scan data. This scan information is stored as scan data files (.STR) in the scan directories. A minimal subset of the scan data is also stored in the Novell eDirectory™ Workstation object.

The Selector on the server processes the scan data files to determine whether the new scan data should be merged with the existing data and then places the files in the appropriate directories.

If your inventory deployment requires roll-up of data, the Sender and the Receiver on the servers transfer the compressed scan files from the lower-level servers to the higher-level servers. The Storer on the database server stores the scan data files in the Inventory database. You view the workstation inventory information in ConsoleOne®.

The inventory scanning cycle is as follows:

1. The inventory policies in eDirectory define the inventory settings, such as scanning time, whether to include software scanning of workstations, and the location of the scan directory. These settings are customizable.
2. The Scanner reads the inventory policies and collects the workstation inventory information.
3. The Scanner stores the scan data of each workstation as a .STR file in the scan directory (SCANDIR) at the server.
4. The Scanner stores the minimal inventory information of the workstation in eDirectory.

5. The Selector validates the .STR file and places the file in the enterprise merge directory (ENTMERGEDIR). If there is a database attached, the Selector places the files in the Database directory (DBDIR).
6. The Storer updates the database with the inventory information of the .STR file.
7. The network administrator views the inventory information, queries the database, and generates inventory reports in ConsoleOne.

Understanding Rolling Up Scan Data Across Servers

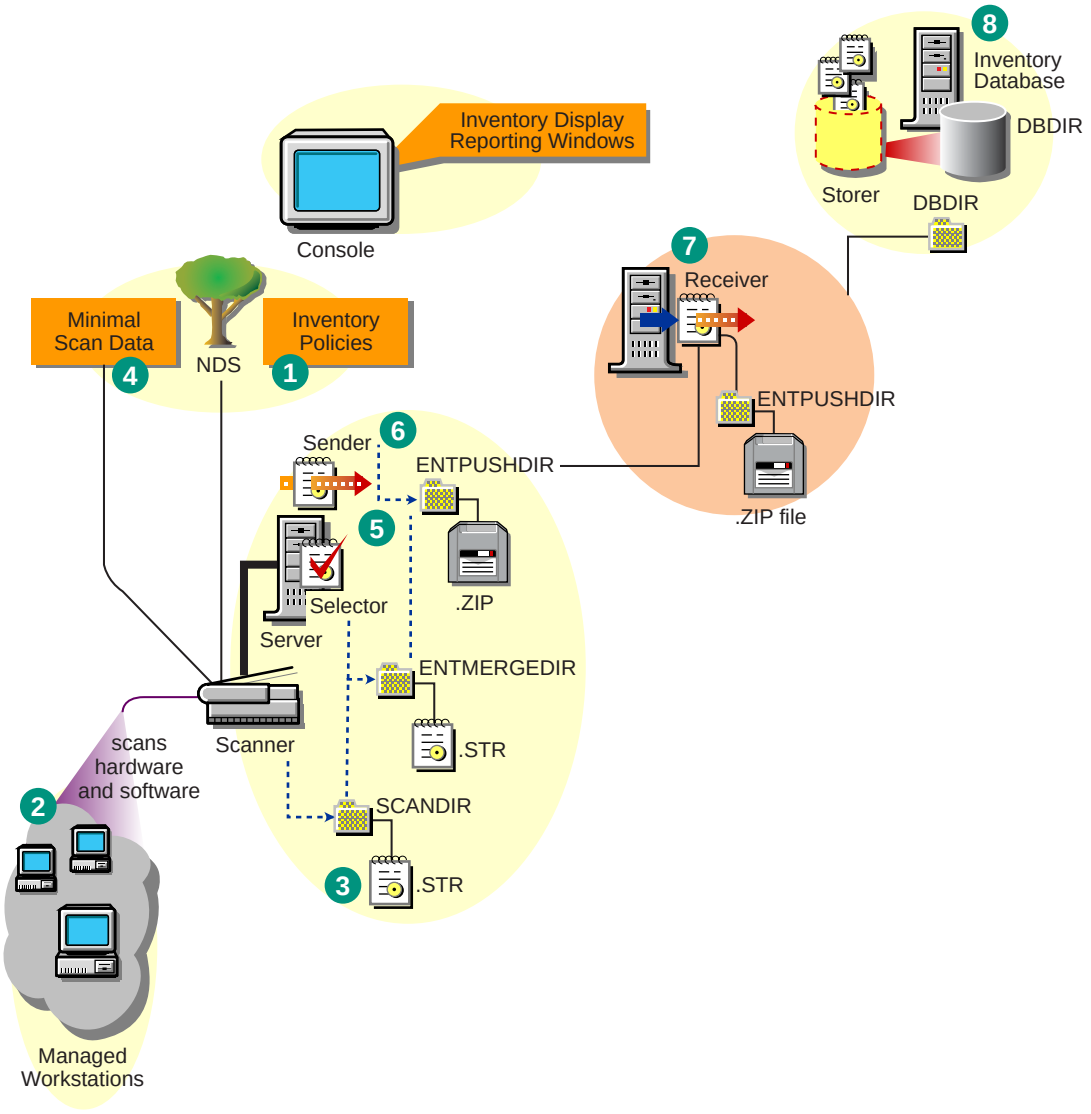
If the inventory deployment rolls up scan data across servers, the process of scanning is as follows:

1. The inventory policies in eDirectory define the inventory settings, such as scanning time, whether to include software scanning of workstations, and the location of the scan directory. These settings are customizable.
2. The Scanner reads the inventory policies and collects the workstation inventory information.
3. The Scanner stores the scan data of each workstation as a scan data file (.STR) in the scan directory (SCANDIR) at the server.
4. The Scanner stores the minimal inventory information of the workstation in eDirectory.
5. The Selector validates the .STR file and places the file in the enterprise merge directory (ENTMERGEDIR) for roll-up of scan data. If there is a database attached, the Selector places the files in the database directory (DBDIR) also.
6. The Sender on the server has a Roll-Up policy to identify the server to which it will transmit the scan data and the Roll-Up Schedule specifies time for roll-up of data. The Sender compresses the .STR files as a .ZIP file and places the .ZIP file in the enterprise push directory (ENTPUSHDIR). The Sender then sends the .ZIP file to the Receiver on the next-level server.
7. The Receiver on the next-level server receives the .ZIP file.

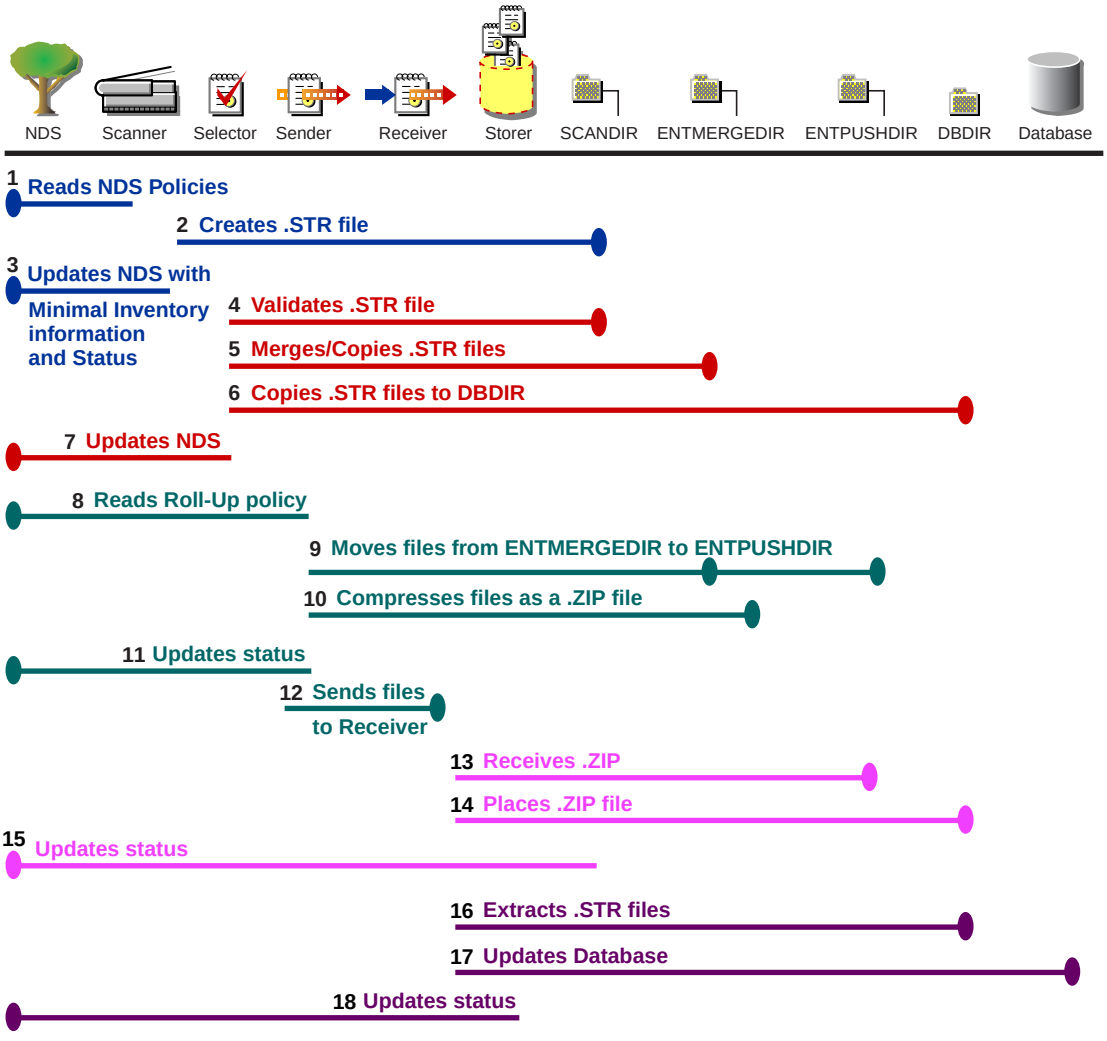
   On the Intermediate Server, the Receiver places the file in the enterprise push directory (ENTPUSHDIR). On the Intermediate Server with Database, or the Intermediate Server with Database and Workstations, the Receiver places the file in ENTPUSHDIR and copies the file in the Database Directory (DBDIR).

   On the Root Server, or the Root Server with Workstations, the Receiver places the file in DBDIR only.
8. The Storer extracts the .ZIP file containing the .STR files in to a temp directory (DBDIR\TEMP) and updates the database with the inventory information of the workstation .STR file.
9. The network administrator views the inventory information, queries the database, and generates inventory reports in ConsoleOne.

The following illustration depicts the scanning process across servers:



The following illustration lists the sequence of scan operations done by each inventory component:



Understanding the Inventory Scanner

ZfD uses the following platform-dependent scanners to collect workstation hardware and software information:

- WINSCAN.EXE to scan Windows* 95/98 workstations
- NTSCAN32.EXE to scan Windows NT* and Windows 2000 workstations

The scanners collect hardware details such as: floppy disk drive, hard disk drive, BIOS, bus, mouse, keyboard, display adapters, network adapter cards, modems, Jaz* drives, Zip* drives, sound cards, memory cards, serial ports, and parallel ports. The software scanning includes checking for applications on the workstations and reporting the information about the scanned software, such as the vendor name, and the product name and version.

The scan information collected by the scanners is stored as scan data files (.STR) in the scan directories (SCANDIR). A minimal set of scan data is also stored in the eDirectory Workstation object.

The following sections contain detailed information about the Inventory scanners:

- “How the Scanners Collect Workstation Inventory Data” on page 294

Also, see "Customizing the Software Scanning Information of Vendors and Products" on page 380.

How the Scanners Collect Workstation Inventory Data

The scanning process is as follows:

- The Workstation Inventory policy lets you configure the Scheduler to adjust scanning times at the workstations. You can set different actions to run the scanners on one or more managed workstations.
- The Scheduler triggers the Scanner, which reads the following inventory settings from the Workstation Inventory policy and Inventory Service object:
  - **Software Scanning Option:** By default, the Scanner collects the hardware information of the workstations. If the Enable Software Scan option is enabled in the Workstation Inventory policy, the Scanner collects information about software applications.
  - **Custom Scan Editor:** If the Software Scanning option is enabled, the Scanner reports the software information of all .EXE files on the scanned workstations. You configure the applications that you want the Scanner to collect information by using the Custom Scan Editor. For more information, see "Customizing the Software Scanning Information of Vendors and Products" on page 380.
  - **Full Scan:** When scanning the workstation for the first time, the Scanner collects the complete inventory of the workstation, referred to as a *full scan.* After the workstation is scanned, the next time the Scanner compares the current inventory data to the history data that it maintains. If there are any changes to the workstation, the Scanner reports the delta scan data, which contains only the changes in inventory since the last scan was reported. The Delta Scan setting is the default scan operation for each successive scan after the first scanning of the workstation.
  - **Enable Scan of Workstation:** The Scanner collects the inventory information of the workstations associated with the Inventory Service object when this option is enabled.
  - **Location of the SCANDIR Path:** The Scanner stores the scan information of the workstations in the scan data files (.STR) located in the scan directory (SCANDIR) on the inventory server.
  - **Start Full Scan:** The Scanner enforces a complete scanning of the workstation and this setting overrides the option set in the Inventory Service Object property page associated with the workstation.

    For more information, see "Setting Up Workstation Inventory" on page 371.
- The Scanner collects the scan data based on the configurations of the inventory settings.

  If the workstation is instrumented for DMI, the scanners query the DMI Service Layer. For more information, see "DMI-Compliant Scanners" on page 297. If the workstations are WMI

compliant, the scanners also collect the hardware data by querying the WMI information. The scanners also probe the workstations for hardware data.

We recommend that you instrument DMI/WMI on your workstations and install DMI/WMI components that are supplied by the vendors.

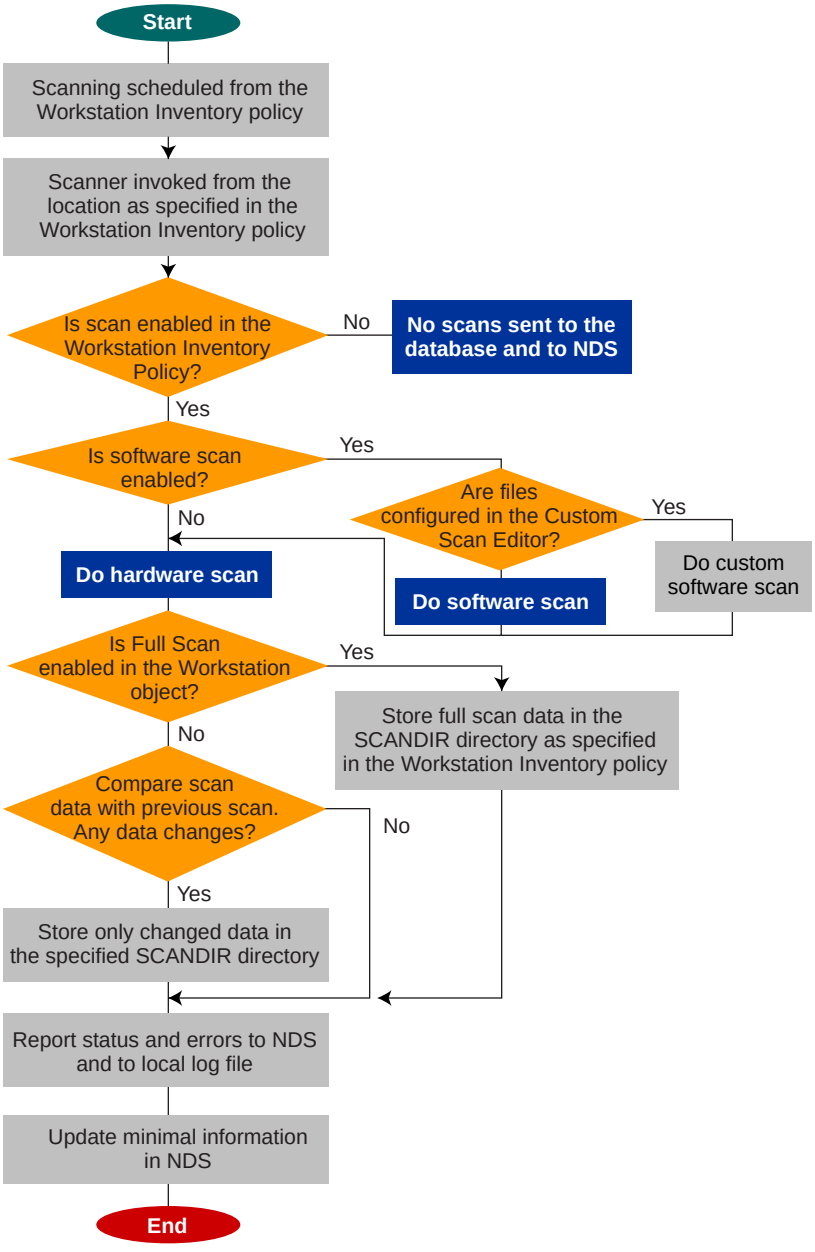
- The scan data of each workstation is stored as .STR files in the SCANDIR directory on the inventory server. The .STR file follows the filename convention: *macaddress_gmt_sequencenumber*.STR, where *macaddress* is the MAC Address of the workstation, *gmt* is the time at which the workstation is scanned for the first time, and *sequencenumber* is the internal sequencing number of the workstation. For example, 00508b12b2c4_944029836000_10.STR is the .STR file for the workstation with the MAC address of 00508b12b2c4, the GMT of 944029836000, and the internal sequencing number of 10.
- The Scanner reports errors in the ZENERRORS.LOG file and updates the status information in the eDirectory Workstation object. The log file is stored in the WINDOWS\TEMP directory on Windows 95/98 workstations or in the TEMP directory on Windows NT/2000 workstations.

  The Scanner tracks the changes in scan data by storing the scan data in the HIST.INI history file. For subsequent scans, the Scanner compares the history scan data with the actual collected data and generates the .STR file.
- The Scanner stores minimal information of the scan data in the MINFO.INI file located in WINDOWS\TEMP on Windows 95/98 workstations and in TEMP on Windows NT/2000 workstations.

  The Scanner updates the eDirectory object with the scan data contained in MINFO.INI.

Scanning Process Flow Chart

The following flow chart illustrates the hardware and software scanning process:



Summary of Files that the Scanner Processes

A summary of the files that the Scanner processes follows:

Filename	Description	Location
filename.STR	Contains the scan data of each workstation.	Scan directory (SCANDIR).
HIST.INI	Contains the history of scan data for each workstation.	WINDOWS\TEMP on Windows 95/98 workstations, or TEMP on Windows NT/2000 workstations.
ZENERRORS.LOG	Contains the error and status information for the latest scan of the workstation.	WINDOWS\TEMP on Windows 95/98 workstations, or TEMP on Windows NT/2000 workstations.

Software Information Collected by the Scanners

The scanners follow this process for software scanning:

- Collects the information about the software on the workstations.
- Customizes the software scanning using the Custom Scan Editor.

  By default, the software scanning includes collecting information of files with .EXE file extensions. See "Customizing the Software Scanning Information of Vendors and Products" on page 380 for information on the list of software applications you can scan for.

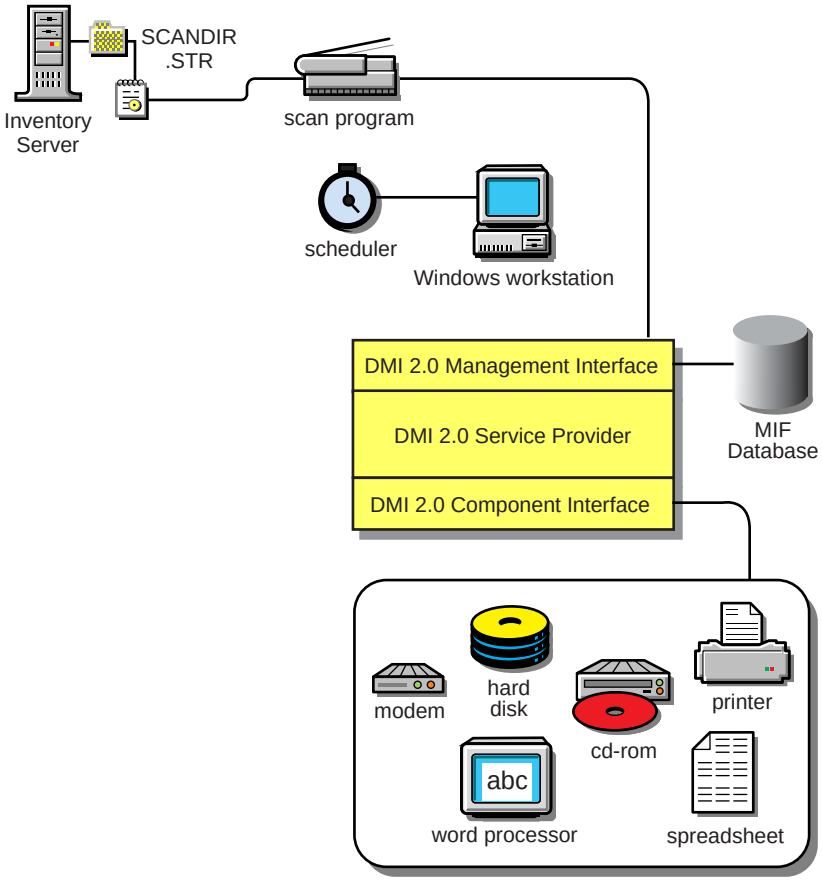
  If the software applications on the workstation are installed using Microsoft* Installer, the scanners use the information from Microsoft Installer (MSI). Otherwise, the scanners collect the software information from the header of the software application files.
- Reports the information about the scanned software, such as name of the software product for each product version and the software vendor.

After the scan data is stored in the database, you can view, query, or generate reports of the software information.

DMI-Compliant Scanners

The scanners for scanning workstations (Windows 95/98 and Windows NT/2000) also include scanning based on the industry-standard Desktop Management Interface (DMI) specification 2.0. These programs use the Management Interface (MI) of DMI to look for the hardware components installed on the workstation. The scanners will scan for specific components that are instrumented on the workstation through DMI. The scanners will query the DMI service layer to retrieve this information.

The MI allows the DMI-compliant scanners to probe the Service Provider within the Service Layer. The Service Provider collects information from the manageable components and stores the collected information in the Management Information Format database. The Component Interface (CI) communicates with the manageable components and the Service layer. The following figure shows the scanner interaction with DMI.



For more information on DMI standards, see the DMTF Web site (http://www.dmtf.org).

To scan the DMI data of the managed workstations, you need to instrument the workstation by installing the vendor-specific components. To install the DMI 2.0 Service Layer on the workstations, use the DMISLSnappshot.AOT file located in the \PUBLIC\ZENWORKS\DMISNAPSHOT directory to create a NAL Application Object.

HINT: If the workstations are DMI compliant, the scanners will collect hardware data by querying the DMI Service Layer. Otherwise, the scanners probe the workstations.

We recommend that you instrument DMI and also install DMI components that are supplied by the vendors.

For example, if you have a Compaq* Family Deskpro EN Model-SFF6500 workstation running under Windows 98, download the Management Product software - Compaq Insight Management Desktop Agents software for Windows 95/98/NT from the Compaq Web site.

For Dell* workstations, access the DM/Desktop Management Utilities software from the Dell Web site.

WMI-Compliant Scanners

The scanners collect hardware data from Windows 95/98/NT/2000 workstations based on Microsoft's Windows Management Instrumentation (WMI) specification.

WMI is the Microsoft implementation of Web-Based Enterprise Management (WBEM) that enables accessing management information in an enterprise environment. WMI 1.5 is fully compliant with Common Information Model (CIM) schema, which is an industry standard. For

more information, see Microsoft WMI Web site (http://www.microsoft.com/hwdev/WMI). WMI also works with existing management standards, such as DMI and SNMP.

The scanners use WMI to look for the hardware components installed on the workstation. The scanners also scan for specific components that are instrumented on the workstation through WMI.

WMI-compliant scanners are supported on Windows 98, Windows 95, and WIndows NT/2000 managed workstations only.

You can view the WMI data of the managed workstations in the Workstation Inventory Summary.

To obtain WMI information from the workstation:

1. Download Microsoft's Windows Management Instrumentation - Core Software Installation from Microsoft WMI Web site (http://msdn.microsoft.com/downloads/default.asp?url=/downloads/sample.asp?url=/msdn-files/027/001/576/msdncompositedoc.xml).

   To instrument a workstation for WMI, you need to download only the WMI Core Software Installation.

   IMPORTANT: On Windows 2000 workstations, WMI Core Software is already installed.

   To troubleshoot any WMI-related problems, you can avail WMI SDK download.

2. Install WMI Core Software on Windows NT/95/98 workstations.

3. On the server, modify the \PUBLIC\ZENWORKS\SCANSOURCE.INI file. Update the following entry in this file:

   ```
   [SOURCE]

   do WMIScan= scansetting
   ```

   where *scansetting* is set to either *TRUE or FALSE*.

   By default, scansetting is set to TRUE and WMI scanning is enabled. To disable WMI scanning, set this to FALSE.

   The scansetting modifications effect only those workstations that are connected to the server. For example, if you set the scansetting to False on a server, such as AUS-INV-SERVER, only those workstations that are connected to this server will not be scanned for WMI.

Hardware Data Collected by the Scanners

The scanners collect the following hardware information.

The following table contains the DMI/WMI components that are addressed in the DMI/WMI information.

Scan Data	DMI Class and Attribute	WMI Class and Attribute
System.Type	Not applicable	Win32_SystemEnclosure.Manufacturer
System.MachineName	Not applicable	Not applicable
System.AssetTag	DMTF|System Enclosure|001.AssetTag	Win32_SystemEnclosure.SMBIOSAssetTag
System.Model	Not applicable	Win32_SystemEnclosure.Model
System.ModelNumber	Not applicable	Win32_SystemEnclosure.SerialNumber

Scan Data	DMI Class and Attribute	WMI Class and Attribute
System.DNName	Not applicable	Not applicable
System.TreeName	Not applicable	Not applicable
IPX.Address	Not applicable	Win32_NetworkAdapterConfiguration.IPX Address (Only on Windows NT/2000)
IP.Address	Not applicable	Win32_NetworkAdapterConfiguration.IPAddress (Only on Windows NT/2000)
IP.Subnet (Subnet Mask)	Not applicable	Win32_NetworkAdapterConfiguration IPSubnet (Only on Windows NT/2000)
DNS.HostName	Not applicable	Win32_NetworkAdapterConfiguration.DNS HostName + Win32_NetworkAdapterConfiguration.DNS Domain (Only on Windows NT/2000)
NetworkAdapter.MACAddress	Not applicable	Win32_NetworkAdapterConfiguration.MAC Address (Only on Windows NT/2000)
Modem.Description	Not applicable	Win32_POTSModem.Description
Modem.Name	Not applicable	Win32_POTSModem.Name
Modem.Vendor	Not applicable	Win32_POTSModem.ProviderName
NetworkAdapter.DriverDescription	DMTF|Network Adapter Driver |001.Driver Software Name	Win32_SystemDriver.Description (Only on Windows NT/2000)
NetworkAdapter.DriverName	DMTF|Network Adapter Driver |001.Driver Software Name	Win32_SystemDriver.PathName (Only on Windows NT/2000)
NetworkAdapter.DriverVersion	DMTF|Network Adapter Driver |001.Driver Software Version	Not applicable
NetworkAdapter.Speed	DMTF|Network Adapter 802 Port|001.5	Win32_NetworkAdapter.MaxSpeed (Only on Windows NT/2000)
NetworkAdapter.Name	DMTF|Network Adapter Driver|001.Driver Software Description	Win32_NetworkAdapter.Name (Only on Windows NT/2000)
NetworkAdapter.PermAddress	DMTF|Network Adapter 802 Port|001.PermanentNetworkAddress	Win32_NetworkAdapter.PermanentAddress (Only on Windows NT/2000)
Login.LoginName	Not applicable	Not applicable
Login.DomainName	Not applicable	Win32_ComputerSystem.Domain (Only on Windows NT/2000)
NWClient.Version	Not applicable	Not applicable
Processor.stepping	DMTF|Processor|004.ProcessorVersionInformation	Win32_Processor.Stepping
Processor.DeviceID	Not applicable	Win32_Processor.DeviceID
Processor.Family	DMTF|Processor|004.Processor.Family	Win32_Processor.Family

Scan Data	DMI Class and Attribute	WMI Class and Attribute
Processor.MaxClockSpeed	DMTF|Processor|004.MaximumSpeed	Win32_Processor.MaxClockSpeed
Processor.CurrentClockSpeed	DMTF|Processor|004.CurrenteSpeed	Win32_Processor.CurrentClockSpeed
Processor.Role	DMTF|Processor|004.ProcessorType	Win32_Processor.ProcessorType
Processor.Upgrade	DMTF|Processor|004.ProcessorUpgrade	Win32_Processor.UpgradeMethod
Processor.OtherFamily	Not applicable	Win32_Processor.OtherFamilyDescription
BIOS.Manufacturer	DMTF|SystemBIOS|001.BIOSManufacturer	Win32_BIOS.Manufacturer
BIOS.BIOSDate	Not applicable	Win32_BIOS.InstallDate
BIOS.BIOSIDBytes	Not applicable	Not applicable
BIOS.Copyright	Not applicable	Win32_BIOS.Caption
BIOS.SerialNumber	Not applicable	Win32_BIOS.SerialNumber
BIOS.BIOSType	DMTF|SystemBIOS|001.BIOSVersion	Win32_BIOS.SMBIOSBIOSVersion
BIOS.PrimaryBIOS	DMTF|SystemBIOS|001.BIOSPrimaryBIOS	Win32_BIOS.PrimaryBIOS
BIOS.Size	DMTF|SystemBIOS|001.BIOSROMSize	Not applicable
Bus.Version	Not applicable	Not applicable
Bus.Type	DMTF|Bus Port|001.Protocol	Not applicable
Mouse.DeviceType	Not applicable	Not applicable
Mouse.Type	DMTF|Mouse|004.Mouse Interface	Not applicable
Mouse.NumberOfButtons	DMTF|Mouse|004.Mouse Buttons	Not applicable
Mouse.DriverName	DMTF|Mouse|004.Mouse Driver Name	Not applicable
Mouse.DriverVersion	DMTF|Mouse|004.Mouse Driver Version	Not applicable
Mouse.IRQ	DMTF|Mouse|004.Mouse IRQ	Not applicable
Keyboard.Layout	DMTF|Keyboard|003.Layout	Win32_Keyboard.Layout
Keyboard.Subtype	Not applicable	Not applicable
Keyboard.Type	DMTF|Keyboard|003.Keyboard.Type	Win32_Keyboard.Description
Keyboard.Fkeys	Not applicable	Win32_Keyboard.NumberOfFunctionKeys
Keyboard.Delay	Not applicable	Not applicable
Keyboard.TypematicRate	Not applicable	Not applicable
Monitor.NumberOfColorPlanes (NEW)	Not applicable	Win32_PCVideoController.NumberOfColor Panes
Monitor.HorizontalResolution	DMTF|Video|004.Current Horizontal Resolution	Win32_PCVideoController.CurrentHorizont alResolution

Scan Data	DMI Class and Attribute	WMI Class and Attribute
Monitor.VerticalResolution	DMTF|Video|004.Current Vertical Resolution	Win32_PCVideoController.CurrentVertical Resolution
Monitor.DisplayType	DMTF|Video|004.Video Type	Win32_PCVideoController.VideoArchitectu re
Monitor.MemoryType	DMTF|Video|004.Video Memory Type	Win32_PCVideoController.VideoMemoryT ype
Monitor.MaxMemorySupported	DMTF|Video|004.Video RAM Memory Size	Win32_PCVideoController.MaxMemorySu pported
Monitor.Bitsperpixel	DMTF|Video|004.Current Number of Bits per Pixel	Win32_PCVideoController.CurrentBitsPer Pixel
Monitor.ControllerDescription	DMTF|Video|004.Video Controller Description	Win32_PCVideoController.Description
Monitor.MaxRefreshrate	DMTF|Video|004.Maximum Refresh Rate	Win32_PCVideoController.MaxRefreshRat e
Monitor.MinRefreshrate	DMTF|Video|004.Minimum Refresh Rate	Win32_PCVideoController.MinRefreshRat e
Monitor.VideoBIOSManufacturer	DMTF|Video BIOS|001.BIOS Manufacturer	Not applicable
Monitor.VideoBIOSVersion	DMTF|Video BIOS|001.Video.BIOS Version	Not applicable
Monitor.VideoBIOSReleaseDate	DMTF|Video BIOS|001.Video.BIOS Release Date	Not applicable
Monitor.VideoBIOS.IsShadowed	DMTF|Video BIOS|001.Video.Shadowing State	Not applicable
ParallelPort.Name	DMTF|Parallel Ports|003.Logical Name	Not applicable
ParallelPort.Address	DMTF|Parallel Ports|003.Parallel Base I/O Address	Not applicable
ParallelPort.DMASupport	DMTF|Parallel Ports|003.DMA Support	Not applicable
ParallelPort.IRQ	DMTF|Parallel Ports|003.IRQ Used	Not applicable
SerialPort.Name	DMTF|Serial Ports|004.Logical Name Pointing Device Port Name	Not applicable
SerialPort.Address	DMTF|Serial Ports|004.Serial Base I/O Address	Not applicable
SerialPort.IRQ	DMTF|Serial Ports|004.IRQ Used	Not applicable
FloppyDrive.DriverName	DMTF|Logical Drives|001.Logical Drive Name (when DMTF|Logical Drives|001.Logical Drive Type=Floppy Drive(7))	Win32_LogicalDisk.DeviceID (where Win32_LogicalDisk.DriveType = 2 (Removable Disk) and Win32_LogicalDisk.MediaType = [2,11]or[13,22])
FloppyDrive.Vendor	Not applicable	Not applicable

Scan Data	DMI Class and Attribute	WMI Class and Attribute
FloppyDrive.Description	DMTF|Disks|003.Interface Description (when DMTF|Disks|003.Storage Type=Floppy Disk(4))	Win32_LogicalDisk.Description (where Win32_LogicalDisk.DriveType = 2 (Removable Disk) and Win32_LogicalDisk.MediaType = [2,11]or[13,22])
FloppyDrive.MaxNumberofCylinders	DMTF|Disks|003.Number of Physical Cylinders	Not applicable
FloppyDrive.NumberOfHeads	DMTF|Disks|003.Number of Physical Heads	Not applicable
FloppyDrive.Sectors	DMTF|Disks|003.Number of Physical Sectors Per Track	Not applicable
FloppyDrive.Size	DMTF|Disks|003.Total Physical Size	Win32_LogicalDisk.Size where Win32_LogicalDisk.DriveType = 2 (Removable Disk) and Win32_LogicalDisk.MediaType = [2,11]or[13,22])
CDROMDrive.Name	DMTF|Logical Drives|001.Logical Drive Name	Win32_CDROMDrive.Drive
CDROMDrive.Vendor	Not applicable	Win32_CDROMDrive.Manufacturer
CDROMDrive.Description	DMTF|Disks|003.Interface.Description (when DMTF|Disks|003.Storage Type=Compact Disk Disk(8))	Win32_CDROMDrive.Description
CDROMDrive.DeviceID	DMTF|Disks|003.DeviceID	Win32_CDROMDrive.Caption
HardDrive.Vendor	Not applicable	Win32_DiskDrive.Manufacturer (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")
HardDisk.Description	DMTF|Disks|003.Interface Description (when DMTF|Disks|003.Storage Type=Hard Disk(3))	Win32_DiskDrive.Description (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")
HardDisk.Cylinders	DMTF|Disks|003.Number of Physical Cylinders	Win32_DiskDrive.TotalCylinders (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")
HardDisk.Heads	DMTF|Disks|003.Number of Physical Heads	Win32_DiskDrive.TotalHeads (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")
HardDisk.Sectors	DMTF|Disks|003.Number of Physical Sectors per Track	Win32_DiskDrive.SectorsPerTrack (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")

Scan Data	DMI Class and Attribute	WMI Class and Attribute
HardDisk.Capacity	DMTF|Disks|003.Total Physical Size	Win32_DiskDrive.Size (Win32_DiskDrive.MediaType = "Fixed Hard Disk media")
HardDisk.PartitionName	DMTF|Partition|002.Partition Name	Not applicable
HardDisk.PartitionSize	DMTF|Partition|002.Partition Size	Not applicable
HardDisk.PartitionFileSystemType	DMTF|Partition|002.FileSystem	Not applicable
LogicalDrive.Name	DMTF|Logical Drives|001.Logical Drive Name (when DMTF|Logical Drives|001.Logical Drive Type=Fixed Drive(3))	Win32_LogicalDiskDeviceID (when Win32_LogicalDisk.DriveType = 3 (Local Disk))
LogicalDrive.Size	DMTF|Logical Drives|001.Logical Drive Size	Win32_LogicalDisk.Size (when Win32_LogicalDisk.DriveType = 3 (Local Disk))
LogicalDrive.FreeSpace	Not applicable	Wind32_LogicalDisk.FreeSpace (when Win32_LogicalDisk.DriveType = 3 (Local Disk))
LogicalDrive.VolumeSerialNumber	Not applicable	Win32_LogicalDisk.VolumeSerialNumber (when Win32_LogicalDisk.DriveType = 3 (Local Disk))
LogicalDrive.Volume (Volume Label)	Not applicable	Win32_LogicalDisk.VolumeName (when Win32_LogicalDisk.DriveType = 3 (Local Disk))
Operating System.Name	DMTF|Operating System|001.Operating System Name	Win32_OperatingSystem.OSType
OperatingSystem.Version	DMTF|Operating System|001.Operating System Version	Win32_OperatingSystem.Version
OperatingSystem.Codepage	Not applicable	Win32_OperatingSystem.CodeSet
OperatingSystem.InstallDate	Not applicable	Win32_OperatingSystem.InstallDate
OperatingSystem.TotalSwapSpaceSize	DMTF|System Memory Settings|001.Total Size of Paging Files	Win32_OperatingSystem.SizeStoredInPagingFiles
OperatingSystem.Description	DMTF|Operating System|001.Operating System Description	Win32_OperatingSystem.Caption
VirtualMemory.TotalVirtualMemorySize	DMTF|System Memory Setting|001.Total Virtual Memory	Not applicable
InventoryScanner.Version	Not applicable	Not applicable
InventoryScanner.LastScanDate	Not applicable	Not applicable

Scan Data	DMI Class and Attribute	WMI Class and Attribute
InventoryScanner.InventoryServer	Not applicable	Not applicable
SoundCard.Description	Not applicable	Win32_SoundDevice.Description
SoundCard.Name	Not applicable	Win32_SoundDevice.Name
SoundCard.Manufacturer	Not applicable	Win32_SoundDevice.Manufacturer
Scsidrive.Description	Not applicable	Win32_DiskDrive.Description (Win32_DiskDrive.MediaType = "Removable media")
Scsidrive.Manufacturer	Not applicable	Win32_DiskDrive.Manufacture (Win32_DiskDrive.MediaType = "Removable media")
Scsidrive.Name (mapped drive)	Not applicable	Not applicable
Memory.Size	DMTF|System Memory Settings|001.Total Physical Memory	Not applicable
Cache.Level	DMTF|System Cache|003.System Cache Level	Win32_CacheMemory.Level
Cache.WritePolicy	DMTF|System Cache|003.System Cache Write Policy	Win32_CacheMemory.WritePolicy
Cache.ErrorCorrection	DMTF|System Cache|003.System Cache Error Correction	Win32_CacheMemory.ErrorMethodology
Cache.Type	DMTF|System Cache|003.System Cache Type	Win32_CacheMemory.CacheType
Cache.LineSize	DMTF|System Cache|003.Line Size	Win32_CacheMemory.LineSize
Cache.ReplacementPolicy	DMTF|System Cache|003.Replacement Policy	Win32_CacheMemory.ReplacementPolicy
Cache.ReadPolicy	DMTF|System Cache|003.Read Policy	Win32_CacheMemory.ReadPolicy
Cache.Associativity	DMTF|System Cache|003.Associativity	Win32_CacheMemory.Associativity
Cache.Speed	DMTF|System Cache|003.System Cache Speed	Win32_CacheMemory.CacheSpeed
Cache.Size	DMTF|System Cache|003.System Cache Size	Win32_CacheMemory.MaxCacheSize
Motherboard.Verify	Not applicable	Not applicable
MotherBoard.BoardRev	Not applicable	Not applicable
MotherBoard.Slots	DMTF|Motherboard|001.Number of Expansion slots	Not applicable
Battery.Name	DMTF|Portable Battery|002.Portable Battery Device Name	Win32_Battery.Name

Scan Data	DMI Class and Attribute	WMI Class and Attribute
Battery.Chemistry	DMTF|Portable Battery|002.Portable Battery Device Chemistry	Win32_Battery.Chemistry
Battery.Capacity	DMTF|Portable Battery|002.Portable Battery Design Capacity	Win32_Battery.DesignCapacity
Battery.Voltage	DMTF|Portable Battery|002.Portable Battery Design Voltage	Win32_Battery.DesignVoltage
Battery.Version	DMTF|Portable Battery|002.Portable Smart Battery Version	Win32_Battery.SmartBatteryVersion
Battery.Manufacturer	DMTF|Portable Battery|002.Portable Battery Manufacturer	Win32_PortableBattery.Manufacturer
Battery.ManufacturerDate	DMTF|Portable Battery|002.Portable Battery Manufacturer Date	Win32_Battery.InstallDate
Battery.SerialNumber	DMTF|Portable Battery|002.Portable Battery Serial Number	Not applicable
PowerSupply.InputVoltageDescription	DMTF|Power Supply|002.Power Suppy Input Voltage Capability Description	Win32_UninterruptiblePowerSupply.Description
PowerSupply.Power	DMTF|Power Supply|002./Total Output Power	Win32_UninterruptiblePowerSupply.TotalOutputPower
DMA.Number	DMTF|DMA|001.DMA Number	Win32_DMA.DMAChannel
DMA.Description	DMTF|DMA|001.DMA Description	Win32_DMA.Description
DMA.Availability	DMTF|DMA|001.DMA Channel Availability	Win32_DMA.Availability
DMA_BurstMode	DMTF|DMA|001.DMA BurstMode	Win32_DMA.BurstMode
UCS.PrimaryOwnerContact	DMTF|General Information|001.3	Win32_UnitaryComputerSystem.PrimaryOwnerContact
UCS.PrimaryOwnerName	DMTF|General Information|001.4	Win32_UnitaryComputerSystem.PrimaryOwnerName
IRQ.Number	DMTF|IRQ|002.IRQNumber	Win32_IRQ.IRQNumber
IRQ.Availability	DMTF|IRQ|002.Availability	Win32_IRQ.Availability
IRQ.TriggerType	DMTF|IRQ|002.TriggerType	Win32_IRQ.TriggerType
IRQ.Shareable	DMTF|IRQ|002.Shareable	Win32_IRQ.Shareable
CIM_Card.Description	DMTF|System Slots|003.Description	Not applicable
CIM_Slot.MaxDataWidth	DMTF|System Slots|003.MaxDataWidth	Not applicable
CIM_Slot.ThermalRating	DMTF|System Slots|003.Tr	Not applicable

NOTE: PCMCIA modems are connected to the computer through the PCMCIA slots on the workstations. The Scanner detects PCMCIA modems that are active on the computer. If you want to know which modem is installed on the computer, use the Windows System Device Manager on the Windows workstation.

Non-PCMCIA modems are connected to the computer through the external ports. For example, some non-PCMCIA modems are connected through the serial ports. The Scanner detects non-PCMCIA modems that are installed on the computer.

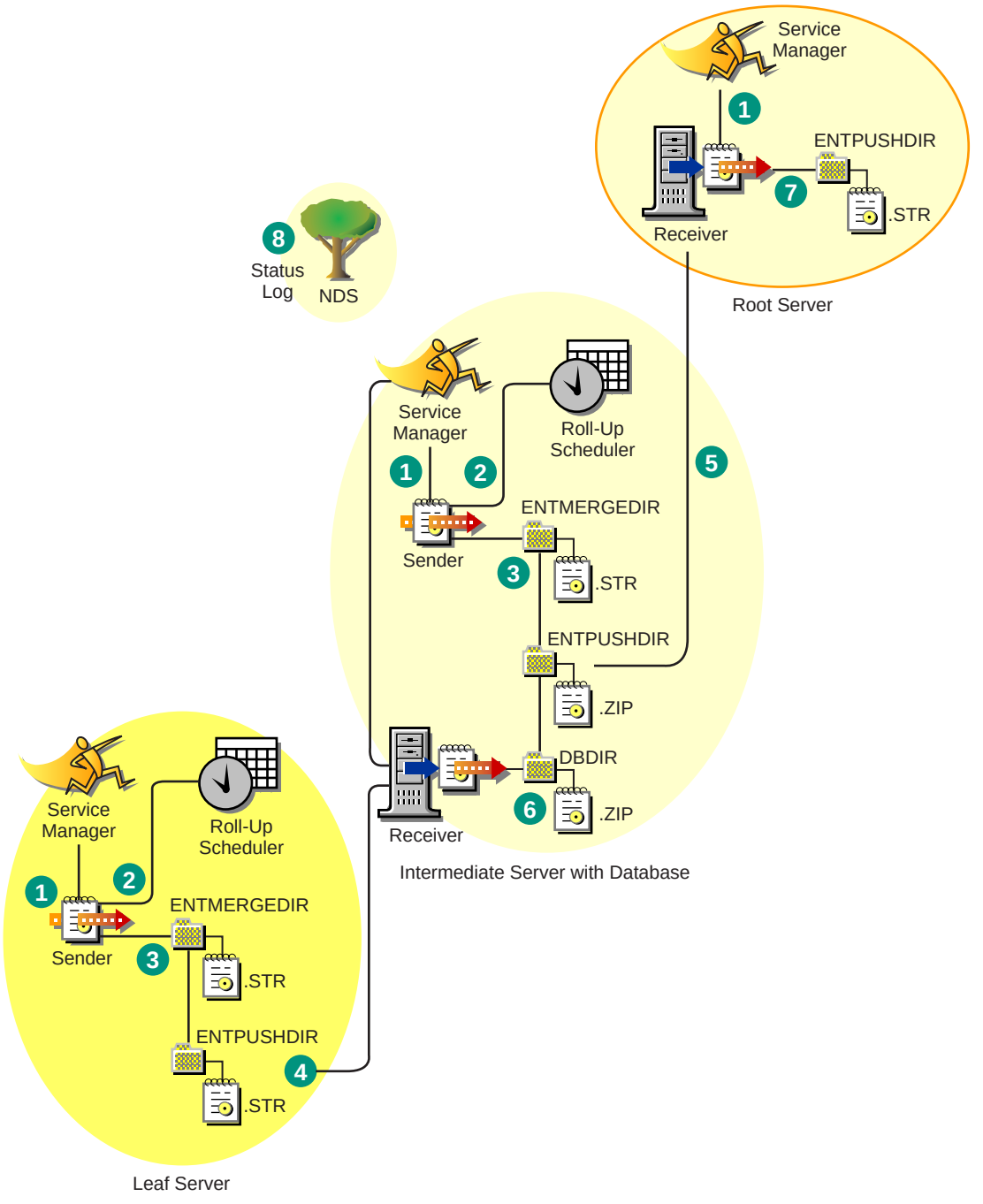
Non-PCMCIA modems may not be active at the time of scanning. Also, these modems may not be connected, though configured on the computer. In this case, the Scanner detects the modem and reports the scan information of the modem.

Understanding the Sender-Receiver

The Sender and the Receiver on the servers transfer the scan files from the lower-level servers to the higher-level servers. The following sections contain more information:

- "Understanding the Sender" on page 309
- "Understanding the Receiver" on page 309
- "Understanding the Compressed Scan Data File" on page 310
- "Sender-Receiver Directories" on page 310

The following illustration depicts the processing done by the Sender-Receiver.



The processing done by the Sender-Receiver is as follows:

1. The Service Manager starts the Sender-Receiver component.
2. The Roll-Up Scheduler activates the Sender at the specified roll-up time.
3. The Sender moves the scan data files (.STR) from the enterprise merge directory (ENTMERGEDIR) to the enterprise push directory (ENTPUSHDIR) and compresses the files as a .ZIP file.
4. The Sender sends the .ZIP file from the ENTPUSHDIR directory to the Receiver on the next-level server.

5. The Sender on the Intermediate Server sends the .ZIP file to the Receiver on the next-level server.
6. The Receiver copies the .ZIP files to the ENTPUSHDIR directory.
7. The Receiver copies the .ZIP files to the database directory (DBDIR).
8. The Sender-Receiver logs the status in eDirectory.

Understanding the Sender

The Sender is a Java* component that runs on any Leaf Server or on the Intermediate Server. The Sender is a service loaded by the Service Manager. See "Inventory Components on Servers" on page 322 for a quick reference table of server components.

The flow of information from the Sender in the roll-up of scan data is as follows:

1. The Service Manager starts the Sender on the server. At the specified time scheduled in the Roll-Up Schedule, the Sender moves the scan data files (.STR) from the enterprise merge directory (ENTMERGEDIR) to the enterprise push directory (ENTPUSHDIR).

   The Sender compresses these .STR files in the ENTPUSHDIR directory of the server as a .ZIP file and then deletes the .STR files. For more information, see "Understanding the Compressed Scan Data File" on page 310.
2. The Sender creates a new record in the zeninvRollUpLog attribute of the Inventory Service object (ZenInvservice) in eDirectory with the following details: server on which the Sender compresses the STR files and the name and size of the .ZIP file.
3. Based on the Discard Scan Data Time in the Inventory Service object properties of the Receiver, the Sender deletes the compressed .ZIP files in the ENTPUSHDIR directory that have been created earlier than the specified discard scan data time. This removes unwanted scan information being sent in the roll-up.
4. The Sender sends the compressed .ZIP files to the Receiver, with the oldest compressed files sent first.
5. The Sender receives an acknowledgment from the Receiver that a .ZIP file was properly received and then deletes the compressed files in the ENTPUSHDIR directory.
6. After the roll-up of data, the Sender updates the zeninvRollUpLog attribute of the server on which the compressed file was created with the following details: server from which the Sender transmitted the file, name of the .ZIP file, time of transmission, total time taken to transmit the files, and the server to which it was sent.

   The status information for all actions of the Sender is logged in the Roll-Up Log and Server Status log. For more information, see "Troubleshooting Workstation Inventory with Status Logs" on page 431.

If the Sender is unable to connect to the Receiver, the Sender retries to connect after 10 seconds. The time interval increases exponentially by a factor of 2. After 14 retries, the Sender stops trying to connect to the Receiver. The Sender retries for approximately 23 hours before it discontinues trying. The Sender does not process any other data while it is establishing the connection.

Understanding the Receiver

The Receiver is a Java component that runs on the Intermediate Server or on the Root Server. The Receiver is a service loaded by the Service Manager. See "Inventory Components on Servers" on page 322 for a quick reference table of server components.

The processing done by the Receiver is as follows:

1. On successfully establishing communication with the Sender, the Receiver receives the scan .ZIP file from the Sender. The file is placed in the enterprise push directory (ENTPUSHDIR).

   On an Intermediate Server, the file is placed in ENTPUSHDIR. On an Intermediate Server with Database, or an Intermediate Server with Database and Workstations, the file is placed in ENTPUSHDIR and copied to the Database Directory (DBDIR).

2. The Receiver on the Root Server or the Root Server with Workstations receives the .ZIP files from the Senders and copies the files to the DBDIR directory on the server.

3. The Receiver logs the status information in the Roll-Up log. For more information, see "Troubleshooting Workstation Inventory with Status Logs" on page 431.

Understanding the Compressed Scan Data File

The Sender compresses the scan data files (.STR) into a .ZIP file. The .ZIP file is named using the following naming conventions:

scheduledtime_inventoryservername_siteID_sitename.ZIP

where *scheduledtime* refers to the date and time when the Sender is scheduled for roll-up of scan information, *inventoryservername* refers to the inventory server on which the .ZIP file was compressed, *siteID* refers to the identification of the database that is attached to the inventory server, *sitename* refers to the unique site name of the database specified during installation, and *ZIP* is the file extension for the compressed files.

The .ZIP filename changes depending on if the database is attached to the server. If the database is not attached to the server, the file is named as follows:

*scheduledtime_inventoryservername*_NOTSTOREDINDATABASETILLNOW_NULL.ZIP

The .ZIP file contains the .STR files and a property file. The property file is named using the following conventions:

scheduled_time_inventoryservername.PRP

The property file identifies the information for roll-up from the enterprise push directory (ENTPUSHDIR) to the next-level server. The property file contains the scheduled time, inventory server name, and signature. The signature helps to authenticate the .ZIP file.

Each .ZIP file can contain a maximum of 1,000 .STR files.

Sender-Receiver Directories

The following table provides a quick reference of the directories that the Sender-Receiver uses:

Server	Sender	Receiver	ENTMERGDIR	ENTPUSHDIR	DBDIR
Leaf Server, Leaf Server with Database	Runs on this server	--	• Sender moves the STR files to the ENTPUSHDIR.	• Sender compresses the .STR files as a .ZIP file. • Sender deletes the .STR files. • Sends the .ZIP file to the next-level server.	--

Server	Sender	Receiver	ENTMERGDIR	ENTPUSHDIR	DBDIR
Intermediate Server	Runs on this server	Runs on this server	--	◆ Receiver receives the .ZIP files from the lower-level server in this directory. ◆ Sender sends the .ZIP files to the next-level server.	--
Intermediate Server with Workstations	Runs on this server	Runs on this server	◆ Sender moves the .STR files to the ENTPUSHDIR.	◆ Receiver receives the .ZIP files from the lower-level server in this directory. ◆ Sender compresses the .STR files in to .ZIP files. ◆ Sender deletes the .STR files. ◆ Sender sends the .ZIP files to the next-level server.	
Intermediate Server with Database	Runs on this server	Runs on this server	--	◆ Receiver receives the .ZIP files from the lower-level server in this directory. ◆ Sender sends the .ZIP file to the next-level server.	◆ Receiver copies the file in this directory.
Intermediate Server with Database and Workstations	Runs on this server	Runs on this server	◆ Sender moves the .STR files to the ENTPUSHDIR.	◆ Receiver receives the .ZIP files from the lower-level server in this directory. ◆ Sender compresses the .STR files as a .ZIP file. ◆ Sender deletes the .STR files. ◆ Sender sends the .ZIP file to the next-level server.	◆ Receiver copies the file in this directory.
Root Server, Root Server with Workstations	--	Runs on this server	--	--	◆ Receiver receives the .ZIP files from the lower-level server in this directory.

On the Standalone Server, the Receiver is not loaded.

Understanding the Selector

The Selector is a Java component on the server that receives the scan data from the workstations. These servers can be any of the following: Leaf Server, Leaf Server with Database, Intermediate Server with Database and Workstations, Intermediate Server with Workstations, Root Server with Workstations, and Standalone Server. See "Inventory Components on Servers" on page 322 for a quick reference table of server components.

The processing done by the Selector is as follows:

1. While scanning the workstation, the Scanner creates a scan data file (.STR) in the scan directory (SCANDIR) at the server for each scan done on the workstation. The location of SCANDIR is obtained from the Inventory Service object. The Selector processes the .STR files placed by the Scanner in the SCANDIR directory.
2. The Selector checks the validity of the .STR file to ensure that it is a valid file generated by the Scanner. The Selector processes only valid .STR files. If invalid files are present in the directory, the Selector deletes them.
3. Based on the role of the server, the Selector copies the .STR files to the appropriate directories:
   - If a full scan is done at the workstation, the Selector on the server copies the .STR file to the DBDIR directory (if the database is attached) and the ENTMERGE directory. If the .STR file already exists in the directory, it overwrites the file. See the table below.
   - If a delta scan is done at the workstation, the Selector on the server appends the contents of the file in to the existing files in the DBDIR directory (if the database is attached) and the ENTMERGE directory.

   The following table lists the directories that the Selector copies the files to:

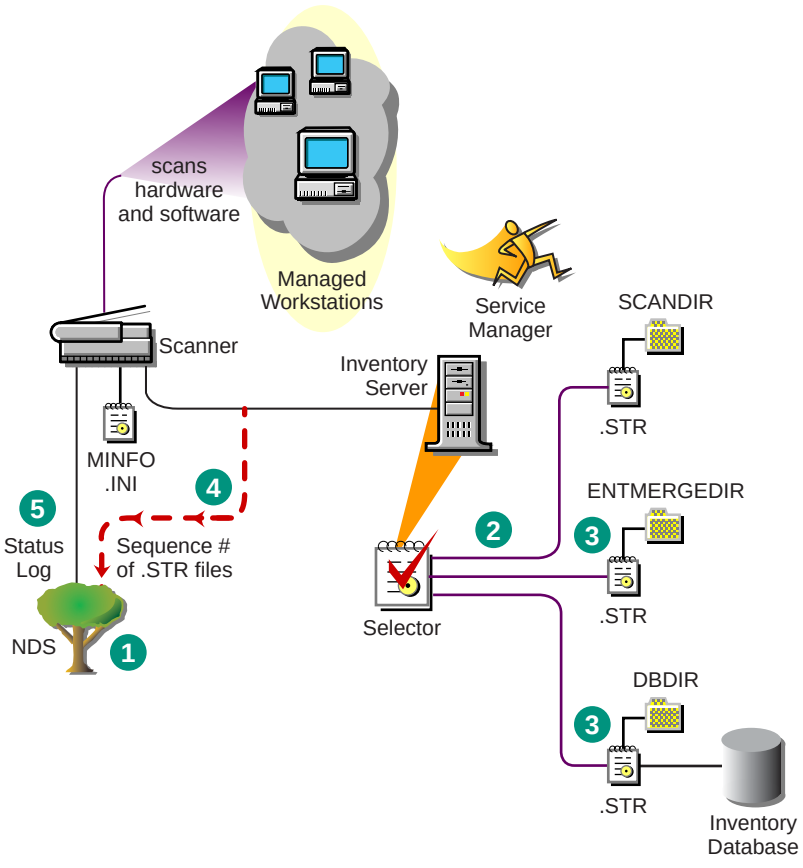
Server	Copies the .STR file to the Database Directory (DBDIR)	Copies the .STR file to the Enterprise Merge Directory (EntMergeDir)
Leaf Server with Database	Yes	Yes
Leaf Server	--	Yes
Intermediate Server with Database & Workstations	Yes	Yes
Standalone Server	Yes	--
Root Server with Workstations	Yes	--

4. The Selector updates the sequence number of valid .STR files in eDirectory.

   The Selector determines whether to enforce a full scan if the scanning sequence number in the .STR file is improper. If the .STR file is invalid or if there are discrepancies in the sequence number of the .STR file, the Selector enforces a full scan.
5. The Selector logs the status in the Server log. For more information, see "Troubleshooting Workstation Inventory with Status Logs" on page 431.

   The Selector removes the existing .STR files in the SCANDIR directory.

The following illustration depicts the processing done by the Selector:



Understanding the Storer

The Storer is a Java component on the server that has a database attached to it. These servers can be any of the following: Leaf Server with Database, Intermediate Server with Database, Intermediate Server with Database and Workstations, Root Server, and Root Server with Workstations. See “Inventory Components on Servers” on page 322 for a quick reference table of server components.

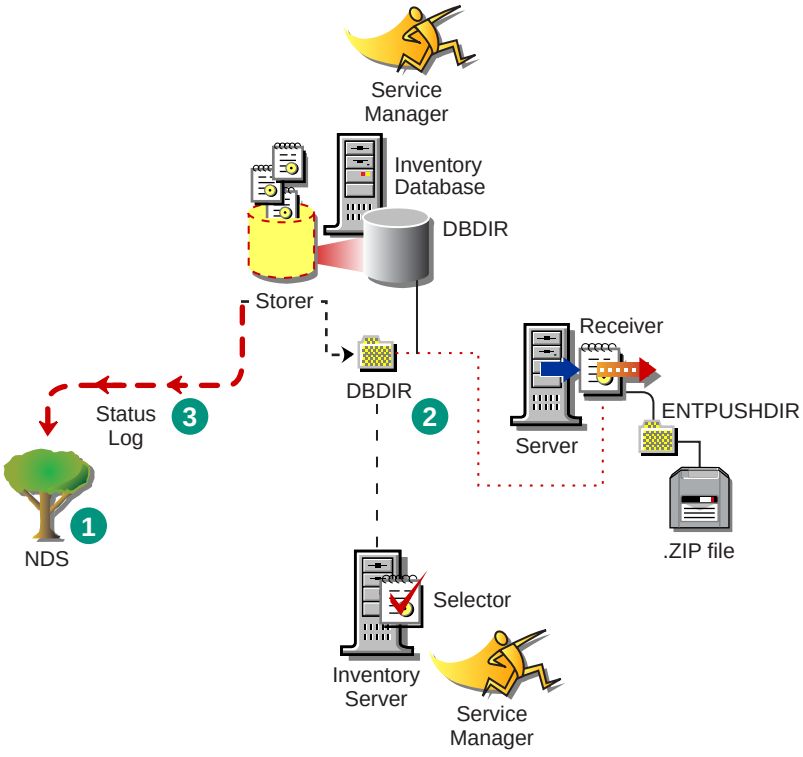
The Storer processes the files in the DBDIR directory. The Storer runs as a Service loaded by the Service Manager.

The processing done by the Storer is as follows:

1. From the server configuration information stored in eDirectory, the Storer looks in the database directory (DBDIR) for the scan files. The server configuration information determines the location of DBDIR and the database server from the eDirectory policy. The Selector places the .STR files in DBDIR and the Receiver places the scan .ZIP files in DBDIR.
2. The Storer extracts the .ZIP file containing the .STR files to a temp directory (DBDIR\TEMP) and updates the database with the inventory information of the .STR file for a workstation.

   The Storer forces a full scan of a workstation if there are problems with the .STR files.
3. The Storer updates the status in the Workstation Status log and updates the Roll-Up log.You can view the status information in the Server Status log. For more information, see “Troubleshooting Workstation Inventory with Status Logs” on page 431.

The following illustration depicts the processing done by the Storer:



Understanding the Service Manager

The Inventory Service Manager loads the inventory components on the server, based on the configuration parameters specified in the server properties file.

This sections contains the following:

- "List of Services" on page 314
- "Services on NetWare Servers" on page 317
- "Services on Windows NT/2000 Servers" on page 318

List of Services

The Service Manager loads the following services:

Service Name	Description
Server Configuration Service	Loads the server configuration services
Inventory Scheduler Service	Loads the Inventory Scheduler
Selector Service	Loads the Selector
Receiver Service	Loads the Receiver
Sender Service	Loads the Sender
Storer Service	Loads the Storer

Service Name	Description
Inventory Upgrade Service	Runs the upgrade utilities for inventory
NDSLookupForDB Service	Loads the service for NDSLookupForDB tool
DBDelete Service	Loads the service for DBDelete tool
DBBackup Service	Loads the service for DBBackup tool

The AlterDBSpace tool loads the AlterDBSpace Service and the ZEN2 Delete tool uses the zen2remove Service.

Property File: There are property files that load the different services on the server depending on the role of the server. The name of the property file indicates the role of the server. Only the required services are loaded as per the role of the server. The property files should not be modified.

A sample role-based property file for Leaf Server with Database is as follows:

```
[Server Configuration Service]

type = system

Load Sequence = 0

Load Option = auto

Class Name = com.novell.zenworks.desktop.inventory.servercommon.ServerConfig

Arguments =

[Upgrade Service]type = userLoad Sequence = 1Load Option = autoClass Name =
com.novell.zenworks.desktop.inventory.upgradeService.UpgradeServiceArgument
s =

[Inventory Scheduler Service]

type = system

Load Sequence = 2

Load Option = auto

Class Name =
com.novell.zenworks.desktop.inventory.servercommon.InventorScheduler

Arguments =

[Selector Service]

type = user

Load Sequence = 3

Load Option = auto

Class Name =
com.novell.zenworks.desktop.inventory.selector.SelectorServiceInit

Arguments =

[Storer Service]

type = user
```

```
Load Sequence = 4

Load Option = auto

Class Name = com.novell.zenworks.desktop.inventory.storer.StorerServiceInit

Arguments =

[Sender Service]

type = user

Load Sequence = 5

Load Option = auto

Class Name =
com.novell.zenworks.desktop.inventory.senderreceiver.control.SenderServiceI
nit

Arguments =

[NDSLookupForDB Service]

type = user

Load Sequence = 6

Load Option = manual

Class Name =
com.novell.zenworks.desktop.inventory.dbutilities.NDSLookupForDB

Arguments = "WSDELETE.LOK"

[DBDelete Service]

type = user

Load Sequence = 7

Load Option = manual

Class Name = com.novell.zenworks.desktop.inventory.dbutilities.DBDelete

Arguments = "WSDELETE.LOK"

[DBBackup Service]

type = user

Load Sequence = 8

Load Option = manual

Class Name = com.novell.zenworks.desktop.inventory.dbutilities.DBBackup

Arguments = "Backup"
```

Do not modify these property files as services or the Service Manager cannot be loaded.

Depending on the role of the server, the server properties files include:

Server Type	Server Property File
Root Server	ROOT_DB.PROPERTIES

Server Type	Server Property File
Root Server with Workstations	ROOT_DB_WKS.PROPERTIES
Intermediate Server	INT.PROPERTIES
Intermediate Server with Workstations	INT_WKS.PROPERTIES
Intermediate Server with Database	INT_DB.PROPERTIES
Intermediate Server with Database and Workstations	INT_DB_WKS.PROPERTIES
Leaf Server	LEAF_WKS.PROPERTIES
Leaf Server with Database	LEAF_DB_WKS.PROPERTIES
Standalone Server	STANDALONE.PROPERTIES

The Inventory Service Manager reads the server properties file (CONFIG.PROPERTIES) and the role-based property file in the \PUBLIC\ZENWORKS\WMINV\PROPERTIES directory, and loads the required services and server components.

The contents of the CONFIG.PROPERTIES file are as follows:

```
NDSTREE=treename

INVENTORYSERVICEDN=dn_of_the_inventory_service_object

SINGLETONPORT=65433
```

Services on NetWare Servers

On a NetWare® server, the installation program modifies the ZFDSTART.NCF file located in SYS:\SYSTEM directory to load STARTINV.NCF. The STARTINV.NCF file located in the SYS:\SYSTEM brings up the Inventory Service Manager at server startup time.

On a NetWare server, the installation program adds the STARTINV.NCF entry in the ZFDSTART.NCF file.

The contents of the ZFDSTART.NCF file are as follows:

```
;ZENWORKS for Desktop 3 Settings

STARTINV.NCF
```

The contents of the STARTINV.NCF file are as follows:

```
InvEnv

Naming

java -DConfigFile=sys:\public\zenworks\wminv\properties\Config.properties -
nsac -jszenWSInv -neh -mx128m -classpath $tmppath;$classpath
com.novell.zenworks.desktop.inventory.servercommon.ZENWorksInventoryService
Manager
```

You can start, stop, or list the services, if the Inventory Service Manager is already loaded.

To check if the Inventory Service Manager is loaded, at the server prompt, enter **`java -show`**.

This will display the following message:

```
com.novell.zenworks.inventory.servercommon.ZENWorksInventoryServiceManager
```

To start a service:

1. At the server prompt, enter **StartSer *service_name***

   service_name refers to any of the listed services. Follow the service naming syntax when you modify the *service_name*.

   For example, to start the Storer, enter **StartSer *Storer***

To stop a service:

1. At the server prompt, enter **StopSer *service_name***

   service_name refers to any of the listed services. Follow the service naming syntax when you modify the *service_name*.

   For example, to start the Storer, enter **StopSer *Storer***

   To stop all services, enter **StopSer ***

To list a service:

1. Edit the LISTSER.NCF file located in the SYS:\SYSTEM directory.
2. Modify the *service_name* in the following line:

   ```
   java -neh - classpath $tmppath;CLASSPATH
   com.novell.zenworks.desktop.inventory.servercommon.ZENWorksInventoryList
   Service "service_name"
   ```

service_name specified in the .NCF file refers to any of the listed services. Follow the service naming syntax when you modify the *service_name*.

For example, to list Selector Server, the *service_name* specified in the file should be "Selector Service".

To refer to all services, use the asterisk (*) wildcard character within double quotes "*". This wildcard character can be used with Stop and List services parameters.

Services on Windows NT/2000 Servers

On Windows NT/2000 servers, the installation program creates the Service Manager as a service. During server startup, this Inventory Service Manager is loaded as a service.

You can start, stop, or list the services, if the Inventory Service Manager (ZENworks Inventory Service) is already loaded.

To start a service:

1. Go to the PUBLIC\ZENWORKS\WMINV\BIN directory.
2. At the prompt, enter **StartSer *"service_name"***.

   where *service_name* refers to an Inventory service.

To stop a service:

1. Go to the PUBLIC\ZENWORKS\WMINV\BIN directory.
2. At the prompt, enter **StopSer*"service_name"***.

   where *service_name* refers to an Inventory service.

To stop all services (ZENworks Inventory Service), use the Windows NT/2000 Services from the desktop menu.

To list a service:

1. Go to the PUBLIC\ZENWORKS\WMINV\BIN directory.
2. At the prompt, enter **`ListSer [-verbose] "service_name"`**.

   where *service_name* refers to an Inventory service.

Follow the service naming syntax when you modify the service_name.

To refer to all services, use the asterisk (*) wildcard character within double quotes "*". This wildcard character can be used with ListSer parameters.

Inventory Upgrade Service

The Inventory Upgrade Service runs the upgrade utilities for inventory. For example, this service makes the necessary updates in the database tables, and creates database tables. This service triggers full scan on workstations that have more than one MAC Addresses, IP/IPX™ Address, or DNS Name.

This service (Upgrade Service) is auto loaded on NetWare and Windows NT/2000 servers.

Understanding the Effects of Workstation Inventory Installation

On the servers, the Workstation Inventory installation program does the following:

- On NetWare servers:
  - Copies the inventory related files to the PUBLIC\ZENWORKS directory.
  - Copies the Workstation Inventory snap-in component to the PUBLIC\MGMT\CONSOLEONE*ConsoleOne_version*\BIN directory.
  - Assigns Create rights to the SCANDIR directory on NetWare servers.
  - The installation program assigns the SCANDIR as a trustee of the [Root] with Create rights.
  - Creates an Inventory Service object (*servername*_ZenInvservice) in eDirectory for each server on which Inventory is installed. This object is populated with the attributes: zeninvRole (role of the server), zeninvScanFilePath (path to SCANDIR directory), and zeninvHostServer (DN of the server on which Inventory is installed).
  - If the Inventory Service object already exists, the object is destroyed and created again.
  - During installation, the Inventory Service object is made a trustee of the NCP™ server with compare and read rights.
  - The installation program assigns the Inventory Service object as trustee to the tree.

    If there are any higher-level containers preceding the container that has the Inventory Service object, the Inventory Service object is assigned as a trustee of these containers.

    For example, if the Inventory tree is Novell_US, that has an Inventory Service object with the DN as us.california.sanjose.ZENInvService_SanJoseServer, where ZENInvService_SanJoseServer is the object, then ZENInvService_SanJoseServer is made a trustee of Novell_US, us container, california container, and sanjose container.

- Creates the scan directory (SCANDIR) with the subdirectories (ENTPUSHDIR, ENTMERGE, and DBDIR) in the specified volume on the server.
- The PUBLIC\ZENWORKS directory is made a trustee of [Root] with Read and filescan rights.

- On Windows NT/2000 servers:
  - Modifies the registry entries so that at run time, the scanners can be executed on the workstations from the servers. The installation adds the SYS share to the registry entry on Windows NT/2000 servers.
  - Creates the SCANDIR directory with the subdirectories.
  - Creates an Inventory Service object (*servername*_ZenInvservice) in eDirectory for each server on which Inventory is installed. These attributes are populated: zeninvRole (Role of the server), zeninvScanFilePath (Path to ScanDir), and zeninvHostServer (DN of the server on which Inventory is installed).
  - If an Inventory Service object already exists, the object is destroyed and created again.
  - The installation program assigns the Inventory Service object as trustee to the tree.

    If there are any higher-level containers preceeding the container that has the Inventory Service object, the Inventory Service object is assigned as a trustee of these containers.

    For example, if the Inventory tree is Novell_US, that has an Inventory Service object with the DN as us.california.sanjose.ZENInvService_SanJoseServer, where ZENInvService_SanJoseServer is the object, then ZENInvService_SanJoseServer is made a trustee of Novell_US, us container, california container, and sanjose container.
  - Creates the SCANDIR directory (Share directory on the server\ZENWORKS\SCANDIR directory) with the subdirectories (ENTPUSHDIR, ENTMERGE, and DBDIR).
  - The installation program assigns rights to the SCANDIR directory. The installation program modifies the registry entries so that the scanners can create the scan data files (.STR) in the SCANDIR directory.
  - On the server, the Inventory Service Manager is created as a service.
- On the database servers:
  - Installs the Sybase* ASA 7.0.0.505 database on the server you specify.
  - On a NetWare server, if Sybase 7 is already installed, only the database files are copied to the server.
  - If the Sybase database does not exist on the NetWare server, then Sybase database and database files are copied. Also, the installation program creates the MGMTDBS.NCF file in the SYS:\SYSTEM directory.
  - On Windows NT/2000 servers, the Sybase database and the database files are copied. Also, the database server service (Adaptive Service Anywhere - ZENworks for Desktops 3) is created.
  - On the servers, the installation program initializes the database. At server startup time, the database is loaded.
  - If the MGMTDBS.NCF file already exists, then MGMTDB.DB and NAL.DB entries are added to this file, if these entries do not exist. Also, any other entries that ZfD uses are added if these entries do not exist.

- Creates a Database object (ZfDInventoryDatabase) for Sybase and configures the properties of the object.

- On an existing ZENworks 2 installation:
  - On a NetWare server, detects whether a ZENworks 2 installation exists. If so, the existing directory under \SYS:\PUBLIC is renamed as ZENWORKS.ZEN2BKUP*currentdate*. Also, ZfD3 installation takes care of loading the Inventory database (Sybase) for ZENworks 2 and ZfD3.
  - Detects if an existing Sybase database with ZENworks 2 or ZENworks for Servers (ZfS) exists. If so, the installation program checks the database version and file size. If the existing Sybase version is 7.0.0.313, the installation program copies the new database and does not copy Sybase files.
  - If ZENworks 2 with Support Pack 1 exists on the server, the MGMTDB.DB and NAL.DB entries are added to MGMTDBS.NCF file. The ZENworks 2 entries in the AUTOEXEC.NCF entries will be deleted.
  - If a ZENworks 2 setup exists on the server, the ZENINVDB entry is added to the MGMTDBS.NCF file. The ZENworks 2 entries in the AUTOEXEC.NCF entries will be deleted.
  - ZENworks 2 inventory entries are removed from the AUTOEXEC.NCF file.
- On an existing ZfD 3 installation:
  - Detects if ZfD 3 files exist. If so, the files are overwritten. The existing Inventory Service object and the database object are overwritten. You need to configure the policies and properties for the new Inventory Service object and the database object.
- On the workstations:

  When you install the Novell Client™ on the workstation, the following files are copied on the workstation:

Filename	Directory
PUBLIC\ZENWORKS\WM95INV3.DLL	WINDOWS\SYSTEM on Windows 95/98
PUBLIC\ZENWORKS\WMINV3.DLL	WINNT\SYSTEM32 on Windows NT/2000
PUBLIC\ZENWORKS\INVSTAT.DLL	WINDOWS\SYSTEM on Windows 95/98
	WINNT\SYSTEM32 on Windows NT/2000
PUBLIC\ZENWORKS\LOC32VC.DLL	WINDOWS\SYSTEM on Windows 95/98
	WINNT\SYSTEM32 on Windows NT/2000
PUBLIC\ZENWORKS\NLS\ENGLISH\INVMSG.DLL	WINDOWS\SYSTEM\NLS\ENGLISH on Windows 95/98
	WINNT\SYSTEM32\NLS\ENGLISH on Windows NT/2000
PUBLIC\ZENWORKS\ZENPOL32.DLL	WINDOWS\SYSTEM on Win 95/98
	WINNT\SYSTEM32 on Win NT/2000

Inventory Components on Servers

Depending on the type of server, the following inventory components exist on the server.

Server Component	Root Server	Leaf Server with Database	Leaf Server	Intermediate Server	Intermediate Server with Database and Workstations	Intermediate Server with Database	Standalone Server	Root Server with Workstations
Service Manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Selector	--	Yes	Yes	--	Yes	--	Yes	Yes
Storer	Yes	Yes	--	--	Yes	Yes	Yes	Yes
Sender	--	Yes	Yes	Yes	Yes	Yes	--	--
Receiver	Yes	--	--	Yes	Yes	Yes	--	Yes
Database	Yes	Yes	--	--	Yes	Yes	Yes	Yes

Understanding ZfD Inventory Attributes

The following table lists the Workstation Inventory attributes that ZENworks for Desktops uses.

Each row in the table has:

- Name of the attribute as displayed in the Inventory Database Export Wizard in ConsoleOne
- Name of the attribute in the exported CSV file (first row in the CSV)
- Inventory database attribute name
- Type of the attribute in the Inventory database
- Length of the attribute in the Inventory database
- Brief description of the attribute

Hardware and software enumerated values are listed separately, following the table.

For more information about the ZfD Inventory database, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
General-NDSName-Label	NDSName_LABEL	ManageWise.NDSName.Label	String	254	The DN name of the workstation registered in eDirectory
General-Asset-Description	Asset_Description	Zenworks.SystemInfo.Description	String	254	Description of the system asset information
General-Asset-Caption	Asset_Caption	Zenworks.SystemInfo.Caption	String	64	Identifying information of the computer

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
General-Asset-Asset Tag	Asset_AssetTag	Zenworks.SystemInfo.AssetTag	String	256	Asset tag number that the ROM-based setup program creates. This is unique to every workstation.
General-Asset-Model Number	Asset_Model Number	Zenworks.SystemInfo.Model	String	64	Model number value for the computer, assigned during manufacture
General-Asset-Serial Number	Asset_SerialNumber	Zenworks.SystemInfo.Serial Number	String	64	Model serial number value for the computer, assigned during manufacture
General-User Information-Current Login User	UserInformation_Currentloginuser	ManageWise."User".CurrentLoginName	String	254	User logged in to the Primary eDirectory tree when the workstation was scanned
General-User Information.-Last Login User	UserInformation_Lastloginuser	ManageWise."User".LastLogin Name	String	254	User logged in last to the Primary eDirectory tree when the workstation was scanned
SOFTWARE - Applications-Name	Applications_Name	CIM.Product.Name	String	256	Name of the software application
SOFTWARE - Applications-Vendor	Applications_Vendor	CIM.Product.Vendor	String	256	Name of the software application manufacturer
SOFTWARE - Applications-Version	Applications_Version	CIM.Product.Version	String	64	Version of the software application
SOFTWARE-Operating Systems-Name	OperatingSystems_Name	ZENworks.ZENOperatingSystem.OSType	Unsigned Small Integer (enum)		Operating system name. For example, Windows NT/ Windows 2000. See “Enumeration Values for SOFTWARE-Operating Systems-Name” on page 343.
SOFTWARE-Operating Systems-Version	OperatingSystems_Version	ZENworks.ZENOperatingSystem.Version	String	254	Version of the operating system

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
SOFTWARE-Operating Systems-Description	OperatingSystems_Description	ZENworks.ZENOperatingSystem.Description	String	254	More description about the operating system
SOFTWARE-Operating Systems-Install Date	OperatingSystems_InstallDate	ZENworks.ZENOperatingSystem.InstallDate	String	25	Install date of the operating system
SOFTWARE-Operating Systems-Size Stored in Paging Files	OperatingSystems_SizeStoredInPagingFiles(Kb)	ZENworks.ZENOperatingSystem.SizeStoredInPagingFiles	Unsigned Bit Integer		Total size allocated for paging by the operating system
SOFTWARE-Operating Systems-Code Page	OperatingSystems_CodePage	ZENworks.ZENOperatingSystem.CodePage	String	254	Current language code page being used
SOFTWARE-Scanner Information-Version	ScannerInformation_Version	ZENworks.InventoryScanner Version	String	64	Version of the scanner running on the workstation
SOFTWARE-Scanner Information-Last Scan Date	ScannerInformation_LastScanDate	ZENworks.InventoryScanner. LastScanDate	Unsigned Bit Integer		The date when the scanner was last scanned.Stored as milliseconds time value so that it could be read and displayed in any an appropriate date format
SOFTWARE-Scanner Information-Inventory Server	ScannerInformation_InventoryServer	ZENworks.InventoryScanner.InventoryServer	String	254	Name of the inventory server to which the scans are sent. It is not the complete DN of the server name
SOFTWARE-NetWare Client-Version	NetwareClient_Version	ZENworks.NetWareClient.Version	String	64	Version of the NetWare client software installed on the workstation
SOFTWARE-Drivers-Network Adapter Driver-Description	NetworkAdapterDriver_Description	ZENworks.NetworkAdapterDriver.Description	String	254	Description of the network adapter driver installed on the workstation. For example, IBM 10/100 Ethernet adapter, EN-2420Px Ethernet adapter

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
SOFTWARE-Drivers-Network Adapter Driver-Name	NetworkAdapterDriver_Name	ZENworks.NetworkAdapterDriver.Name	String	256	Name of the network adapter driver software installed, that corresponds to the adapter. For example, ne2000.sys, pppmac.vxd and others
SOFTWARE-Drivers-Network Adapter Driver-Version	NetworkAdapterDriver_Version	ZENworks.NetworkAdapterDriver.Version	String	64	Network adapter driver version
SOFTWARE-Drivers-Mouse Driver-Name	MouseDriver_Name	ZENworks.PointingDeviceDeviceDriver.Name	String	256	Name of the mouse driver installed on the workstation
SOFTWARE-Drivers-Mouse Driver-Version	MouseDriver_Version	ZENworks.PointingDeviceDeviceDriver.Version	String	64	Mouse driver version
HARDWARE-Mouse-Name	Mouse_Name	CIM.PointingDevice.Name	String	256	The name of the pointing device, such as Mouse. The string stored in this field will be MOUSE. The CIM.PointingDevice.PointingType field determines the type of the pointing device. The different types of pointing devices are as listed in "Enumeration Values for HARDWARE-Mouse-Name" on page 341.
HARDWARE-Mouse-Number of buttons	Mouse_NumberofButtons	CIM.PointingDevice.NumberOfButtons	Unsigned Tiny Integer		The number of buttons used by the pointing device

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Mouse-IRQ Number	Mouse_IRQNumber	CIM.IRQ.IRQNumber	Unsigned Integer		The IRQ channel on the system to which the Mouse pointing device is attached. This information is stored in an IRQ class and not in the PointingDevice class in the database. For more information on how they are associated, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.
HARDWARE-Keyboard.Number of function keys	Keyboard_NumberofFunctionKeys	ZENworks.ZENKeyboard.NumberOfFunctionKeys	UnsignedSmall Integer		Number of function keys on keyboard
HARDWARE-Keyboard.Layout	Keyboard_Layout	ZENworks.ZENKeyboard.layout	String	254	Layout information. For example, US English.
HARDWARE-Keyboard. SubType	Keyboard_Subtype	ZENworks.ZENKeyboard.SubType	Unsigned Integer		A number indicating the subtype of the keyboard
HARDWARE-Keyboard.Delay	Keyboard_Delay(mSecs)	ZENworks.ZENKeyboard.Delay	Unsigned Integer		Delay before the repeat of a key
HARDWARE-Keyboard. Typematic rate	Keyboard_TypematicRate (mSecs)	ZENworks.ZENKeyboard.Typematic Rate	Unsigned Integer		Rate of processing the keys
HARDWARE-Keyboard. Description	Keyboard_ Description	ZENworks. ZENKeyboard.Description	String	254	Keyboard description indicating the type of keyboard. For example, IBM* enhanced (101/102 key) keyboard.
HARDWARE-Video BIOS. Manufacturer	VideoBIOS_ Manufacturer	CIM.Video BIOSElement.Manufacturer	String	254	Manufacturer of the video BIOS driver installed on the system
HARDWARE-Video BIOS.Version	Video BIOS_Version	CIM.Video BIOSElement.Version	String	254	Version of the Video BIOS driver
HARDWARE-Video BIOS.Install Date	Video BIOS_InstallDate	CIM.Video BIOSElement.InstallDate	String	25	Video BIOS release date

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Video BIOS.IS Shadowed	Video BIOS_IsShadowed	CIM.Video BIOSElement.ISShadowed	BIT (Used for Boolean conditionshere)		Is a Boolean condition indicating the video BIOS supports Shadow memory. 0 represents false and 1 is true.
HARDWARE-Display Adapter.Number Of color panes	DisplayAdapter_ NumberofColor Planes	ZENworks. VideoAdpater.NumberOf ColorPanes	Unsigned Integer		Number of color planes supported by the video system
HARDWARE-Display Adapter.Current Vertical Resolution	DisplayAdapter_ CurrentVertica lResolution	ZENworks. VideoAdpater.Current Vertical Resolution	Unsigned Integer		Vertical resolution of the display
HARDWARE-Display Adapter.Current Horizontal Resolution	DisplayAdapter_ CurrentHorizontalResoluti on	ZENworks. VideoAdpater.Current Horizontal Resolution	Unsigned Integer		Horizontal resolution of the display
HARDWARE-Display Adapter. Description	DisplayAdapter_ Description	ZENworks. VideoAdpater.Description	String	254	Video adapter description
HARDWARE-Display Adapter.Min Refresh Rate	DisplayAdapter_ Min_RefreshRate	ZENworks. VideoAdpater.MinRefresh Rate	Unsigned Integer		Minimum refresh rate of the monitor for redrawing the display, measured in Hertz
HARDWARE-Display Adapter.Max Refresh Rate	DisplayAdapter_ Max_RefreshRate	ZENworks. VideoAdpater.MaxRefresh Rate	Unsigned Integer		Maximum refresh rate of the monitor for redrawing the display, measured in Hertz
HARDWARE-Display Adapter.Video Architecture	DisplayAdapter_ VideoArchitecture	ZENworks. VideoAdpater.Video Architecture	Unsigned Integer (enum)		The architecture of the video subsystem in this system. For example, CGA/VGA/ SVGA/8514A. See “Enumeration Values for HARDWARE-Display Adapter.Video Architecture” on page 340.

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Display Adapter.Video Memory Type	DisplayAdapter_ VideoMemoryType	ZENworks. VideoAdpater.VideoMemoryType	Unsigned Small Integer (Enum)		The type of memory for this adapter. For example, VRAM/ SRAM/DRAM/EDO RAM. See Enumeration Values for HARDWARE-Display Adapter.Video Memory Type.
HARDWARE-Display Adapter.Max memory supported	DisplayAdapter_ MaxMemory Supported(bytes)	ZENworks. VideoAdpater.MaxMemory Supported	Unsigned Integer		Maximum memory that the display adapter supports for VIDEO RAM
HARDWARE-Display Adapter.Current Bits/Pixel	DisplayAdapter_ CurrentBits/Pixel	ZENworks. VideoAdpater.CurrentBits PerPixel	Unsigned Integer		Number of adjacent color bits for each pixel
HARDWARE-Modem.Caption	Modem_Caption	CIM.POTS Modem. Caption	String	64	Modem label. Usually the name of the manufacturer is stored here. For example, 3Com, IBM*.
HARDWARE-Modem. Description	Modem_Description	CIM.POTS Modem. Description	String	254	The complete description of the modem. For example, Standard 2400 bps modem, IBM PCMCIA HPC modem.
HARDWARE-Modem.Name	Modem_Name	CIM.POTS Modem.Name	String	256	The name of the modem dictating its type and usage. For example, Standard Windows Modem means that this is used in standard windows architecture.
HARDWARE-BIOS.BIOS Identification Bytes	BIOS_BIOS IdentificationBytes	ZENworks. BIOS.BIOS IDBytes	String	254	Byte in the BIOS that indicates the computer model
HARDWARE-BIOS.Serial Number	BIOS_ SerialNumber	ZENworks. BIOS.Serial Number	String	64	Serial number of BIOS assigned by the manufacturer

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-BIOS.Primary BIOS	BIOS_PrimaryBios	ZENworks. BIOS.PrimaryBIOS	BIT (Used for Boolean conditions here)		True when set to 1, indicates that this BIOS is the primary BIOS. Used in systems with additional BIOS chips.
HARDWARE-BIOS.Install Date	BIOS_InstallDate	ZENworks. BIOS.Install Date	String	25	The release date of the BIOS given by the manufacturer
HARDWARE-BIOS.Version	BIOS_Version	ZENworks. BIOS.Version	String	254	Version or revision level of the BIOS
HARDWARE-BIOS. Manufacturer	BIOS_ Manufacturer	ZENworks. BIOS. Manufacturer	String	254	The manufacturer name of BIOS
HARDWARE-BIOS.Caption	BIOS_Caption	ZENworks. BIOS.Caption	String	64	The name of the BIOS as given by the BIOS manufacturer
HARDWARE-BIOS.size	BIOS_Size(KB)	ZENworks. BIOS.size	Unsigned Integer		Size of the BIOS in bytes
HARDWARE-Processor-Current Clock Speed	Processor_CurrentClockSpeed(MHz)	CIM. Processor. CurrentClockSpeed	Unsigned Integer		Current clock speed of the processor in MHz
HARDWARE-Processor-Maximum clock speed	Processor_ MaximumClock Speed (MHz)	CIM. Processor. MaxClock Speed	Unsigned Integer		Maximum clock speed of the processor in MHz
HARDWARE-Processor-Role	Processor_Role	CIM. Processor. Role	String	254	Type of processor such as central processor, math coprocessor, and others
HARDWARE-Processor-Processor Family	Processor_ ProcessorFamily	CIM. Processor. Family	Unsigned Small Integer (enum)		Family the processor belongs to. See "Enumeration Values for HARDWARE-Processor-Processor Family" on page 341.
HARDWARE-Processor-Other family description	Processor_Other FamilyDescription	CIM. Processor. OtherFamily Description	String	64	Additional description about the processor family, such as the Pentium* processor with MMX technology

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Processor-Upgrade Method	Processor_ UpgradeMethod	CIM. Processor. Upgrade Method	Unsigned Small Integer (Enum)		The method by which this processor can be upgraded, if upgrades are supported. See "Enumeration Values for HARDWARE-Processor-Upgrade Method" on page 342.
HARDWARE-Processor - Processor Stepping	Processor_ ProcessorStepping	CIM. Processor. Stepping	String	254	Single-byte code characteristic provided by microprocessor vendors to identify the processor stepping model
HARDWARE-Processor-Device ID	Processor_ DeviceID	CIM. Processor. DeviceID	String	64	Special hexadecimal string identifying the processor type
HARDWARE-Memory-Physical Memory-Physical Memory Size	PhysicalMemory_Physical Memory Size(Kb)	CIM.Memory.NumberOf Blocks	Unsigned Bit Integer		Total physical memory size of the workstation
HARDWARE-Memory-Virtual Memory-Total Virtual Memory	VirtualMemory_ TotalVirtual Memory(Kb)	ZENworks. VirtualMemory.TotalVirtual MemorySize			Indicates the total number of bytes in the virtual address space
HARDWARE-Memory-Cache Memory-Speed	CacheMemory_ Speed(nsec)	CIM.PhysicalMemory. Speed	Unsigned Bit Integer		Speed of this System Cache module in nanoseconds. This is stored in CIM.PhysicalMemory class and is associated to CIM.CacheMemory. For more information on how they are associated, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Memory-Cache Memory-Capacity	CacheMemory_ Capacity(Kb)	CIM.PhysicalMemory. Capacity	Unsigned Bit Integer		Capacity of this System Cache module in nanoseconds. This is stored in CIM.PhysicalMemory class and is associated to CIM.CacheMemory. For more information on how they are associated, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.
HARDWARE-Memory-Cache Memory-Level	CacheMemory_ Level	CIM.Cache Memory. "Level"	Unsigned Small Integer (enum)		Indicates the cache level: internal cache that is built in to the microprocessors, or external cache that is between the CPU and DRAM. Enumeration values:1 = "Other" 2 = "Unknown" 3 = "Primary" 4 = "Secondary" 5 = "Tertiary" 6 = "Not Applicable"
HARDWARE-Memory-Cache Memory-Write Policy	CacheMemory_ WritePolicy	CIM.Cache Memory. WritePolicy	Unsigned Small Integer (enum)		Indicates the two different ways (Write-Back and Write-Through Cache) that the cache can handle to write to the memory. Enumeration values: 1 = "Other" 2 = "Unknown" 3 = "Write Back" 4 = "Write Through" 5 = "Varies with Address" 6 = "Determination Per I/O"

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Memory-Cache Memory-Error methodology	CacheMemory_ ErrorMethodology	CIM.CacheMemory.Error Methodology	String	254	Error correction scheme supported by this cache component, for example, Parity/ Single Bit ECC/ MultiBit ECC
HARDWARE-Memory-Cache Memory-Cache type	CacheMemory_ CacheType	CIM.Cache Type	Unsigned Small Integer (enum)		Defines the system cache type. For example, Instruction, Data, Unified. Enumeration values: 1 = "Other" 2 = "Unknown" 3 = "Instruction" 4 = "Data" 5 = "Unified"
HARDWARE-Memory-Cache Memory-Line Size	CacheMemory_ LineSize(Bytes)	CIM.Cache Memory .LineSize	Unsigned Integer		Size in bytes of a single cache bucket or line
HARDWARE-Memory-Cache Memory-Replacement Policy	CacheMemory_ Replacement Policy	CIM.Cache Memory. ReplacementPolicy	Unsigned Integer (enum)		Algorithm that the cache uses to determine which cache lines or buckets should be reused. See "Enumeration Values for HARDWARE-Memory-Cache Memory-Replacement Policy" on page 342.
HARDWARE-Memory-Cache Memory-Read Policy	CacheMemory_ ReadPolicy	CIM.Cache Memory. ReadPolicy	Unsigned Small Integer (enum)		Indicates whether the data cache is for read operation.Enumeration values are as follows: 1 = "Other" 2 = "Unknown" 3 = "Read" 4 = "Read-ahead" 5 = "Read and Read-ahead" 6 = "Determination Per I/O"

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Memory-Cache Memory-Associativity	CacheMemory_ Associativity	CIM.Cache Memory. Associativity	Unsigned Integer (enum)		Defines the system cache associativity (direct-mapped, 2-way, 4-way)Enumeration values are as follows: 1 = "Other" 2 = "Unknown" 3 = "Direct Mapped" 4 = "2-way Set-Associative" 5 = "4-way Set-Associative" 6 = "Fully Associative"
HARDWARE-Disk-Floppy-Manufacturer	Floppy_ Manufacturer	ZENworks. Physical Diskette. Manufacturer	String	256	Vendor name
HARDWARE-Disk-Floppy-. Description	Floppy_ Description	ZENworks. Physical Diskette. Description	String	254	Floppy diskette description
HARDWARE-Disk-Floppy-Physical Cylinders	Floppy_Physical Cylinders	ZENworks. Physical Diskette. Physical Cylinders	Unsigned Integer		Total number of cylinders or tracks on the floppy
HARDWARE-Disk- Floppy - Physical Heads	Floppy_Physical Heads	ZENworks. Physical Diskette. Physical Heads	Unsigned Small Integer		Number of heads
HARDWARE-Disk- Floppy - Capacity	Floppy_Capacity (Kb)	ZENworks. Physical Diskette. Capacity	Unsigned Bit Integer		Total size
HARDWARE-Disk- Floppy - Sectors/Track	Floppy_Sectors/Track	ZENworks. Physical Diskette. SectorsPer Track	Unsigned Integer		Number of sectors per track
HARDWARE-Disk-Floppy Drive- DeviceID	FloppyDrive_ DeviceID	CIM.Diskette Drive	String	64	The drive name representing the floppy drive
HARDWARE-Disk-Hard Disk-Manufacturer	HardDisk_ Manufacturer	ZENworks. PhysicalDisk.Manufacturer	String	256	Vendor name

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Disk- Hard Disk - .Description	HardDisk_ Description	ZENworks. PhysicalDisk.Description	String	254	Hard disk vendor description
HARDWARE-Disk- Hard Disk - Physical Cylinders	HardDisk_ PhysicalCylinders	ZENworks. PhysicalDisk.Physical Cylinders	Unsigned Integer		Total number of cylinders
HARDWARE-Disk- Hard Disk - Physical Heads	HardDisk_PhysicalHeads	ZENworks. PhysicalDisk.Physical Heads	Unsigned Small Integer		Number of heads
HARDWARE-Disk- Hard Disk - Sectors/Track	HardDisk_Sectors/Track	ZENworks. PhysicalDisk.SectorsPer Track	Unsigned Integer		Number of sectors per track
HARDWARE-Disk- Hard Disk - Capacity	HardDisk_ Capacity(Kb)	ZENworks. PhysicalDisk.Capacity	Unsigned Bit Integer		Total size of the hard disk
HARDWARE-Disk-Hard Disk Drive-Device ID	HardDiskDrive_ DeviceID	ZENworks. LogicalDisk Drive. DeviceID	String	64	The logical drive letter partitioned on the hard disk. For example, C:, D:, and others.
HARDWARE-Disk-Hard Disk Drive-Size	HardDiskDrive_ Size(MB)	ZENworks. LogicalDisk Drive. TotalSize	Unsigned Integer		Total size on the logical drive
HARDWARE-Disk Hard Disk Drive-Available Space	HardDiskDrive_ FreeSize(MB)	ZENworks. LogicalDisk Drive. FreeSize	Unsigned Integer		Available space on the logical drive
HARDWARE-Disk-Hard Disk Drive-Volume Serial Number	HardDiskDrive_ VolumeSerial Number	ZENworks. LogicalDisk Drive.VolumeSerialNumber	String	254	Volume serial number of the logical drive
HARDWARE-Disk-Hard Disk Drive-Caption	HardDiskDrive_ Caption	ZENworks. LogicalDisk Drive.Caption	String	64	Volume label assigned to the logical drive
HARDWARE-Disk-CDROM-Name	CDROM_Name	ZENworks. Physical CDROM. Manufacturer	String	256	The manufacturer of the CD-ROM drive
HARDWARE-Disk-CDROM-Caption	CDROM_Caption	ZENworks. Physical CDROM. Caption	String	64	CD-ROM label

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Disk-CDROM-Description	CDROM_ Description	ZENworks. Physical CDROM. Description	String	256	Description of the CD-ROM drive, as given by the manufacturer. For example, ATAPI CDROM, CREATIVE CD1620E SL970520.
HARDWARE-Disk-CDROM Drive-DeviceID	CDROMDrive_ DeviceID	ZENworks. Logical CDROM. DeviceID	String	64	Drive letter allocated for the CD-ROM on the workstation
HARDWARE-Disk-Backup Disk-Name	BackUpDisk_ Name	ZENworks. SCSIDrive. Name	String	256	Name of the backup device vendor. For example, IOMEGA.
HARDWARE-Disk-Backup Disk-Description	BackUpDisk_ Description	ZENworks. SCSIDrive. Description	String	254	The description of the backup device or type. For example, IOMEGA ZIP 100 indicates that it is a zip drive.
HARDWARE-Disk-Backup Disk Drive-DeviceID	BackUpDiskDrive_DeviceID	ZENworks. Logical SCSIDrive-DeviceID	String	64	The drive mapped to the backup disk on the workstation
HARDWARE-Ports-Serial Port-Name	SerialPort_Name	ZENworks. SerialPort. Name	String	256	The name of the serial port. For example, COM1, COM2 and others.
HARDWARE-Ports-Serial Port-Address	SerialPort_ Address	ZENworks. SerialPort. Address	Unsigned Bit Integer		The address mapped in memory for the serial port

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Ports-Serial Port-IRQ	SerialPort_IRQ	CIM.IRQ.IRQNumber	Unsigned Integer		The IRQ channel on the system to which the serial port is attached. In the database, this information is stored in an IRQ class and not in Serial Port class. For more information on how they are associated, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.
HARDWARE-Ports-Parallel Port-Name	ParallelPort_Name	ZENworks. ParallelPort. Name	String	256	The name of the parallel port. For example, LPT1 and others.
HARDWARE-Ports-Parallel Port-Address	ParallelPort_ Address	ZENworks. ParallelPort. Address	Unsigned Bit Integer		The name of the parallel port. For example, LPT1 and others
HARDWARE-Ports-Parallel Port-DMA Support	ParallelPort_DMASupport	ZENworks. ParallelPort. DMASupport	BIT (used for Boolean conditions here)		If True or 1, then it means that DMA is channel is allocated for bulk data transfer for use with devices connected to the parallel ports
HARDWARE-Ports-Parallel Port-IRQ	ParallelPort_IRQ	CIM.IRQ. IRQNumber	Unsigned Integer		The IRQ channel on the system to which the parallel port is attached. This information is stored in an IRQ class and not in parallel Port class in the database. For more information on how they are associated, see "Understanding the ZENworks for Desktops Inventory Database Schema" on page 344.

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Bus-Version	Bus_Version	ZENworks. Bus.Bus Version	String	254	Version of the Bus supported by the motherboard
HARDWARE-Bus-Protocol Supported	Bus_Protocol Supported	ZENworks. Bus. Protocol Supported	Unsigned Small Integer (Enum)		Bus type indicates PCI, ISA, and others. See "Enumeration Values for HARDWARE-Bus-Protocol Supported" on page 343.
HARDWARE-Network Adapter-Name	NetworkAdapter_ Name	CIM.EthernetAdapter.Name	String	256	Network adapters installed on the system
HARDWARE-Network Adapter-Max. Speed	NetworkAdapter_Max_Speed(bits/sec_)	CIM.EthernetAdpater. MaxSpeed	Unsigned Bit Integer		Rate at which the adapter can transfer data
HARDWARE-Network Adapter-Permanent Address	NetworkAdapter_ Permanent Address	CIM.EthernetAdapter. Permanent Address	String	64	Machine address stored permanently in the adapter (MAC address)
HARDWARE-MultiMedia Card-Description	MultimediaCard_ Description	ZENworks. SoundCard. Description	String	254	Description of the multimedia component for the workstation
HARDWARE-MultiMedia Card-Name	MultimediaCard_ Name	ZENworks. SoundCard. Name	String	256	Name of the sound card installed on the system
HARDWARE-MultiMedia Card-Manufacturer	MultimediaCard_ Manufacturer	ZENworks. SoundCard. Manufacturer	String	256	Vendor name
HARDWARE-Cards-Description	Cards_Description	CIM.Card. Description	String	254	Name of the cards installed on the workstation
HARDWARE-Battery-Name	Battery_Name	CIM.Battery. Name	String	254	Name of the battery installed on the system
HARDWARE-Battery-Chemistry	Battery_Chemistry	CIM.Battery. Chemistry	Unsigned Small Integer		Indicates battery's chemistry, such as lead acid, nickel cadmium and others. See "Enumeration Values for HARDWARE-Battery-Chemistry" on page 341.

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
HARDWARE-Battery-Design Capacity	Battery_Design Capacity(mWatt-hours)	CIM.Battery. Design Capacity	Unsigned Integer		The design capacity of the battery in mWatt-hours
HARDWARE-Battery-Design Voltage	Battery_Design Voltage(MilliVolts)	CIM.Battery. DesignVoltage	Unsigned Bit Integer		The design voltage of the battery in mVolts
HARDWARE-Battery-Smart Battery Version	Battery_ SmartBattery Version	CIM.Battery. SmartBatteryVersion	String	64	The Smart Battery Data Specification version number supported by this battery
HARDWARE-Battery-Manufacturer	Battery_ Manufacturer	CIM.PhysicalComponent. Manufacturer	String	254	Vendor name of the battery
HARDWARE-Battery-Install Date	Battery_Install Date	CIM.PhysicalComponent. InstallDate	String	25	Date of manufacturing the battery
HARDWARE-Battery-Serial Number	Battery_Serial Number	CIM.PhysicalComponent. SerialNumber	String	64	Battery serial number
HARDWARE-Power Supply-Description	PowerSupply_ Description	CIM.Power Supply. Description	String	254	Name and description of the power supply on the system
HARDWARE-Power Supply-Total Output Power	PowerSupply_TotalOutput Power (MilliWatts)	CIM.Power Supply.Total OutputPower	Unsigned Integer		Total output power of the power supply
NETWORK-IP Address - Address	IPAddress_ Address	CIM.IP Protocol Endpoint. Address	String	254	IP address of the workstation
NETWORK-IP Address - Subnet Mask	IPAddress_ SubnetMask	CIM.IP Protocol Endpoint. SubnetMask	String	254	The subnet mask of the workstation
NETWORK -DNS - LABEL	DNS_LABEL	ManageWise.DNSName. Label	String	254	DNS name of the workstation
NETWORK -IPX Address - Address	IPXAddress_ Address	CIM.IPX Protocol Endpoint. Address	String	254	IPX address of the workstation
NETWORK -Mac Address - MACAddress	MacAddress_ MACAddress	CIM.LAN Endpoint. MACAddress	String	12	MAC address of the workstation

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
SYSTEM-MotherBoard-Hosting Board	MotherBoard_ HostingBoard	CIM.Card. HostingBoard	BIT(used for Boolean conditions)		When True or 1, the card represents a motherboard. For all other cards, this attributes will be False or 0
SYSTEM-MotherBoard-Version	MotherBoard_ Version	CIM.Card. Version	String	64	Motherboard version
SYSTEM-MotherBoard-Description	MotherBoard_ Description	CIM.Card. Description	String	254	The number of expansion slots on the motherboard
SYSTEM-IRQ-IRQ Number	IRQ_IRQNumber	CIM.IRQ.IRQNumber	Unsigned Integer		The system interrupt number
SYSTEM-IRQ-Availability	IRQ_ IRQAvailability	CIM.IRQ. Availability	Unsigned Small Integer (Enum)		Indicates whether the IRQ channel is used or available. Enumeration values are as follows: 1 = "Other" 2 = "Unknown" 3 = "Available" 4 = "In Use/Not Available" 5 = "In Use and Available/Shareable"
SYSTEM-IRQ-IRQ Trigger Type	IRQ_IRQTrigger Type	CIM.IRQ. TriggerType	Unsigned Small Integer		IRQ trigger type indicating whether edge (value=4) or level triggered (value=3) interrupts occur. Enumeration values are as follows: 1 = "Other" 2 = "Unknown" 3 = "Level" 4 = "Edge"
SYSTEM-IRQ-IRQ Shareable	IRQ_IRQ Shareable	CIM.IRQ. Shareable	Unsigned Small Integer		Boolean indicating whether the IRQ can be shared

Export Wizard Attribute Name	Export Attribute Name (Column Heading in the CSV file)	Database Schema Attribute Name	Data Type	Length	Description of the Attribute
SYSTEM-SLOT-Max. Data Width	Slot_Max_ DataWidth	CIM.Slot. MaxData Width	Unsigned Small Integer		Maximum bus width of adapter cards that can be inserted into this slot in bits. If the value is 'unknown', enter 0. If the value is other than 8, 16, 32, 64 or 128, enter 1. It is expressed in bits
SYSTEM-SLOT-Thermal Rating	Slot_Thermal Rating(MilliWatts)	CIM.Slot. Thermal Rating	Unsigned Integer		Maximum thermal dissipation of the slot in milliwatts
SYSTEM-DMA-DMA Channel Number	DMA_DMA ChannelNumber	CIM.DMA. DMAChannel	Unsigned Integer		The DMA channel number
SYSTEM-DMA-Description	DMA_Description	CIM.DMA. Description	String	254	The name of the device using the DMA channel
SYSTEM-DMA-Availability	DMA_IRQ Availability	CIM.DMA. Availability	Unsigned Small Integer		Indicates whether the DMA channel is available or not: Enumeration values are as follows: 1 = "Other" 2 = "Unknown" 3 = "Available" 4 = "In Use/Not Available" 5 = "In Use and Available/Shareable"
SYSTEM-DMA-DMA Burst Mode	DMA_DMA BurstMode	CIM.DMA. BurstMode	BIT (used for Boolean condition here)		Indication that the DMA channel supports the burst mode

Enumeration Values for HARDWARE-Display Adapter.Video Architecture

The enumeration values are:

1 = "Other"	6 = "SVGA"	11 = "XGA"
2 = "Unknown"	7 = "MDA"	12 = "Linear Frame Buffer"
3 = "CGA"	8 = "HGC"	160 = "PC-98"
4 = "EGA"	9 = "MCGA"	
5 = "VGA"	10 = "8514A"	

See “HARDWARE-Display Adapter.Video Architecture” on page 327.

Enumeration Values for HARDWARE-Display Adapter.Video Memory Type

The enumeration values are:

1 = "Other"	6 = "WRAM"	11 = "3DRAM"
2 = "Unknown"	7 = "EDO RAM"	12 = "SDRAM"
3 = "VRAM"	8 = "Burst Synchronous DRAM"	13 = "SGRAM"
4 = "DRAM"	9 = "Pipelined Burst SRAM"	
5 = "SRAM"	10 = "CDRAM"	

See “HARDWARE-Display Adapter.Video Memory Type” on page 328.

Enumeration Values for HARDWARE-Mouse-Name

The enumeration values are:

1 = "Other"	4 = "Track Ball"	7 = "Touch Pad"
2 = "Unknown"	5 = "Track Point"	8 = "Touch Screen"
3 = "Mouse"	6 = "Glide Point"	9 = "Mouse - Optical Sensor"

See “HARDWARE-Mouse-Name” on page 325.

Enumeration Values for HARDWARE-Battery-Chemistry

The enumeration values are:

1 = "Other"	5 = "Nickel Metal Hydride"
2 = "Unknown"	6 = "Lithium-ion"
3 = "Lead Acid"	7 = "Zinc air"
4 = "Nickel Cadmium"	8 = "Lithium Polymer"

See “HARDWARE-Battery-Chemistry” on page 337.

Enumeration Values for HARDWARE-Processor-Processor Family

The enumeration values are:

1 = "Other"	36 = "Power PC 604"	98 = "68010"
2 = "Unknown"	38 = "Power PC X704"	99 = "68000"
3 = "8086"	39 = "Power PC 750"	100 = "68020"
4 = "80286"	48 = "Alpha Family"	101 = "68030"
5 = "80386"	50 = "Alpha 21066"	112 = "Hobbit Family"
6 = "80486	51 = "Alpha 21164"	128 = "Weitek"

7 = "8087"	52 = "Alpha 21164PC"	144 = "PA-RISC Family"
8 = "80287"	53 = "Alpha 21164a"	145 = "PA-RISC 8500"
9 = "80387"	55 = "Alpha 21364"	146 = "PA-RISC
10 = "80487"	64 = "MIPS Family"	147 = "PA-RISC 7300LC"
11 = "Pentium Family"	65 = "MIPS R4000"	147 = "PA-RISC 7300LC"
12 = "Pentium Pro"	66 = "MIPS R4200"	148 = "PA-RISC 7200"
13 = "Pentium II"	67 = "MIPS R4400"	149 = "PA-RISC 7100LC"
14 = "Pentium MMX"	68 = "MIPS R4600"	150 = "PA-RISC 7100"
15 = "Celeron"	69 = "MIPS R10000"	160 = "V30 Family"
16 = "Pentium II Xeon"	80 = "SPARC Family"	176 ="Pentium III Xeon"
18 = "M1 Family"	81 = "SuperSPARC"	180 = "AS400 Family"
26 = "K6 Family"	82 = "microSPARC II"	200 = "IBM390 Family"
27 = "K6-2"	83 = "microSPARC IIep"	201 = "G4"
28 = "K6-3"	84 = "UltraSPARC"	202 = " 65"
29 = "K7"	85 = "UltraSPARC II"	250 = "i860"
30 = "AMD29000 Family"	86 = "UltraSPARC IIi"	251 = "i960"
32 = "Power PC Family"	87 = "UltraSPARC III"	280 = "ARM"
33 = "Power PC 601"	88 = "UltraSPARC IIIi"	281 = "StrongARM"
34 = "Power PC 603"	96 = "68040"	300 = "6x86"
35 = "Power PC 603+"	97 = "68xxx Family"	301 = "MediaGX"
302 = "WinChip"	350 = "DSP"	500 = "Video Processor"

See "HARDWARE-Processor-Processor Family" on page 329.

Enumeration Values for HARDWARE-Processor-Upgrade Method

The enumeration values are:

1= "Other"	5 = "Replacement/Piggy Back"	9 = "Slot 2"
2 = "Unknown"	6 = "None"	10 = "370 Pin Socket"
3 = "Daughter Board"	7 = "LIF Socket"	11 = "Slot A"
4 = "ZIF Socket"	8 = "Slot 1"	12 = "Slot M"

See "HARDWARE-Processor-Upgrade Method" on page 330.

Enumeration Values for HARDWARE-Memory-Cache Memory-Replacement Policy

The enumeration values are:

1 = "Other"	5 = "Last In First Out (LIFO)"

2 = "Unknown"

3 = "Least Recently Used (LRU)"

4 = "First In First Out (FIFO)"

6 = "Least Frequently Used (LFU)"

7 = "Most Frequently Used (MFU)"

8 = "Data Dependent Multiple Algorithm"

See "HARDWARE-Memory-Cache Memory-Replacement Policy" on page 332.

Enumeration Values for SOFTWARE-Operating Systems-Name

The enumeration values are:

1 = "Other"

2 = "MACOS"

3 = "ATTUNIX"

4 = "DGUX"

5 = "DECNT"

6 = "Digital Unix"

7 = "OpenVMS"

8 = "HPUX"

9 = "AIX"

10 = "MVS"

11 = "OS400"

12 = "OS/2"

13 = "JavaVM"

14 = "MSDOS"

15 = "WIN3x"

16 = "WIN95"

17 = "WIN98"

18 = " WINNT"

21 = "NetWare"

22 = "OS"

23 = "DC/OS"

24 = "Reliant UNIX"

25 = "SCO UnixWare"

26 = "SCO OpenServer"

27 = "Sequent"

28 = "IRIX"

29 = "Solaris"

30 = "SunOS"

31 = "U6000"

32 = "ASERIES"

33 = "TandemNSK"

34 = "TandemNT"

35 = "BS2000"

36 = "Linux"

37 = "Lynx"

38 = "XENIX"

39 = "VM/ESA"

40 = "Interactive UNIX"

41 = "BSDUNIX"

43 = "NetBSD"

44 = "GNU Hurd"

45 = "OSg"

46 = "MACH Kernel"

47 = "Inferno"

48 = "QNX"

49 = "EPOC"

50 = "IxWorks"

51 = "VxWorks"

52 = "MiNT"

53 = "BeOS"

54 = "HP MPE"

55 = "NextStep"

56 = "PalmPilot"

57 = "Rhapsody"

58 = "Windows 2000"

59 = "Dedicated"

60 = "OS/390"

61 = "VSE"

62 = "TPF"

63 = "Windows (R) Me"

See "SOFTWARE-Operating Systems-Name" on page 323.

Enumeration Values for HARDWARE-Bus-Protocol Supported

The enumeration values are:

1 = "Other"

7 = "Flexible Diskette"

8 = "1496"

9 = "SCSI Parallel Interface"

21 = "Power"

22 = "HIPPI"

23 = "MultiBus"

24 = "VME"

36 = "ESDI"

37 = "IDE"

38 = "CMD"

39 = "ST506"

10 = "SCSI Fibre Channel Protocol""	25 = "IPI"	40 = "DSSI"
11 = "SCSI Serial Bus Protocol"	26 = "IEEE-488"	41 = "QIC2"
12 = "SCSI Serial Bus Protocol - 2 (1394)	27 = "RS232"	42 = "Enhanced ATA/IDE"
13 = "SCSI Serial Storage Architecture"	28 = "IEEE 802.3 10BASE5"	43 = "AGP"
14 = "VESA"	29 = "IEEE 802.3 10BASE2"	44 = "TWIRP (two-way infrared"
15 = "PCMCIA"	30= "IEEE 802.3. 1BASE5"	45 = "FIR (fast infrared)"
16 = "Universal Serial Bus"	31 = "IEEE 802.3 10BROAD36"	46 = "SIR (serial infrared)"
17 = "Parallel Protocol"	32 = "IEEE 802.3 100BASEVG"	47 = "IrBus"
18 = "ESCON"	33 = "IEEE 802.5 Token-Rin"	
19 = "Diagnostic"	34 = "ANSI X3T9.5 FDDI"	
20 = "12C"	35 = "MCA"	

See "HARDWARE-Bus-Protocol Supported" on page 337.

Understanding the ZENworks for Desktops Inventory Database Schema

This section describes the design of the ZfD Inventory database schema implemented using the Common Information Model (CIM) of Distributed Management Task Force (DMTF). To understand this document effectively, you should be familiar with terminology such as CIM and Desktop Management Interface (DMI). You should also have a solid understanding of relational database based managed systems (RDBMS) and database concepts.

The following sections provide in-depth information:

Overview

The DMTF is the industry organization leading the development, adoption, and unification of management standards and initiatives for desktop, enterprise, and Internet environments. For more information about DMTF, see the DMTF Web site (http://www.dmtf.org).

The DMTF CIM is an approach to system and network management that applies the basic structuring and conceptualization techniques of the object-oriented paradigm. The approach uses a uniform modeling formalism that together with the basic repertoire of object-oriented constructs supports the cooperative development of an object-oriented schema across multiple organizations.

A management schema is provided to establish a common conceptual framework at the level of a fundamental topology, both with respect to classification and association, and to a basic set of classes intended to establish a common framework for a description of the managed environment. The management schema is divided into the following conceptual layers:

- **Core Model:** An information model that captures notions that are applicable to all areas of management.
- **Common Model:** An information model that captures notions that are common to particular management areas, but independent of a particular technology or implementation. The common areas are systems, applications, databases, networks, and devices. The information model is specific enough to provide a basis for the development of management applications. This model provides a set of base classes for extension into the area of technology-specific schemas. The Core and Common models together are expressed as the CIM schema.
- **Extension Schemas:** This schema represents technology-specific extensions of the Common model. These schemas are specific to environments, such as operating systems, for example, UNIX* or Microsoft Windows.

CIM comprises a specification and a schema (see the DMTF Web site (http://www.dmtf.org/spec/cims.html). The specification defines the meta-schema plus a concrete representation language called Managed Object Format (MOF).

CIM Schema

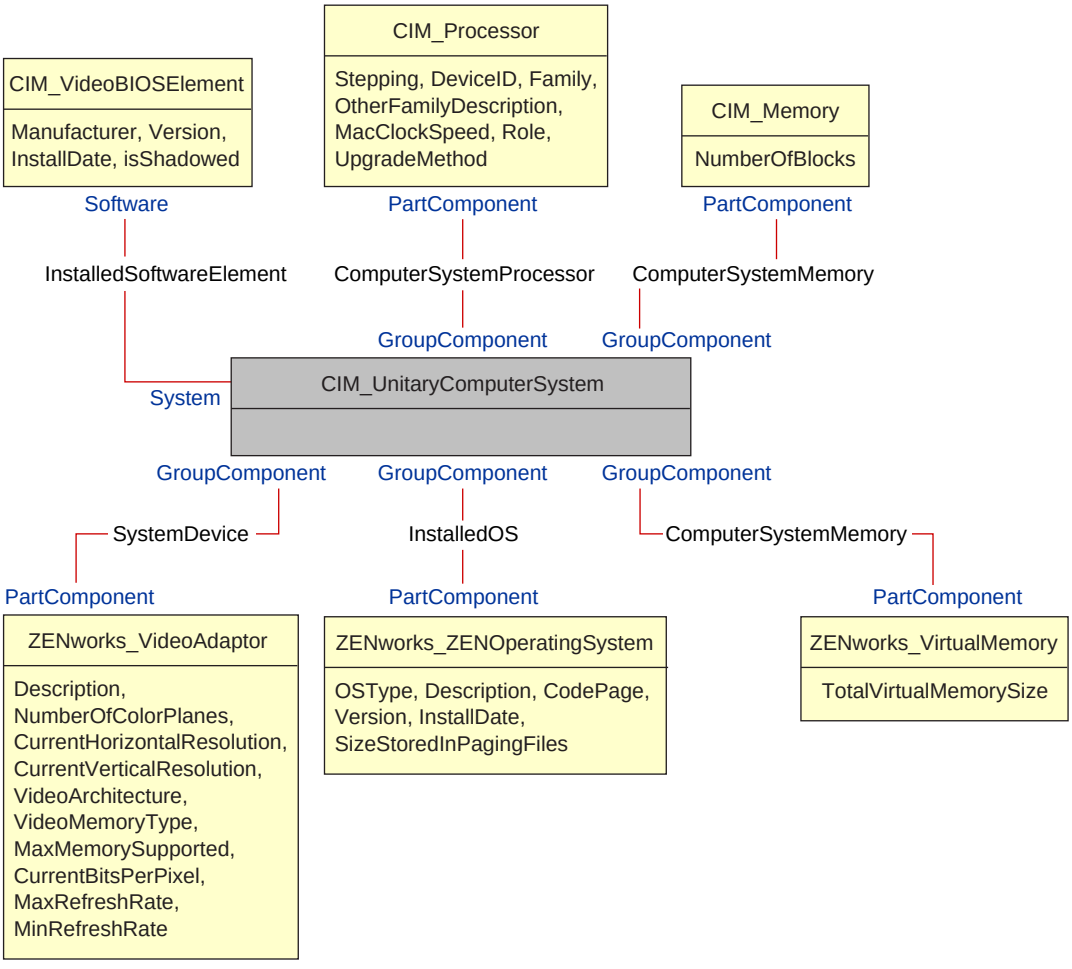
The elements of the meta schema are classes, properties, and methods. The meta schema also supports indications and associations as types of classes and references as types of properties.

Classes can be arranged in a generalization hierarchy that represents subtype relationships between classes. The generalization hierarchy is a rooted, directed graph that does not support multiple inheritance.

A regular class may contain scalar or array properties of any intrinsic type such as Boolean, integer, string, and others. It cannot contain embedded classes or references to other classes.

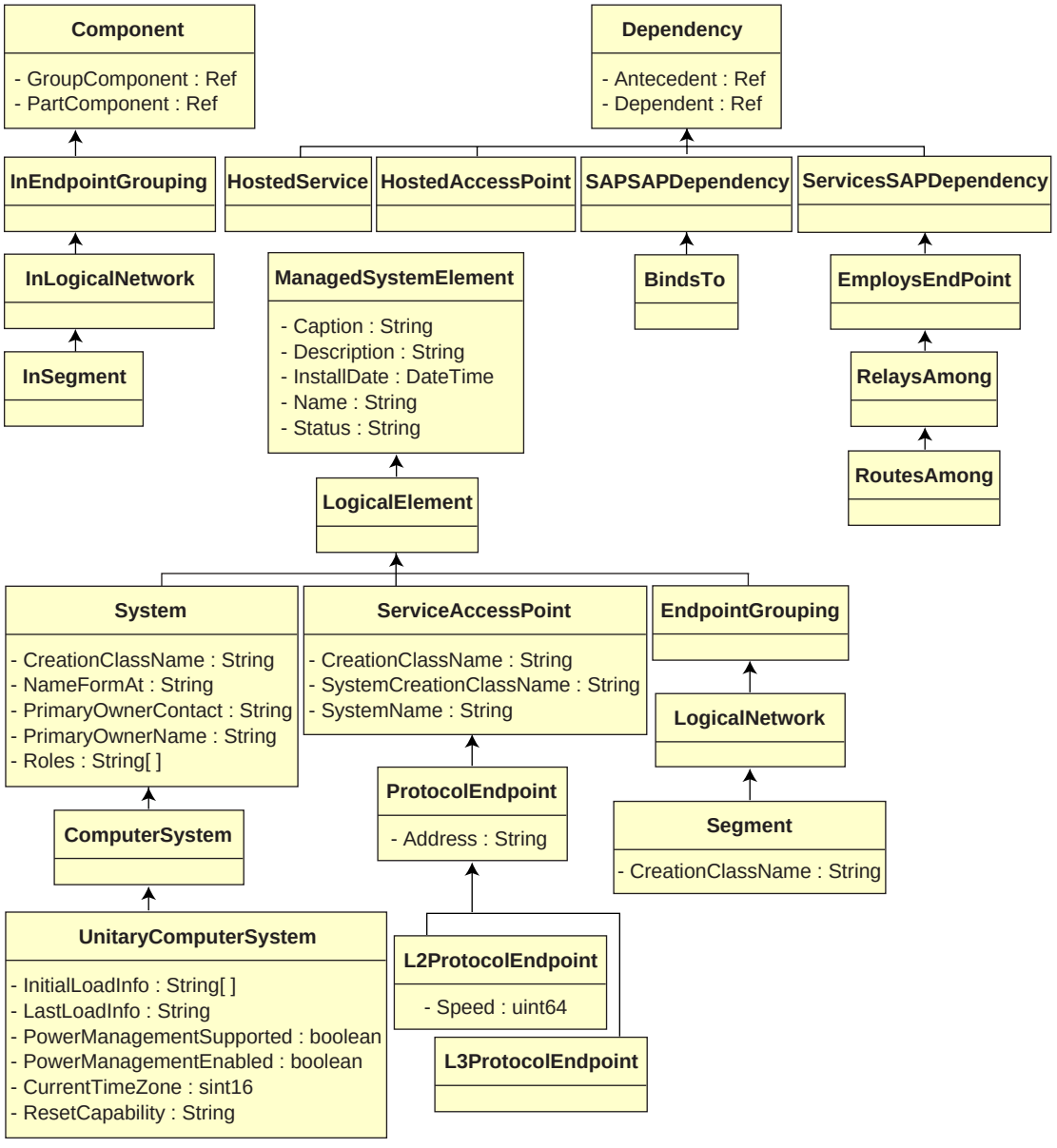
An association is a special class that contains two or more references. It represents a relationship between two or more objects. Because of the way associations are defined, it is possible to establish a relationship between classes without affecting any of the related classes. That is, addition of an association does not affect the interface of the related classes. Only associations can have references.

The schema fragment in the following illustration shows the relationships between some CIM objects that ZfD uses.



The illustration shows how the CIM schema maps to a relational DBMS schema. The classes are shown with the class name as the box heading. The associations are labeled within the lines between two classes.

The inheritance hierarchy of this schema fragment is shown in the following illustration of the CIM 2.2 schema. The references shown as type Ref are in bold with each association sub-type narrowing the type of the reference.



CIM-to-Relational Mapping

CIM is an object model complete with classes, inheritance, and polymorphism. The generated mapping to a relational schema preserves these features to the maximum extent. The following two aspects are part of the relational mapping:

- **Logical Schema:** The logical schema defines how the data appears to applications, similar to an API. The goal is that the logical schema remains the same irrespective of the underlying database so that application software can run unchanged on any supported databases. Though SQL (pronounced as sequel) is a standard, this goal is not fully possible. Application software will need to know more about the database in use and this information can be abstracted and isolated to a small area of the application code.
- **Physical Schema:** The physical schema defines how the data is structured in the database. The schema tends to be specific to the database because of the nature of SQL and RDBMS. This document will describe the physical schema in general terms only.

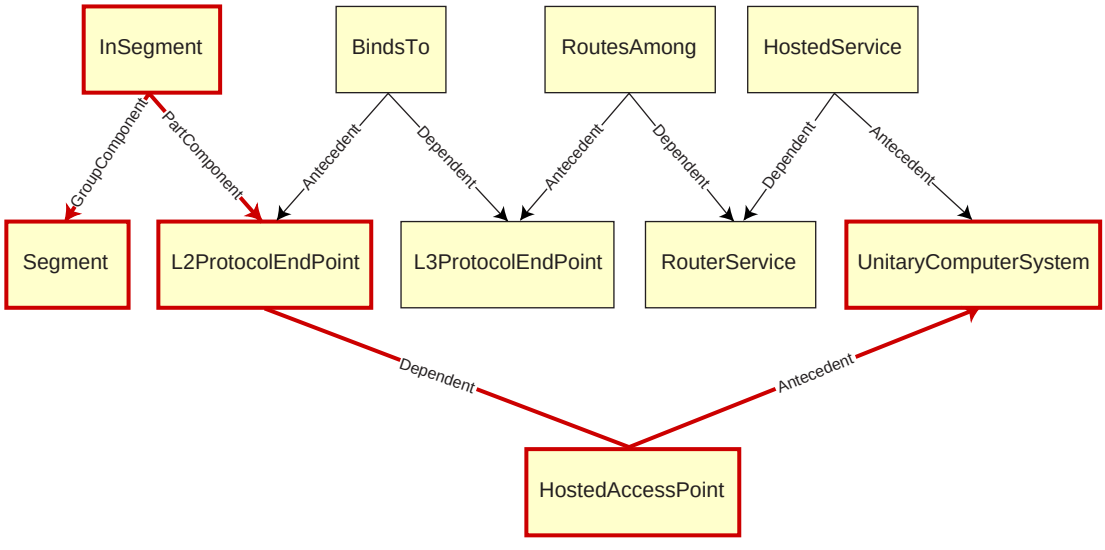
A table in the database represents each class in the CIM hierarchy. A column of the appropriate type in the table represents each non-inherited property in the class. Each table also has a primary key, id$, which is a 64-bit integer that uniquely identifies an instance. An instance of a CIM class is represented by a row in each table that corresponds to a class in its inheritance hierarchy. Each row has the same value for id$.

Each CIM class is also represented by a view that uses id$ to join rows from the various tables in the inheritance hierarchy to yield a composite set of properties (inherited plus local) for an instance of that class. The view also contains an extra column, class$, of type integer that represents the type of the actual (leaf-most) class of the instance.

Associations are mapped in the same manner as regular classes, with a reference property being represented by a column with the id$ field of the referenced object instance. Thus associations can be traversed by doing a join between the reference field in the association and the id$ field in the referenced table. The following illustration depicts a typical query using this mapping:

```
Get Computers for Segment

SELECT CIM.UnitaryComputerSystem.*
FROM   CIM.UnitaryComputerSystem, CIM.Segment, CIM.L2ProtocolEndPoint,
       CIM.HostedAccessPoint, CIM.InSegment
WHERE  CIM.SegmentName = 'xxx'
AND    CIM.InSegment.GroupComponent = CIM.Segment.id$
AND    CIM.InSegment.PartComponent = CIM.L2ProtocolEndPoint.id$
AND    CIM.HostedAccessPoint.Dependent = CIM.L2ProtocolEndPoint.id$
AND    CIM.HostedAccessPoint.Antecedent = CIM.UnitaryComputerSystem.id$
```



This query finds all the computers attached to a given network segment. The classes and relationships involved are highlighted with borders.

The following topics describe both the schema types:

- “Logical Schema” on page 349
- “Physical Schema” on page 355

Logical Schema

The logical schema is the database schema as seen by users of the database and the application program. The schema consists of stored procedures and views. The underlying tables are not visible to the application.

Typically, each CIM class has the following:

- A constructor procedure to generate an instance of the class. For more information, see "Constructor" on page 353.
- A destructor procedure to destroy an instance of the class. For more information, see "Destructor" on page 354.
- A view to access and update the values of properties of the class.

ZfD Inventory components use JDBC to issue SQL statements to the RDBMS and to convert between RDBMS data types and Java data types. The use of JDBC with stored procedures and views provides a level of abstraction that insulates application code from the underlying database technology and from changes to the physical schema.

The various elements of the logical schema are discussed in more detail in the following sections:

Naming Schema Elements

We recommend that you use the CIM names unchanged in the database schema. Some problems may still ensue because of the differences in the naming schemes, such as the following:

- Names in CIM and SQL are not case-sensitive.
- All databases have different sets of reserved words that must be enclosed in quotes (" ") when used as schema element names; however, in Oracle*, enclosing a name in quotes makes it case-sensitive.
- CIM classes avoid using SQL reserved words as names.
- CIM names are not limited in length and usually the names are long. Sybase allows up to 128 characters, but Oracle restricts the names to 30 characters.

Most of these problems are avoided during schema generation by preserving the case of CIM names, abbreviating any names longer than 30 characters, and placing quotes around any name that is in the union of the sets of reserved words.

Any name longer than 28 characters is abbreviated to a root name of 28 or fewer characters to allow a two-character prefix so that all associated SQL schema elements can use the same root name. The abbreviation algorithm shortens a name so that it is mnemonic, recognizable, and also unique within its scope. The abbreviated name is given a # character as a suffix (note that # is an illegal character in CIM) to prevent clashes with other names. If two or more names within the same scope generate the same abbreviation, an additional digit is appended to make the name

unique. For example, AttributeCachingForRegularFilesMin is abbreviated to AttCacForRegularFilesMin#.

All such mangled names are written to the mangled name table so that a program can look up the real CIM name and retrieve the mangled name to use with the SQL.

Views are the schema elements that are most often manipulated by application code and queries. They use the same name as the CIM class they represent. For example, the CIM_UnitaryComputerSystem class is represented by a view named CIM.UnitaryComputerSystem.

When necessary, names for indexes and auxiliary tables are created by concatenating the class name and property name separated by a $ character. These names are usually abbreviated. For example, NetworkAdapter$NetworkAddresses is abbreviated to NetAdapter$NetAddresses#. This does not have any adverse impact on ZfD schema users.

Users and Roles

In SQL, a user with the same name as the schema is the owner of each schema, for example, CIM, ManageWise®, ZENworks, and others.

Additionally, there is an MW_DBA user that has Database Administrator privileges and rights to all schema objects. The MW_Reader role has read-only access to all schema objects and the MW_Updater role has read-write-execute access to all schema objects.

Application programs should access the database as either MW_Reader or MW_Updater for a Sybase database and MWO_Reader or MWO_Updater for an Oracle database, depending on their requirements.

Data Types

CIM data types are mapped to the most appropriate data type provided by the database. Usually, the Java application does not require the type because it uses JDBC to access the data.

Java does not natively support unsigned types, so you should use classes or integer types of the next size to represent them. Also, ensure that there are no problems while reading or writing to the database. For example, reading or writing a negative number to an unsigned field in the database is likely cause an error.

Strings in CIM and Java are Unicode*, so the database is created using the UTF8 character set. Internationalization does not pose any problems; however, it may create problem with case sensitivity in queries.

All databases preserve the case of string data stored within them, but may access the data as either case sensitive or otherwise during queries. In ZfD, the Inventory Query component is not affected because the queried data is retrieved from the database before being queried and so case sensitivity is automatically taken care of.

In CIM, strings may be specified with or without a maximum size in characters. Many strings have no specified size, which means they can be unlimited in size. For efficiency reasons, these unlimited strings are mapped to a variable string with maximum size of 254 characters. CIM strings with a maximum size are mapped to variable database strings of the same size. The size in the database is in bytes and not as characters because a Unicode character may require more than one byte for storage.

Views

Each CIM class is represented in the database by a view that contains all the local and inherited non-array properties of that class. The view is named the same as the CIM class. For example, the CIM class CIM_System represents a SQL view named CIM.System, as shown in the following illustration.

The CIM.System view is created with attributes that are selected from multiple tables. These attributes include: id$ selected from cim.t$ManagedSystemElement,class$ is filled up automatically using the function mw_dba.extractClass, Caption selected from cim.t$ManagedSystemElement, Description selected from cim.t$ManagedSystemElement, InstallDate selected from cim.t$ManagedSystemElement, Status selected from cim.t$ManagedSystemElement, CreationClassName selected from cim.t$System, Name selected from cim.t$ManagedSystemElement. NameFormat selected from cim.t$System.NameFormat, PrimaryOwnerContact selected from cim.t$System, and PrimaryOwnerName selected from cim.t$System. The view is created by joining the tables CIM.t$ManagedSystemElement and CIM.t$System where the id$ of both the tables are same.

The CIM.SYSTEM view is as follows:

```
CREATE VIEW CIM.System

{

  id$,

  class$,

  Caption,

  Description,

  InstallDate,

  Status,

  CreationClassName,

  Name,

  NameFormat,

  PrimaryOwnwerContact,

  PrimaryOwnerName

}

AS SELECT

  CIM.t$ManagedSystemElement.id$

  MW_DBA.extractClass(CIM.t$ManagedSystemElement.id$),

  CIM.t$ManagedSystemElement.Caption,

  CIM.t$ManagedSystemElement.Description,

  CIM.t$ManagedSystemElement.InstallDate,

  CIM.t$ManagedSystemElement.Status,

  CIM.t$System.CreationClassName,

  CIM.t$ManagedSystemElement.Name,
```

```
  CIM.t$System.NameFormat,
  CIM.t$System.PrimaryOwnerContact,
  CIM.t$System.PrimaryOwnerName
FROM
  CIM.t$ManagedSystemElement,
  CIM.t$System
WHERE
  CIM.t$ManagedSystemElement.id$ = CIM.t$System.id$
```

In addition to the properties of the class, the view has the following two additional fields:

- **Id$:** An object identifier that uniquely identifies the particular instance of the class. See "Object Identifier Id$" on page 352.
- **Class$:** An integer field that identifies the actual type of the class. For example, the actual type of a CIM_System can be any of the concrete subclasses of CIM_System.

Views can be queried using the SELECT statement and updated using the UPDATE statement. Because views cannot be used with the INSERT and DELETE statements, use the constructor and destructor procedures.

Object Identifier Id$

Id$ is a 64-bit object identifier that uniquely identifies a particular instance of a class. This object identifier is usually used as an opaque handle to a particular instance. Id$ is modeled as a signed number for ease of manipulation in Java as a long data type.

Id$ contains the following three parts of information, which can each be extracted by invoking the appropriate stored procedure.

- The most significant 16 bits of id$ encode the actual class of the object.

  This field can be extracted using the MW_DBA.extractClass() function. This field is used for type decisions or to access additional information about the class from the MW_DBA.Class table.

- The next 8 bits of id$ encode the site ID.

  The site ID uniquely identifies the database on a particular site. This field makes the object identifier unique across as many as 256 sites so that inventory data from multiple sites can be rolled up into a single database (Root Server with database) for querying and reporting without causing key conflicts. The site ID can be extracted using the MW_DBA.extractSite() function.

- The least significant 40 bits uniquely identify the particular instance of that class.

  This part can be extracted using the MW_DBA.extractId() function. This is not useful from an end-user's perspective.

The id$ field is used in its entirety as an opaque handle to an instance of a class. When an association class represents a relationship between instances of two classes, the reference fields of the association hold the id$ of the referenced instances (like the pointers). Therefore, id$ and these reference fields are frequently used in Join conditions when constructing the database queries that reference more than one view.

Constructor

Each concrete (non-abstract) CIM class has a constructor stored procedure that must be called to create an instance of the class. This stored procedure has input parameters that allow the user to specify a value for each property in the class, and a single output parameter that returns the id$ allocated to the created instance. The application uses this returned id$ value to construct association classes that reference that particular instance.

The constructor is named by prefixing the root name with c$, and each parameter is named by prefixing the root property name with p$. For example, the constructor for CIM_UnitaryComputerSystem, a subclass of CIM_System, is named CIM.c$UnitaryComputerSystem and is constructed for Oracle as shown in the following example.

```
CREATE PROCEDURE CIM.c$UnitaryComputerSystem

(

p$id$  OUT NUMBER,

p$Caption IN CIM.t$ManagedSystemElement.Caption%TYPE DEFAULT  NULL,

p$Description IN CIM.t$ManagedSystemDescription%TYPE DEFAULT NULL,

p$InstallDate IN CIM.t$ManagedSystemElement.InstallDate%TYPE DEFAULT NULL,

p$Status IN CIM.t$ManagedSystemElement.Status%TYPE DEFAULT NULL,

p$CreationClassName IN CIM.t$System.CreationClassName%TYPE DEFAULT NULL,

p$Name IN CIM.t$ManagedSystemElement.Name%TYPE DEFAULT NULL,

p$PrimaryOwnerContact IN CIM.t$System.PrimaryOwnerContact%TYPE DEFAULT NULL,

p$PrimaryOwnerName IN CIM.t$System.PrimaryOwnerName%TYPE DEFAULT NULL,

p$NameFormat IN CIM.t$System.NameFormat%TYPE DEFAULT NULL,

p$LastLoadInfo IN CIM.t$UnitaryComputerSystem.LastLoadInfo%TYPE DEFAULT
NULL,

p$ResetCapability IN CIM.t$UnitaryComputerSystem.ResetCapability%TYPE
DEFAULT NULL,

p$PowerManagementSupported IN
CIM.t$UnitaryComputerSystem.PowerManagementSupported%TYPE DEFAULT NULL,

p$PowerState IN CIM.t$UnitaryComputerSystem.PowerState%TYPE DEFAULT NULL

)IS

  temp NUMBER;

BEGIN

  LOOP

  SELECT CIM.s$UnitaryComputerSystem.NEXTVAL INTO temp FROM DUAL;

  SELECT MW_DBA.makeId(240, temp) INTO temp FROM DUAL;

  EXIT WHEN MOD(temp,100) != 0;

  END LOOP;

  p$id$ := temp;
```

```
INSERT INTO CIM.t$ManagedSystemElement (id$, classOid$, Caption, Description,
InstallDate, Status, Name)VALUES( p$id$, HEXTORAW('0302100203'), p$Caption,
p$Description, p$InstallDate, p$Status, p$Name);

INSERT INTO CIM.t$System ( id$, CreationClassName, PrimaryOwnerContact,
PrimaryOwnerName, NameFormat )VALUES( p$id$, p$CreationClassName,
p$PrimaryOwnerContact, p$PrimaryOwnerName, p$NameFormat );

INSERT INTO CIM.t$UnitaryComputerSystem (id$, LastLoadInfo, ResetCapability,
PowerManagementSupported, PowerState ) VALUES( p$id$, p$LastLoadInfo,
p$ResetCapability, p$PowerManagementSupported, p$PowerState );

END;
```

Stored procedures can be called with either positional arguments or keyword arguments, or with a combination of the two. If any positional arguments are supplied, they must precede any keyword arguments. Always use keyword arguments when calling constructor stored procedures. This provides better insulation from CIM schema changes that cause either the insertion of extra parameters or the recording of existing parameters, either of which can break a positional call in a possible undetectable way. The procedures are generated such that any omitted parameters will default to NULL.

It is permissible to use the positional notation for the first parameter pid, which is the output parameter that returns the object identifier of the newly created instance.

The following code sample shows how to call a stored procedure using positional notation for the first argument and keyword notation for all subsequent arguments on Sybase.

```
CallableStatement CS =

conn.prepareCall( "{call CIM.c$UnitaryComputerSystem( ?,  p$Name=?,
p$Description=?)}" )

cs.registerOutParameter ( 1, java.sql.Types.BIGINT ); //id$

cs.setString( 2, "Bogus_UCS_1") ; //Name

cs.setString( 3, "Created with mixture of positional & keyword args" ); //
Description

cs.executeUpdate();

long id = cs.getLong ( 1 );

SQLWarning w = cs.getWarnings();

if( w != null )

  printWarnings( w );

else

  System.out.println("Created UCS id$ = " + id );
```

The syntax for keyword notation differs in Sybase ASA and Oracle. In Sybase ASA, the syntax is KEYWORD=*value*. In Oracle, the syntax is KEYWORD => *value*. Properly written code will dynamically construct the call string using syntax appropriate for the database in use.

Destructor

Each non-abstract CIM class has a destructor stored procedure that is called to destroy an instance of the class. This stored procedure has only one input parameter that specifies the object identifier (id$) of the instance to be destroyed and returns no value.

The destructor deletes the appropriate rows in all relevant tables, including the rows in the inheritance chain and any associations that reference the instance being destroyed. Only the association is destroyed; the associated objects associated are not destroyed. If there is need to destroy the association, the programmers must ensure that they are not destroyed.The destructor is named by prefixing the root name with d$ and the single object identifier parameter is named pid. This procedure is called using positional notation. For example, the destructor for CIM_UnitaryComputerSystem, a concrete subclass of CIM_System, is named as CIM.d$UnitaryComputerSystem.

Physical Schema

The physical schema comprises elements necessary to implement the database. The physical schema differs for each database. A typical physical schema consists of:

- Table definitions 't$*xxx*'Index definitions 'i$*xxx*'
- Trigger definitions 'x$*xxx*', 'n$*xxx*' and 'u$*xxx*'
- Sequence definitions (Oracle) 's$*xxx*'
- Stored procedures and functions

The logical schema is layered on top of the physical schema and makes it unnecessary for users and applications to know the physical schema.

Inventory Database Schema in ZfD

The following section describes the database schema classes and the extensions and associations made to the CIM schema for use in ZfD. These extensions have ZENworks or ManageWise as their schema name. ZENworks.*classname* refers to the extended class in the ZENworks schema and ManageWise.*classname* refers to the extended class in the ManageWise schema.

The following sections will help you understand the ZfD database schema:

- “Case Study of CIM Schema Implementation in ZfD” on page 355
- “Legends for Schema Diagrams” on page 358
- “Leaf Objects in the Database” on page 358
- “Non-CIM Tables and Views in the ZfD Database Schema” on page 359
- “CIM Classes and Extension Classes in ZfD” on page 359
- “Schema Diagrams of CIM and the Extension Schema in ZfD” on page 361
- “Sample Inventory Database Queries” on page 368

Case Study of CIM Schema Implementation in ZfD

The following scenario describes a managed workstation that has two parallel ports with a specified interrupt number.

In the following schema diagram, the CIM_UnitaryComputerSystem represents a managed inventory system.

In this illustration, class CIM.PointingDevice associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to

CIM.PointingDevice. The relationship between the two classes is one to many. This means a computer system might have more than one pointing devices.

Class CIM.IRQ associates to CIM.PointingDevice using the association CIM.AllocatedResource. Dependent pointing to CIM.PointingDevice and Antecedent pointing to CIM.IRQ.

Class ZENworks.ZENKeyboard associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to ZENworks.ZENKeyboard. The relationship between the two classes is one to one. This means a computer system can have only one Keyboard.

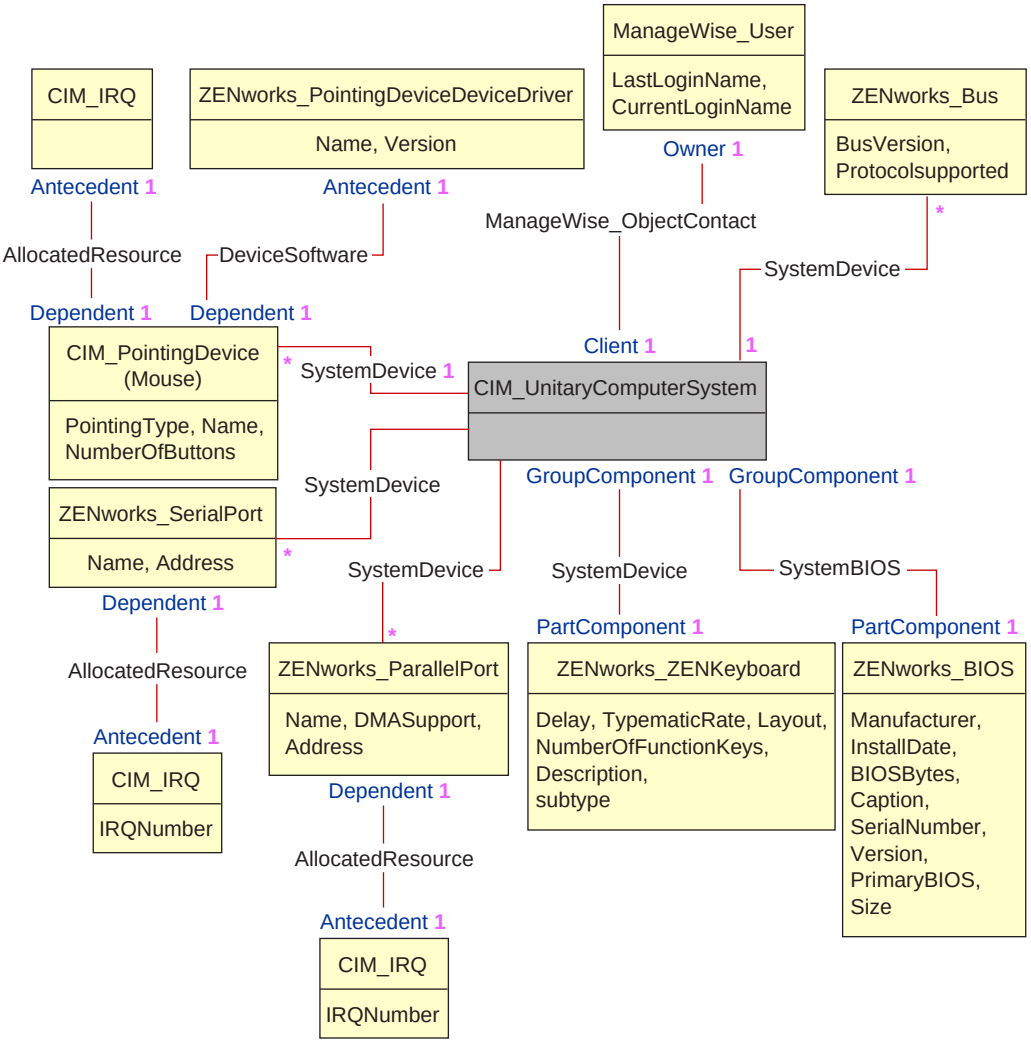
Class ZENworks.BIOS associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemBIOS.PartComponent pointing to ZENworks.BIOS. The relationship between the two classes is one to one. This means a computer system can have only one BIOS.

Class CIM.ZENworks.ParallelPort associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to CIM.ZENworks.ParallelPort. The relationship between the two classes is one to many. This means a computer system might have more than one parallel port.

Class ZENworks.BUS associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemBUS.PartComponent pointing to ZENworks.BUS. The relationship between the two classes is one to one. This means a computer system can have only one BUS.

Class ManageWise.User associates to CIM.UnitaryComputerSystem using the association CIM.ManageWise.ObjectContact with Client.

Class CIM.IRQ associates to CIM.ParallelPort using the association CIM.AllocatedResource. Dependent pointing to CIM.ParallelPort and Antecedent pointing to CIM.IRQ.



The schema diagram illustrates the following:

- All components that a computer system manages are represented as associations from the UnitaryComputerSystem class. The type of references (1..n, 1..1) between two classes are marked.
- Those associations that do not have a schema name are assumed as CIM schema.

  There are three instances of ZENworks_ParallelPort associated to one instance of: CIM_UnitaryComputerSystem using three instances of CIM_SystemDevice associations, CIM_SystemDevice.GroupComponent references UnitaryComputerSystem, CIM_SystemDevice.PartComponent references ParallelPort

  This is called 1 to n object reference relationship and is depicted in the illustration as 1..*. Similarly, every instance of ParallelPort has a corresponding instance of CIM_IRQ designating the port's irq. This is one-to-one relationship and is depicted as 1..1.

All other classes follow similar representation. For an explanation of the CIM and extended classes, see “CIM Classes and Extension Classes in ZfD” on page 359. For schema diagrams of other classes, see “Schema Diagrams of CIM and the Extension Schema in ZfD” on page 361.

Legends for Schema Diagrams

The legends for reading the schema diagrams are as follows:

- Class names are enclosed in boxes with the class name as the heading and the attribute names within it.
- Red lines connect two classes using an association class.
- The association class name is shown within the line joining two classes.
- References of the association class are marked on either side of the associated classes.

For an explanation about CIM schema, see the CIM 2.2 schema specification on the DMTF Web site (http://www.dmtf.org).

Leaf Objects in the Database

A leaf object in the Inventory database has only one instance at any given point of time. In terms of relational mapping, a table that is made as a leaf object will have only one row and this row will be shared across multiple workstation objects in the database. The advantages of this approach are better optimized storage and better performance for queries.

Any Inventory component object behaves like a leaf object in the database if it is same across several workstations and no other objects are associated under it. For example, a software application installed on the workstation is a leaf object. The following classes are leaf nodes in the ZfD Inventory database:

1. ZENworks_PointingDeviceDeviceDriver
2. ZENworks_ZENKeyboard
3. ZENworks_Bus
4. CIM_IRQ
5. CIM_DMA
6. ZENworks_ZENOperatingSystem
7. CIM_Processor
8. CIM_Memory
9. CIM_VideoBIOSElement
10. CIM_Product
11. ZENworks_NetwareClient
12. CIM_POTSModem
13. ZENworks_SoundCard
14. ZENworks_MotherBoard
15. CIM_PowerSupply
16. ZENworks_PhysicalDisk
17. ZENworks_PhysicalDiskette
18. ZENworks_LogicalDiskette
19. ZENworks_PhysicalCDROM
20. Zenworks.NetworkAdapterDriver

"CIM Classes and Extension Classes in ZfD" on page 359 describes the CIM classes that ZfD uses.

Non-CIM Tables and Views in the ZfD Database Schema

There are a few tables called "support tables" in the ZfD database. These tables and views do not follow the CIM specification. These tables and views are as follows:

View Name	Description	Table that the View Uses	Inventory Component that Uses the View
ZENworks.Processor.Family	Contains the enum values and strings indicating the processor families. These enum values are described in the DMI specification.	t$ProcessorFamily	Inventory Reporting
ZENworks.ProcessorRole	Contains the enum values and strings indicating the processor roles. These enum values are described in the DMI specification.	t$ProcessorRole	Inventory Reporting
ZENworks.OperatingSystemType	Contains the enum values and strings indicating the types of operating systems. These enum values are described in the DMI specification.	t$OperatingSystemType	Inventory Reporting
ZENworks.VideoArchitecture	Contains the enum values and strings indicating the different video adapter types. These enum values are described in the DMI specification.	t$VideoArchitecture	Inventory Reporting
MW_DBA.LockTable	Inventory Storer maintains modification time stamps indicating the last modified time of the inventory information. The Storer will not store the inventory scan received if the time stamp is the same.	t$LockTable	Inventory Storer

CIM Classes and Extension Classes in ZfD

The following table describes the CIM and extension classes that ZfD uses:

CIM and Extension Class in ZfD	Description of the details that the Class Models
CIM.PointingDevice	Any pointing device available on the managed system. Mostly used to model the mouse.
ZENworks.SystemInfo	Identification details about the system such as serial number and asset tag.
ZENworks.Site	Site ID and site name of the Inventory database.
ZENworks.PointingDeviceDeviceDriver	Device driver that is installed with the pointing device.
ZENworks.SerialPort	Serial ports on the managed system.
ZENworks.ParallelPort	Parallel ports on the managed system.
ZENworks.ZENKeyboard	Attributes modeling the properties of the system keyboard.

CIM and Extension Class in ZfD	Description of the details that the Class Models
ZENworks.BIOS	BIOS software on the system.
ZENworks.Bus	System bus in the system.
ManageWise.User	Details of the user who was logged in to the workstation.
ManageWise.MSDomainName	Name of the domain to which the Windows NT workstation is attached.
ManageWise.NDSName	DN name and tree under which the managed workstation is registered in eDirectory.
CIM.VideoBIOSElement:	Video driver.
CIM.Processor	Processor of the workstation.
CIM.Memory	Total memory of the workstation.
ZENworks.VirtualMemory	Total virtual memory size of the workstation.
ZENworks.Videoadapter	Properties of the monitor and the adapter connecting it.
ZENworks.ZENOperatingSystem	Details of the operating system.
ZENworks.InventoryScanner	Details of the inventory scanner that has scanned for hardware and software details of the managed workstation
ZENworks.NetwareClient	NetWare client version of the workstation
CIM.Product	Software installed on the managed system. Key attributes are the names of the product, vendor, and version.
CIM.EthernetAdapter	Information on the properties of the network adapter.
ZENworks.NetworkAdapterDriver	Network card adapter driver information.
CIM.IPProtocolEndpoint	IP address of the workstation.
CIM.IPXProtocolEndpoint	IPX address of the workstation.
CIM.LANEndpoint	Active MAC address.
ManageWise.DNSName	DNS name of the workstation.
ZENworks.SoundCard	Description of the multimedia adapter on the workstation.
CIM_POTSModem	Physical configuration of the modem device.
CIM_DMA	Information about the system DMA channels.
CIM.CacheMemory	Information about the configured system cache.

CIM and Extension Class in ZfD	Description of the details that the Class Models
CIM.IRQ	List of Interrupt channels and their status on the system. They are also associated to devices that use the specified interrupt number.
ZENworks.MotherBoard	Information about the motherboard on the workstation.
CIM.PowerSupply	Information about the power supply unit of the workstation.
CIM.Battery	Physical details of the system battery.
CIM.Card	Details of adapter cards mounted on the system board.
CIM.Slot	Expansion slots available on the system board.
ZENworks.StoragePhysicalMedia	Physical information about the storage devices on the workstation, such as hard disk, floppy drives, CD drives, and others.
ZENworks.LogicalDiskette	Drive mapped to the floppy drive.
ZENworks.PhysicalDiskette	Derived from ZENworks.StoragePhysicalMedia to model the floppy disk drive.
ZENworks.PhysicalDiskDrive	Derived from ZENworks.StoragePhysicalMedia to model the hard disk.
ZENworks.LogicalDiskDrive	Information about the local drives on the hard disk.
CIM.LocalFileSystem	Information about the local file system mounted on the hard disk.
ZENworks.PhysicalCDROM	Derived from ZENworks.StoragePhysicalMedia to model the CD drive.
ZENworks.LogicalCDROM	Drive mapped to the CD drive.
ZENworks.BackupDisk	Derived from ZENworks.StoragePhysicalMedia to model other backup disks like Jaz drives and Zip disks.
ZENworks.LogicalBackupDisk	Drives mapped to the backup devices on the workstation.

Schema Diagrams of CIM and the Extension Schema in ZfD

The following schema diagrams of the CIM and extension schema model the Inventory database in ZfD:

In the following schema diagram, the CIM_UnitaryComputerSystem represents a managed inventory system.

In this illustration, class CIM.PointingDevice associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to

CIM.PointingDevice. The relationship between the two classes is one to many. This means a computer system might have more than one pointing devices.

Class CIM.IRQ associates to CIM.PointingDevice using the association CIM.AllocatedResource. Dependent pointing to CIM.PointingDevice and Antecedent pointing to CIM.IRQ.

Class ZENworks.ZENKeyboard associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to ZENworks.ZENKeyboard. The relationship between the two classes is one to one. This means a computer system can have only one Keyboard.

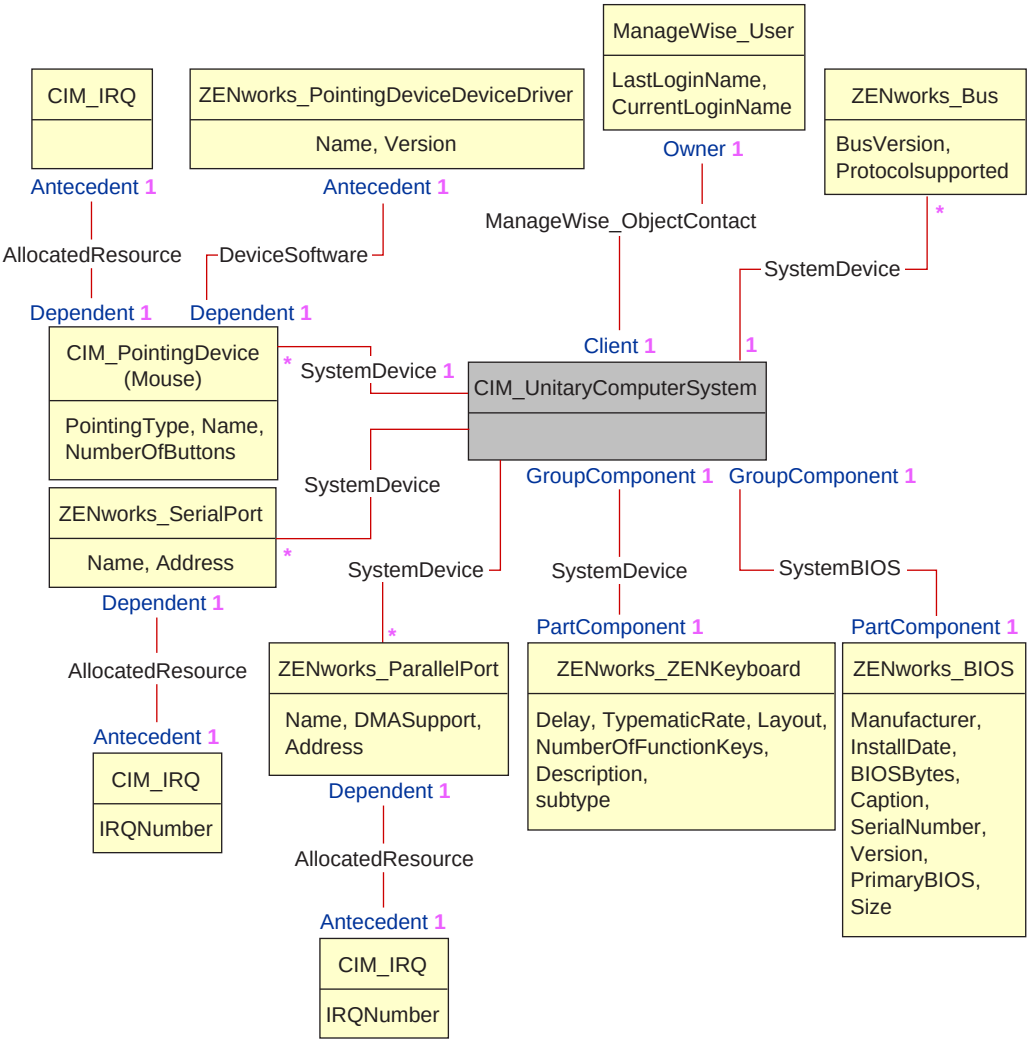
Class ZENworks.BIOS associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemBIOS.PartComponent pointing to ZENworks.BIOS. The relationship between the two classes is one to one. This means a computer system can have only one BIOS.

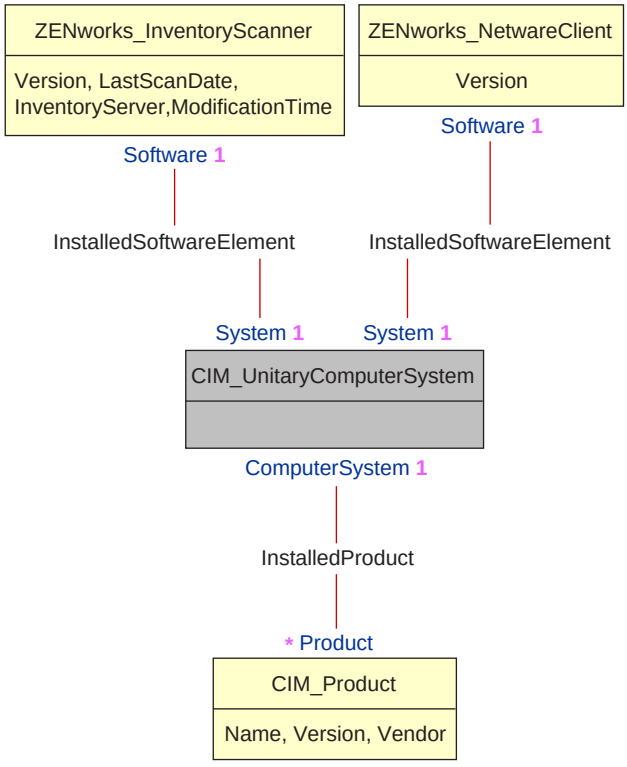
Class CIM.ZENworks.ParallelPort associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemDevice.PartComponent pointing to CIM.ZENworks.ParallelPort. The relationship between the two classes is one to many. This means a computer system might have more than one parallel port.

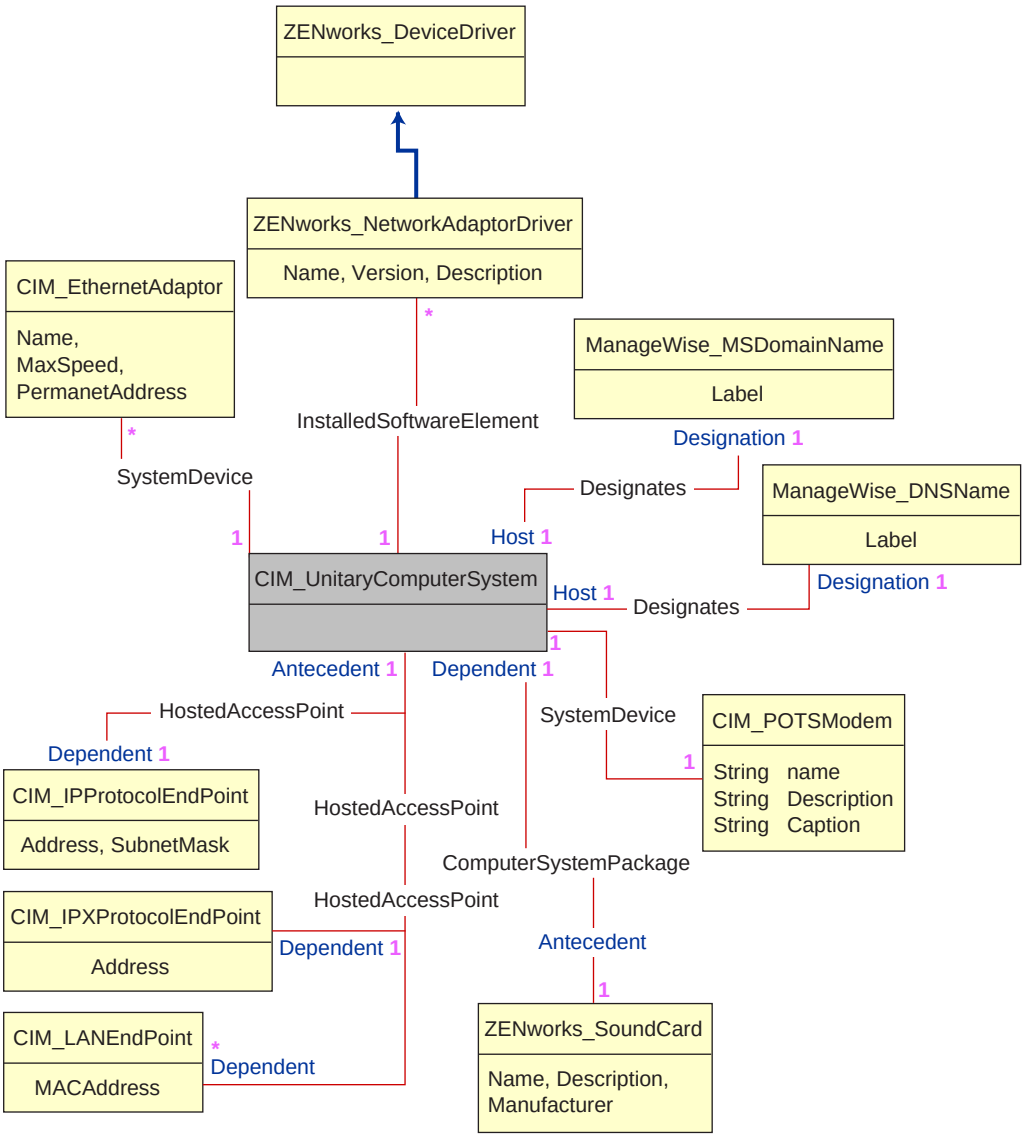
Class ZENworks.BUS associates to CIM.UnitaryComputerSystem using the association CIM.SystemDevice with SystemDevice.GroupComponent pointing to CIM.UnitaryComputerSystem and SystemBUS.PartComponent pointing to ZENworks.BUS. The relationship between the two classes is one to one. This means a computer system can have only one BUS.

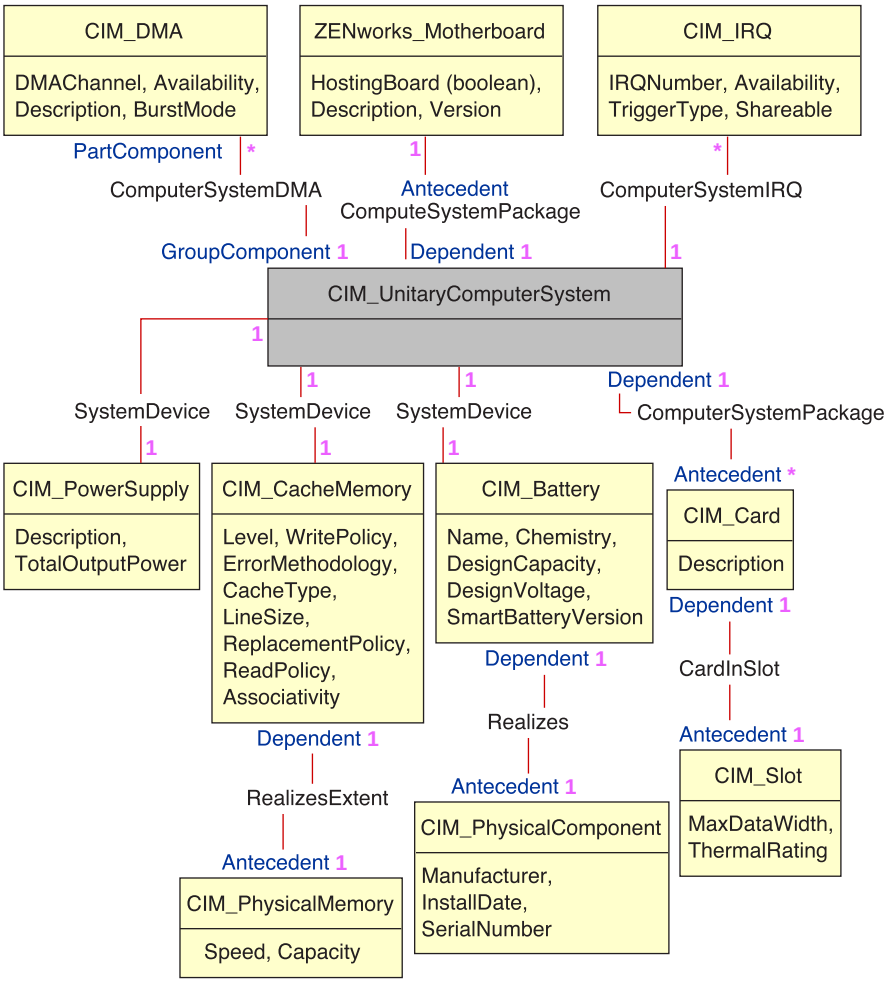
Class ManageWise.User associates to CIM.UnitaryComputerSystem using the association CIM.ManageWise.ObjectContact with Client.

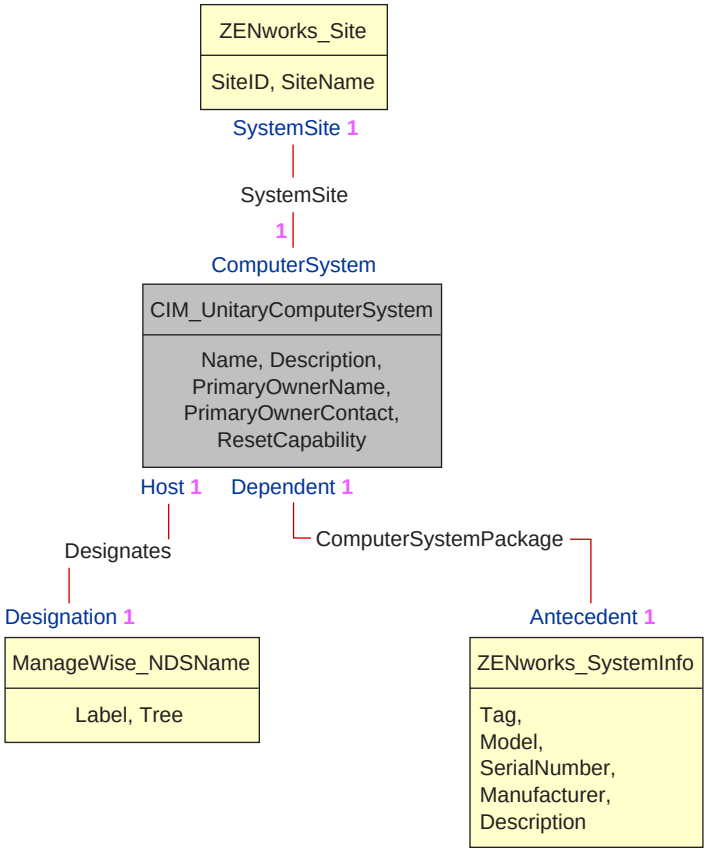
Class CIM.IRQ associates to CIM.ParallelPort using the association CIM.AllocatedResource. Dependent pointing to CIM.ParallelPort and Antecedent pointing to CIM.IRQ.

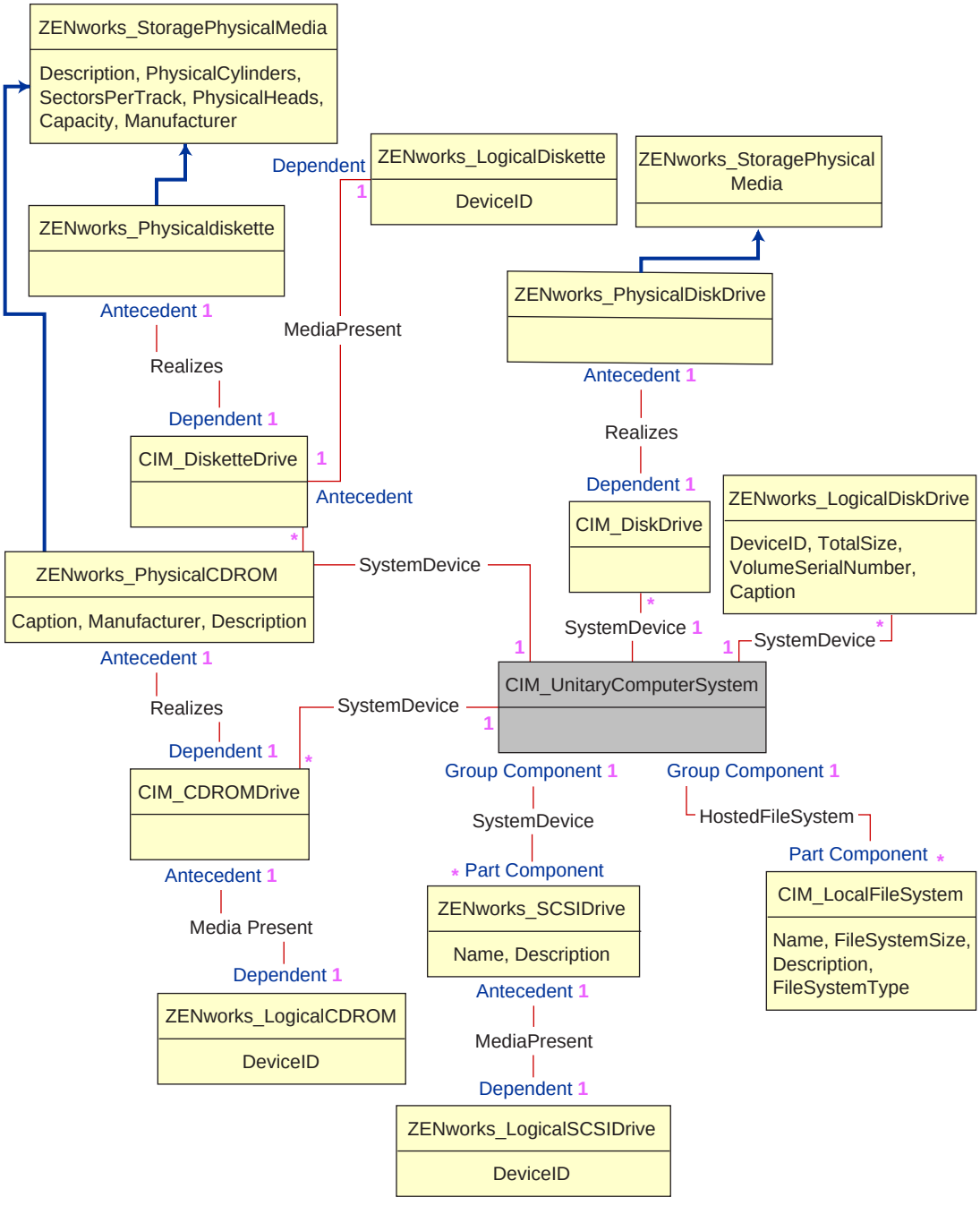

ManageWise_User
LastLoginName, CurrentLoginName
CIM_IRQ
ZENworks_PointingDeviceDeviceDriver
Name, Version
ZENworks_Bus
BusVersion, Protocolsupported
Owner 1
Antecedent 1
Antecedent 1
ManageWise_ObjectContact
AllocatedResource
DeviceSoftware
SystemDevice
*
Dependent 1
Dependent 1
Client 1
1
CIM_PointingDevice (Mouse)
PointingType, Name, NumberOfButtons
*
SystemDevice 1
CIM_UnitaryComputerSystem
SystemDevice
GroupComponent 1
GroupComponent 1
ZENworks_SerialPort
Name, Address
*
SystemDevice
SystemDevice
SystemBIOS
Dependent 1
*
PartComponent 1
PartComponent 1
AllocatedResource
ZENworks_ParallelPort
Name, DMASupport, Address
ZENworks_ZENKeyboard
Delay, TypematicRate, Layout, NumberOfFunctionKeys, Description, subtype
ZENworks_BIOS
Manufacturer, InstallDate, BIOSBytes, Caption, SerialNumber, Version, PrimaryBIOS, Size
Antecedent 1
CIM_IRQ
IRQNumber
Dependent 1
AllocatedResource
Antecedent 1
CIM_IRQ
IRQNumber


ZENworks_InventoryScanner
Version, LastScanDate, InventoryServer,ModificationTime
ZENworks_NetwareClient
Version
Software 1
Software 1
InstalledSoftwareElement
InstalledSoftwareElement
System 1
System 1
CIM_UnitaryComputerSystem
ComputerSystem 1
InstalledProduct
* Product
CIM_Product
Name, Version, Vendor


ZENworks_DeviceDriver
ZENworks_NetworkAdaptorDriver
Name, Version, Description
CIM_EthernetAdaptor
Name,
MaxSpeed,
PermanetAddress
ManageWise_MSDomainName
Label
InstalledSoftwareElement
Designation 1
SystemDevice
Designates
ManageWise_DNSName
Label
Host 1
CIM_UnitaryComputerSystem
Designation 1
Host 1
Designates
Antecedent 1
Dependent 1
HostedAccessPoint
SystemDevice
CIM_POTSModem
String name
String Description
String Caption
Dependent 1
CIM_IPProtocolEndPoint
Address, SubnetMask
HostedAccessPoint
ComputerSystemPackage
HostedAccessPoint
CIM_IPXProtocolEndPoint
Address
Dependent 1
Antecedent
CIM_LANEndPoint
MACAddress
Dependent
ZENworks_SoundCard
Name, Description,
Manufacturer


CIM_DMA
DMAChannel, Availability, Description, BurstMode
ZENworks_Motherboard
HostingBoard (boolean), Description, Version
CIM_IRQ
IRQNumber, Availability, TriggerType, Shareable
PartComponent
*
ComputerSystemDMA
1
Antecedent
ComputeSystemPackage
*
ComputerSystemIRQ
GroupComponent 1
Dependent 1
1
CIM_UnitaryComputerSystem
1
1
1
1
Dependent 1
SystemDevice
SystemDevice
SystemDevice
ComputerSystemPackage
1
1
1
Antecedent *
CIM_PowerSupply
Description, TotalOutputPower
CIM_CacheMemory
Level, WritePolicy, ErrorMethodology, CacheType, LineSize, ReplacementPolicy, ReadPolicy, Associativity
CIM_Battery
Name, Chemistry, DesignCapacity, DesignVoltage, SmartBatteryVersion
CIM_Card
Description
Dependent 1
Dependent 1
CardInSlot
Realizes
Dependent 1
Antecedent 1
Antecedent 1
CIM_Slot
MaxDataWidth, ThermalRating
RealizesExtent
Antecedent 1
CIM_PhysicalComponent
Manufacturer, InstallDate, SerialNumber
Antecedent 1
CIM_PhysicalMemory
Speed, Capacity


ZENworks_Site
SiteID, SiteName
SystemSite 1
SystemSite
1
ComputerSystem
CIM_UnitaryComputerSystem
Name, Description,
PrimaryOwnerName,
PrimaryOwnerContact,
ResetCapability
Host 1
Dependent 1
Designates
ComputerSystemPackage
Designation 1
Antecedent 1
ManageWise_NDSName
Label, Tree
ZENworks_SystemInfo
Tag,
Model,
SerialNumber,
Manufacturer,
Description



Sample Inventory Database Queries

The following are sample queries for retrieving the inventory information from the ZfD Inventory database.

Refer to the schema diagrams in "Schema Diagrams of CIM and the Extension Schema in ZfD" on page 361 to find out the associated schema classes and attribute information.

1. Retrieve the name and ID of all workstations from the database and also to the tree to which these workstations are registered. The query is as follows:

```
SELECT u.id$,m.label,m.tree FROM managewise.NDSName
m,cim.UnitaryComputerSystem u,managewise.Designates s where
s.Designation=m.id$and s.HOST=u.id$
```

2. Retrieve the asset tag, manufacturer, and serial number of all the workstations in the database. The query is as follows:

```
SELECT m.Tag,m.Manufacturer,m.SerialNumber FROM
cim.UnitaryComputerSystem u,zenworks.SystemInfo
m,cim.ComputerSystemPackage s WHERE s.Antecedent=m.id$and
s.Dependent=u.id$
```

3. Retrieve all the software applications with their versions that are installed on the workstation 'SJOHN164_99_139_79.WS' registered under the 'NOVELL_AUS' tree. The query is as follows:

```
SELECT m.name,m.version FROM cim.Product m,cim.UnitaryComputerSystem
u,zenworks.InstalledProduct s,managewise.NDSName
m1,managewise.Designates s1 WHERE (s.Product=m.id$and
s.ComputerSystem=u.id$) AND (s1.Designation=m1.id$and s1.Host=u.id$) AND
m1.label='SJOHN164_99_139_79.WS' and m1.tree='Novell_AUS'
```

4. Retrieve the processor information for the workstation 'SJOHN164_99_139_79.WS'. The query is as follows:

```
SELECT m.DeviceID,m.Family,m.Stepping,m.OtherFamilyDescription,
m.MaxClockSpeed,m.Role,m.UpgradeMethod FROM cim.Processor
m,cim.UnitaryComputerSystem u,cim.ComputerSystemProcessor s
managewise.NDSName m1,managewise.Designates s1 WHERE
(s.PartComponent=m.id$and s.GroupComponent=u.id$) AND
m1.label='SJOHN164_99_139_79.WS'
```

5. Retrieve the ID of the UnitaryComputerSystem used for the workstation 'SJOHN164_99_139_79.WS'. The query is as follows:

```
SELECT s.host FROM managewise.NDSName m,managewise.Designates s WHERE
m.label='SJOHN164_99_139_79.WS' and m.id$=s.Designation
```

6. When you know the ID of the UnitaryComputerSystem for a particular workstation from the query as shown in query 5, query 4 can be modified as:

```
SELECT
m.DeviceID,m.Family,m.Stepping,m.OtherFamilyDescription,m.MaxClockSpeed,
m.Role,m.UpgradeMethod FROM cim.Processor m,cim.UnitaryComputerSystem u,
cim.ComputerSystemProcessor s u.id$=? and s.PartComponent=m.id$ and
s.GroupComponent=u.id$
```

   Substitute the ID of the specified workstation in place of the ? value for u.id in the query.

7. List the IP address, IPX address, and MAC address of all workstations in the database. The query is as follows:

```
SELECT ip.Address, ipx.Address, mac.MACAddress FROM
cim.IPProtocolEndpoint ip, cim.IPXProtocolEndpoint ipx, cim.LANEndpoint
mac, cim.UnitaryComputerSystem u, cim.HostedAccessPoint s WHERE
(s.Dependent=ip.id$ and s.Antecedent=u.id$) AND (s.Dependent=ipx.id$ and
s.Antecedent=u.id$) AND (s.Dependent=mac.id$ and s.Antecedent=u.id$)
```

   Modify the same query to get the information for a specified workstation as follows:

```
SELECT ip.Address, ipx.Address, mac.MACAddress FROM
cim.IPProtocolEndpoint ip, cim.IPXProtocolEndpoint ipx, cim.LANEndpoint
mac, cim.UnitaryComputerSystem u, cim.HostedAccessPoint s WHERE
(s.Dependent=ip.id$ and s.Antecedent=u.id$) AND (s.Dependent=ipx.id$ and
```

```
s.Antecedent=u.id$) AND (s.Dependent=mac.id$ and s.Antecedent=u.id$)AND
u.id$=?
```

Use the query as shown in query 5 to retrieve the ID of the specified workstation and substitute the ID in place of the ? value for u.id in the query.

8. Retrieve the name and other properties of the drives on the hard disk of the specified workstation.

```
SELECT m.DEVICEID, m.TotalSize, m.VolumeSerialNumber, m.Caption FROM
zenworks.LogicalDiskDrive m, cim.UnitaryComputerSystem u,
cim.SystemDevice s WHERE s.PartComponent=m.id$ AND s.GroupComponent=u.id$
and u.id$=?
```

Use the query shown in query 5 to retrieve the ID of the specified workstation and substitute the ID in place of the ? for u.id$ in the query.

25 Setting Up Workstation Inventory

The following sections contain detailed information to help you set up Novell® ZENworks® for Desktops (ZfD) Workstation Inventory:

Configuring the Settings for the Inventory Service Object

The Inventory Service object settings configure the scanning for the associated workstations. From the Inventory Service Object property page, you can configure the following:

- Inventory Server Role
- Discard Scan Data Files
- Scan Directory Path
- Enable scan of workstations
- Start full scan

To open the Inventory Service Object properties page:

1. In ConsoleOne®, right-click the Inventory Service object (*servername*_ZenInvservice) > click Properties > click the Inventory Service Object Properties tab.
2. Modify the following settings:

Inventory Server Role: Based on the servers that you have deployed for scanning inventory, you must specify the role of the server. See "Changing the Role of the Inventory Service Object" on page 381.

Discard Scan Data Time: Any scan data files (.ZIP files) that have scan information collected before the Discard Scan Data Time that you specify in the Inventory Service Object Property page will be discarded. The scan data files are removed from the server, which is one of the following types: Intermediate Server, Intermediate Server with Database, Intermediate Server with Database & Workstations, and Intermediate Server with Workstations.

Scan Directory Path: When you install ZfD, you specify the volume on the server for storing the scan data files. If required, you can modify the volume or the directory of the Scan Directory (SCANDIR) setting in the Inventory Service Object property page. The SCANDIR directory path is the location on the server that stores the scan data files. The format of the Scan Directory Path is as follows: *server_name\volume_of_the_server_directory*.

You cannot modify the server name specified in the SCANDIR path. If you modify the directory, the directory must already exist.

To modify the path, click the Browse button.

Enable Scan of Workstations: To scan the workstations associated with the Inventory Service object, you must enable the scan option listed in the Inventory Service Object property page. To disable the scanning of workstations, uncheck this option.

Start Full Scan: When scanning the workstation for the first time, the Scanner collects the complete inventory of the workstation. A complete inventory scan of the workstation is referred as a *full scan*. After the workstation is scanned, the next time the Scanner compares the current inventory data to the history data that it maintains. If there are any changes to the workstation, the Scanner creates a *delta scan*, which collects the changes in inventory since the last scan was done. The delta scan setting is the default scan operation for each successive scan after the first scanning of the workstation. If the Status Log reported by the inventory component indicates the scanning on the workstation is not successful, you can enforce a full scan. This policy settings is applicable for all workstations associated with it. To override this policy, you set this option for an individual workstation. For more information about the Workstation object settings, see "Configuring the Inventory Settings for the Workstation Object" on page 372 the Workstation.

3 Click OK.

NOTE: If you are modifying the Inventory policies or configuring the objects, always stop the Inventory services. Configure the policies and properties of the objects. Restart the Inventory services again.

Configuring the Inventory Settings for the Workstation Object

You use the inventory settings of the Workstation object to identify the .STR filename of the last scan. Identifying the scan data filename is useful to troubleshoot inventory scanning problems for the workstation. For more information, see View the Scan Data File.

You configure the inventory settings for the selected workstation by enforcing a complete scan of the workstation using the Workstation Scan Configuration property page. For more information about the Full Scan option, see Enable Full Scan.

To configure the inventory settings for the workstation object:

1 In ConsoleOne, right-click the Workstation object > click Properties > ZENworks Inventory > Workstation Scan Configuration properties tab.

2 Check Start Full Scan if required > modify the following settings:

View the Scan Data Filename: The Scanner stores the scan data of the workstation as a scan data file (.STR) in the scan directory (SCANDIR) on the inventory server. The Workstation Scan Configuration properties page displays the scan filename of the last scan done at the workstation. The .STR file uses the following filename conventions: *macAddress_gmt_sequencenumber*.STR where *macAddress* is the MAC address of the workstation, *gmt* is the time that the workstation was first scanned, *sequencenumber* is the internal sequencing number generated by the Scanner for the workstation while scanning, and .STR is the file extension.

For example, 00508b12b2c4_944029836000_10.STR is the .STR file for the workstation with the MAC address of 00508b12b2c4, the GMT of the workstation as 944029836000, and the internal sequencing number of 10.

Start Full Scan: When scanning the workstation for the first time, the scanner collects the complete inventory. A complete inventory scan of the workstation is referred to as a *full scan*. After the workstation is scanned, the next time the scanner compares the current inventory data to the history data that it maintains. If there are any changes to the workstation, the scanner creates a *delta scan*, which collects the changes in inventory since the last scan was done. The delta scan setting is the default scan operation for each successive scan after the first scanning of the workstation. If the status log reported by the inventory component indicates that the scanning on the workstation was not successful, you can enforce a full scan.

3 Click OK.

Configuring the Workstation Inventory Policy Settings

You can set policies to control how workstations collect inventory. The Inventory policy settings configure the inventory scanning options for the selected Workstation Inventory Package. The Inventory policy settings stored in Novell eDirectory™ are associated with a Workstation object. Each Workstation object has an associated Inventory policy package.

From the Inventory policy, you can configure the following:

- DN of the Inventory Service Object
- Enable Software Scan
- Software Applications in the Custom Scan Editor

To set a Workstation Inventory policy:

1. Create or modify a workstation policy package.
2. Enable the Workstation Inventory policy.
3. Set the details in the Workstation Inventory policy.

You can complete these steps on your own or use the Policy Wizard to guide you through the process.

To configure the Workstation Inventory policy:

1 In ConsoleOne, right-click the Workstation Inventory policy package > click Properties > click Policies > click one of the following subtabs: Win95-98 or WinNT-2000.

2 Click the Workstation Inventory row > Properties > Workstation Inventory Policy tab.

3 Modify the settings.

Inventory Service Object: The installation program creates the Inventory Service object and copies the inventory components on the server. In this policy, you choose an Inventory Service object to which the scanners will send the inventory information of the workstations associated with this server.

Enable Software Scan: By default, the scanners collect hardware information of the workstations. When you check the Enable Software Scan option, the next time the workstations associated with this policy package are scanned, the scanners will collect software information. For more information, see "Software Information Collected by the Scanners" on page 297.

Custom Scan Editor: If you enable the software scanning of the workstations, specify the list of software applications that will be scanned for at the workstation in the Custom Scan Editor. For more information, see "Customizing Software Scanning of Workstations" on page 378.

4 Click OK.

NOTE: If you are modifying the Inventory policies or configuring the objects, always stop the Inventory Services. Configure the policies and properties of the objects. Restart the Inventory services again.

Configuring the Roll-Up Policy Settings

The Roll-Up policy settings configure the selected server for roll-up of scan information. The settings in the Roll-Up policy identify the next-level server (DN of the Inventory Service object) for moving the scan data from the selected server. These settings stored in eDirectory are associated with the server object.

To set up the Roll-Up policy:

1. Create or modify a server package.
2. Enable the Roll-Up policy.
3. Configure the Roll-Up policy.

To open the Roll-Up policy:

1 In ConsoleOne, right-click the Server package > click Properties > Policies > click one of the following subtabs: General, NetWare, WinNT-2000.

2 Check the check box under the Enabled column for the zeninvRollup Policy.

3 Click Properties.

4 Modify the setting.

Destination Server Object: You must specify the DN of the Inventory Service object at the next level for moving the scan data from the selected server. The server that you specify must be another Intermediate Server, Intermediate Server with Database, Intermediate Server with Database and Workstations, Intermediate Server with Workstations, Root Server, or Root Server with Workstations.

NOTE: Ensure that the specified server is a different server because the roll-up of data cannot happen on the same server. Also, the higher level roll-up server cannot specify the lower-level server as the next-destination server for roll-up of data.

5 Click OK.

NOTE: If you are modifying the Inventory policies or configuring the objects, always stop the Inventory services. Configure the policies and properties of the objects. Restart the Inventory services again.

Scanning for IBM Computer Models

The Scanner (WINSCAN.EXE) uses the IBMNAMES.INI file to get information about IBM* workstations running under Windows* 95/98. The scanner reads the model name using the machine type and model number information specified in the IBMNAMES.INI file. This file is located in the SYS:\PUBLIC\ZENWORKS directory of the inventory server.

Using the IBMNAMES.INI file is an IBM-specific method of scanning model names of IBM workstations defined by the scanner. If you have a new IBM workstation that is not listed in the IBMNAMES.INI file, the model number of the workstation will not be scanned. You must edit the IBMNAMES.INI file to add the machine type, model number, and model description of the new IBM workstation. By adding this entry, you enable the scanner to identify the new model name

Editing the IBMNAMES.INI File to Add the IBM Computer Models

The IBMNAMES.INI file contains the model number and description of IBM desktops and laptop models. You add entries in this file to specify the models that the scanner should scan for at the workstations.

This file begins with a section called [Product Names].

The format of each entry in the section is as follows:

`4_bytes_machine_type-3_byte_model_number=`*`model_description`*

For example, if the model is IBM PC 140 and the machine type is 6260, specify the model description as IBM PC 140. The entry in the IBMNAMES.INI is 6260-79T = IBM PC 140.

If you want the scanner to scan for all IBM computer models of a particular machine type with the same model description, the *3_byte_model_number* is specified with three question marks (???) as wildcard characters.

A sample IBMNAMES.INI file is as follows:

```
[Product Names]

6272-???=IBM PC 300GL (6272)

6260-???=IBM PC 140 (6260)

6282-???=IBM PC 300Gl (6282)

2460-79T=IBM ThinkPad 5602 (2641)

...
```

For example, to scan all models of a 6282 machine type with same model description, the file entry is as follows:

```
6282-???=IBM PC 300GL (6282)
```

The machine type and model number are printed at the rear of the laptop or on the backside of the desktop workstation. For example, the 760E Thinkpad* model has the following label: TYPE *9546-A98*.

Customizing the Hardware Scanning Information of Jaz, Zip, and Floppy Drive Vendors

The scan information of the vendors for devices such as backup and floppy devices is usually unavailable on the workstation. Also, if the information is available, the vendor information does not usually contain the details. You can customize and update information about the vendors of these devices in the Hardware Rules file. The scanners read this file during the hardware scanning process for these devices.

The contents of the Hardware Rules file (ZIPPNAMES.INI) is as follows:

```
[Identifier]

device_id=vendor_display_name_you_specify

[Floppy]

device_id=vendor_display_name_you_specify
```

where *device_id* is the unique ID generated and updated in the registry by the vendor during the installation of the device on the workstation.

For example, the contents of the file are as follows:

```
[Identifier]

IOMEGA ZIP 100 D.13=Iomega Corporation
```

This entry is for a 100 MB Zip* drive installed on the workstation.

```
[Floppy]

MITBISHI LS-120 F200 08=MITBISHI
```

This entry is for a LS-120 floppy drive installed on the workstation.

To customize and update the vendor information for display:

1. Open the ZIPPNAMES.INI file in a text editor.

   This text file is located in \PUBLIC\ZENWORKS directory on the inventory server.

2. Add or modify the entries in this file.

   If you specify incorrect values for the device ID entry, the device will not be displayed in the Inventory windows.

3. Save the changes.

Scanning for Vendor-Specific Asset Information from DMI

Follow these steps:

1. Modify the asset file, ASSET.INI. For more information, see “Asset File Format” on page 377.

2. Run the scans on the workstations.

   Verify that the inventory information is in eDirectory Minimal Information and the Workstation Summary window.

Asset File Format

The asset file, ASSET.INI contains the following three sections:

- Contains Serial Number in the section [SERIALNUMBER]
- Contains Asset Tag in the section [ASSETTAG]
- Contains Computer Model in the section [MODEL]
- Contains Computer Type [COMPUTERTYPE]
- Contains Computer Model Number [MODELNUMBER]

Each section contains the particular DMI Class name and DMI Class Attribute ID. These three classes contain the Asset Information in DMI.

The format of the ASSET.INI file is as follows:

```
[SERIALNUMBER]

DMI1_CLASSNAME=DMI_class_pathname_for_serial_number

DMI1_ATTRIBUTEID=DMI_attribute_ID_for_serial_number

[ASSETTAG]

DMI1_CLASSNAME=DMI_class_pathname_for_asset_tag

DMI1_ATTRIBUTEID=DMI_attribute_ID_for_asset_tag

[MODEL]

DMI1_CLASSNAME=DMI_class_pathname_for_computer_model

DMI1_ATTRIBUTEID=DMI_attribute_ID_for_computer_model
```

The SerialNumber and Model values can have string lengths of maximum 64 characters. The Assettag value can have string length of maximum 256 characters.

A DMI Class name can be any DMI class other than DMTF|COMPONENTID|00x.

If there is more than one DMI vendor implementing different custom DMI classes, you can specify multiple DMI classes. A maximum of five classes can be specified in these sections.

A sample ASSET.INI file configuration is as follows:

```
[SERIALNUMBER]

DMI1_CLASSNAME=IBMPSG|Serial Number Information|001

DMI1_ATTRIBUTEID=9

DMI2_CLASSNAME=IntelG|Serial Number Information|002

DMI2_ATTRIBUTEID=8

[ASSETTAG]

DMI1_CLASSNAME=Novell|AssetInformation|001

DMI1_ATTRIBUTEID=2

DMI2_CLASSNAME=IntelG|Asset Information|001

DMI2_ATTRIBUTEID=3
```

```
[MODEL]

DMI1_CLASSNAME=Novell|SystemModel|001

DMI1_ATTRIBUTEID=2

DMI2_CLASSNAME=IntelG|SystemModel|002

DMI2_ATTRIBUTEID=4

[COMPUTERTYPE]

DMI1_CLASSNAME=Novell|ComputerType|001

DMI1_ATTRIBUTEID=1

[MODELNUMBER]

DMI1_CLASSNAME=Novell|ComputerModelNumber|001

DMI1_ATTRIBUTEID=1
```

Customizing Software Scanning of Workstations

You can customize the list of software applications that you want to scan for at the managed workstations. You specify the software scan settings in the Workstation Inventory policy page. The software scan settings are saved in eDirectory.

By default, the Scanner will not scan for software applications at the workstation. You must enable the Software Scan option in the Workstation Inventory policy.

To specify the applications you want to scan for, you add the list of applications or import files that contain the list of applications. You can also export the list of applications as a file and then modify the file.

If you have a large number of software applications that you want to specify, you can create a Custom Scan file following the conventions explained in this section and later import the file.

To specify software scan settings that you specified at a different location, you export the file at that location and import the file at the location you want to use the list.

The following sections contain more information to help you customize workstation scanning:

- “Adding New Applications for Scanning” on page 378
- “Format of the Custom Scan File” on page 379
- “Exporting the List of Application Files for Scanning” on page 380

Adding New Applications for Scanning

To add a new application, you must provide the details of the application.

To add a new application for scanning:

1. In ConsoleOne, open the Workstation Inventory policy.

   For more information, see “Configuring the Workstation Inventory Policy Settings” on page 373.

   Ensure that the Enable Software Scan option is checked.

2. Click the Custom Scan Editor button.

3. Click Add to specify the details of the application.
4. Fill in the details of the application:

   Vendor name, Product name, Product version, File name, File Size (in Bytes)
5. Click OK.
6. To save the application entry in eDirectory, click OK in the Custom Scan Editor dialog box.

You can also add application entries to the Custom Scan table by importing a file with the list of application entries. You create this file by following the format of the Custom Scan file conventions. For more information, see "Format of the Custom Scan File" on page 379.

To add a list of new applications:

1. Open a text editor.
2. Create a file with the format specified in "Format of the Custom Scan File" on page 379.
3. Save the application as a text file with any extension you prefer.
4. In ConsoleOne, open the Workstation Inventory policy.

   Ensure that the Enable Software Scan option is checked.
5. Click Custom Scan Editor.
6. Click Import.

   To save the application entry in eDirectory, click OK in the Custom Scan Editor dialog box.

Format of the Custom Scan File

The contents of the Custom Scan file are as follows:

total_number_of_application_entries_in_Custom_Scan_file;
total_number_of_columns_in_the_application_entry

vendor_name;product_name;product_version;file_name;file_size (in Bytes)

vendor_name;product_name;product_version;file_name;file_size (in Bytes)

vendor_name;product_name;product_version;file_name;file_size (in Bytes)

Keep in mind the following guidelines as you work with the Custom Scan file:

- The default total number of columns in the application entry is 5.
- The separator between the columns is a semicolon (;).
- Fill in all the columns for each application entry.
- Do not use comma (,) in the file size parameter.

The following is a sample Custom Scan file:

```
2;5

Novell;GroupWise;5.5;grpwise.exe;4025856

Novell;client32nlm;3.03;client32.nlm;524168
```

Exporting the List of Application Files for Scanning

You can export the Custom Scan file to use at a different location. You export the Custom Scan file at one location and then import it at the other location.

To export the list of applications:

1. In ConsoleOne, open the Workstation Inventory policy.

   For more information, see "Configuring the Workstation Inventory Policy Settings" on page 373.

   Ensure that the Enable Software Scan option is checked.
2. Click Custom Scan Editor.
3. Click Export.
4. Type the filename with any extension for the text file.

   The export file is a text file.
5. Click OK.

The exported file will contain the list of applications that are displayed in the Custom Scan table. If you have not saved the list of applications before exporting, the entries in the exported file and the saved application entries in eDirectory will differ.

Customizing the Software Scanning Information of Vendors and Products

The software information of the same vendor may sometimes have different vendor names or product names. For example, if the software scan data contains information of more than one product for the same vendor, and if the vendor name differs, the inventory display windows will display the software information under different vendor names.

By default, the software information is displayed for each unique vendor name in the Inventory Query window, Inventory Summary window, and the Inventory reports. If the vendor or product names differ, you can merge the software information.You can also prevent the display of specific vendors and products in the inventory windows. You customize these settings in the Software Rules file. The scanners read the file during the scanning process for displaying the vendor or product name as specified in the file.

The contents of the Software Rules file are as follows:

```
[vendor]
```

scanned_vendor_name_reported_by_scanner= vendor_display_name_you_specify

scanned_vendor_name_reported_by_scanner= vendor_display_name_you_specify

```
[product]
```

scanned_product_name_reported_by_scanner= product_display_name_you_specify

scanned_product_name_reported_by_scanner= product_display_name_you_specify

To customize the vendor and product names for display:

1. Open the SWRULES.INI file in a text editor.

The SWRULES.INI file is a text file located in \PUBLIC\ZENWORKS on the inventory server.

2. To modify the vendor name, specify the details for *scanned_vendor_name_reported_by_scanner* and the *vendor_display_name_you_specify*.

   For example, to display the software vendor information for Novell, Novell Inc., Novell Corp, and Novell Inc as Novell Inc., edit the following section:

   ```
   [vendor]

   Novell=Novell Inc.

   NOVELL INC=Novell Inc.

   NOVELL CORP=Novell Inc.

   NOVELL Inc=Novell Inc.
   ```

3. To modify the product name, specify the Scanned Product Name and the Product Display Name.

   For example, to display the product information: Novell NetWare (TM) Operating System, Novell NetWare®, Novell NetWare (R) Operating System as Novell NetWare®, edit the following section.

   ```
   [product]

   Novell NetWare (TM) Operating System=Novell NetWare®

   Novell NetWare=Novell NetWare®

   Novell NetWare (R) Operating System=Novell NetWare®
   ```

4. To specify that the scanned information for a product or vendor should not be reported by the scanners, add the following entry in the file:

   ```
   [vendor]

   others=null
   ```

You should follow these rules while editing the SWRULES.INI file:

- Ensure that blank lines do not exist between the sections of the file.
- The file should end with a Carriage Return.
- Ensure that spaces and symbols in the *scanned_vendor_name_reported_by_the_scanner* and *scanned_product_name_reported_by_the_vendor* do not exist. The scanners compare the *scanned_vendor_name_reported_by_the_scanner* and the *scanned_product_name_reported_by_the_scanner* with the scanned data that they collect. Ensure that names that you use are not case-sensitive.

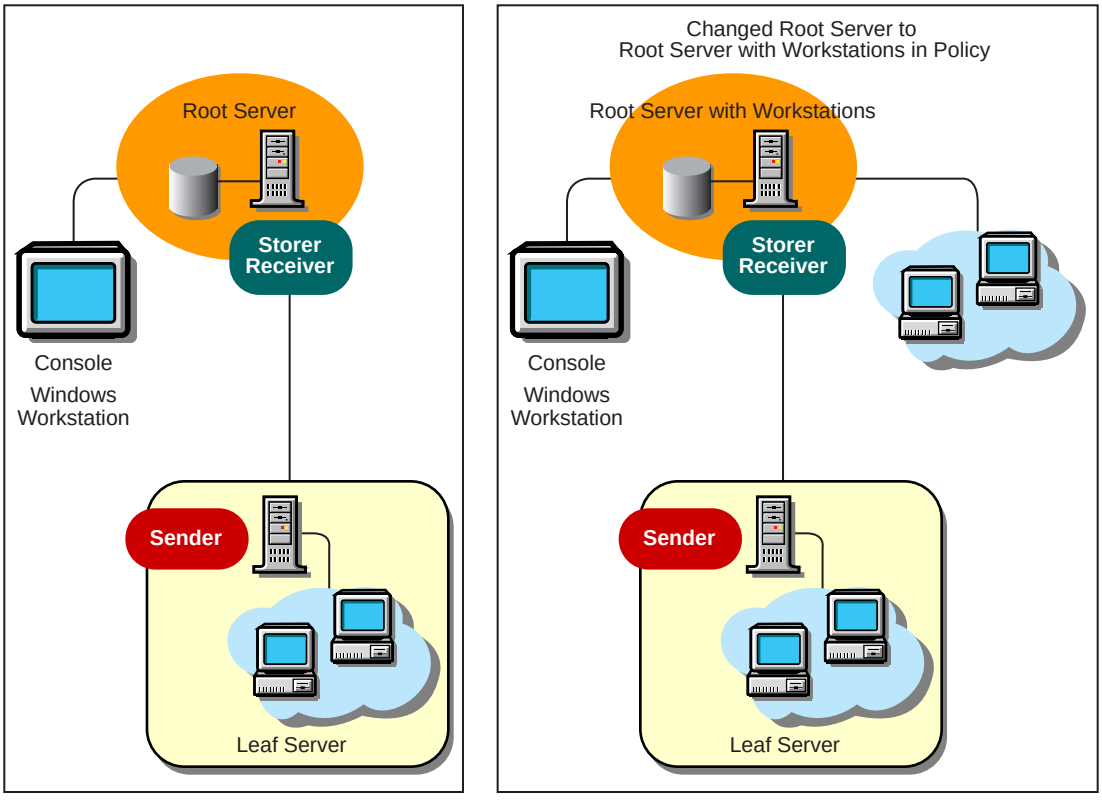
If you specify incorrect entries in the file, the entries preceding the incorrect entry will be used and the other entries will be ignored.

Changing the Role of the Inventory Service Object

When you install ZfD, you assign specific roles to the server based on your inventory deployment. For example, if the deployment plan identifies three servers, such as a Root Server, an Intermediate Server with Database, and a Leaf Server for inventory deployment, you install Workstation Inventory on these servers, and choose the role for the server. Later, if you want to make changes

in the inventory deployment, such as attaching the workstations to the existing Root Server, you need to change the role of the Inventory Service object from Root Server to Root Server with Workstations. Additionally, depending on the new role, there are some policies you need to configure.

The following illustration shows the current deployment and the changes in the deployment:



Existing Inventory Deployment

Changes in the Inventory Deployment Through Policies

To change the role for any server:

1. Plan the change of roles carefully because the changes will impact the existing inventory deployment. Also, consider the disk space requirements and ensure that you have the required configurations for Inventory. For more information, see Workstation Inventory in *Deployment*.
2. In ConsoleOne, right-click the Inventory Service object (*servername*_ZenInvservice) > click Properties > click the Inventory Service Object Properties tab.
3. Choose the new role of the Inventory Service object > click Apply.

   You will see a list of actions that you should follow based on the chosen role. For example, if you change the Root Server to a Root Server with Workstations, you need to configure the Workstation Inventory policy for the workstations that you have attached. Similarly, to change the role to any other server, you need to follow the instructions to make the new role change effective.
4. Bring down the services running on the changed server, follow the actions that you need to change the role, and then bring up the server.

The following sections contain information to help you change the role of the Inventory Service object:

Changing the Role of the Root Server

To change the role of the Root Server to a different role, follow the actions specified in the following table:

To change the role of the Root Server to ...	Tasks:
Root Server with Workstations	Perform the following tasks: 1. After changing the role, configure the Workstation Inventory policy so that the workstations that you have attached to the Root Server with Workstations will be scanned for. 2. Ensure that you enable the Full Scan setting in the Inventory Service Object property page for the server. This setting will ensure that a complete scan of the workstations attached to will be done.
Intermediate Server	Perform the following tasks: 1. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server. 2. If a Database Location policy is associated with a Root Server, remove the policy.
Intermediate Server with Database	Perform the following task: 1. After changing the role, configure the Roll-Up to specify the next-destination server for roll-up of data from this server.
Intermediate Server with Database & Workstations	Perform the following tasks: 1. After changing the role, configure the Workstation Inventory policy so that the workstations that you have attached will be scanned for. 2. Ensure that you enable the Full Scan setting in the Inventory Service Object property page for the server. This setting will ensure that a complete scan of the workstations will be done. 3. Configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server.

To change the role of the Root Server to ...	Tasks:
Intermediate Server with Workstations	Perform the following tasks: 1. After changing the role, configure the Workstation Inventory policy so that the workstations that you have attached will be scanned for. 2. Ensure that you enable the Full Scan setting in the Inventory Service Object property page for the server. This setting will ensure that a complete scan of the workstations will be done. 3. Configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server. 4. If a Database Location policy is associated with the Root Server, remove the policy.
Leaf Server, Leaf Server with Database, or Standalone Server	Workstation Inventory does not allow you to change the Root Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Changing the Role of the Root Server with Workstations

Follow the actions specified in the following table:

To Change the Role of the Root Server with Workstations to ...	Tasks:
Root Server	Perform the following task: 1. Before changing to this role, remove the Workstation Inventory policy associated with the Root Server with Workstations or reconfigure the Inventory policy.
Intermediate Server	Perform the following tasks: 1. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server. 2. If the Database Location policy is associated with the Root Server with Workstations, remove the policy.
Intermediate Server with Database	Perform the following tasks: 1. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server. 2. Before changing the role, if the Workstation Inventory policy is associated with the Root Server with Workstations, remove the policy for those workstations attached to this server or to the lower-level servers that roll up to this server.
Intermediate Server with Database & Workstations	Perform the following tasks: 1. Ensure that you enable the Full Scan setting in the Inventory Service Object property page for the server. This setting will ensure that a complete scan of the workstations will be done. 2. Configure the Roll-Up policy to specify the next-destination server for roll-up of data from this server.

To Change the Role of the Root Server with Workstations to ...	Tasks:
Intermediate Server with Workstations	Perform the following task: 1. Before changing the role, if the Database Location policy is associated with the Root Server with Workstations, remove the policy.
Leaf Server, Leaf Server with Database, or Standalone server	Workstation Inventory does not allow you to change the Root Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Changing the Role of the Intermediate Server

Follow the actions specified in the following table:

To Change the Role of the Intermediate Server to ...	Tasks:
Root Server	Perform the following tasks: 1. Before changing to this role, remove the Roll-Up policy. 2. Configure the Database Location policy.
Root Server with Workstations	Perform the following tasks: 1. After changing the role, configure the Workstation Inventory policy for those workstations attached to this server. 2. Before changing to this role, remove the Roll-Up policy. 3. Configure the Database Location policy.
Intermediate Server with Database	Perform the following task: 1. After changing the role, configure the Database Location policy for the server.
Intermediate Server with Database & Workstations	Perform the following tasks: 1. After changing the role, configure the Workstation Inventory policy so that all the workstations associated to this Inventory Service object, and also those workstations associated to the lower-level servers that roll up to this server will be scanned for. 2. Configure the Database Location policy.
Intermediate Server with Workstations	Perform the following task: 1. After changing the role, configure the Workstation Inventory policy so that the workstations that you have attached will be scanned for.
Leaf Server, Leaf Server with Database, or Standalone server	Workstation Inventory does not allow you to change the Intermediate Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Changing the Role of the Intermediate Server with Database

Follow the actions specified in the following table:

To Change the Role of the Intermediate Server with Database to ...	Tasks:
Root Server	Perform the following task: 1. Before changing to this role, remove the Roll-Up policy.
Root Server with Workstations	Perform the following tasks: 1. Before changing the role, configure the Workstation Inventory policy so that the workstations that you have attached will be scanned for. 2. Remove the Roll-up policy.
Intermediate Server	Perform the following task: 1. Before changing the role, if the Database Location policy is associated with the Intermediate Server with Database, remove the policy.
Intermediate Server with Database & Workstations	Perform the following task: 1. After changing the role, configure the Workstation Inventory policy so that the workstations attached will be scanned for.
Intermediate Server with Workstations	Perform the following tasks: 1. Before changing the role, if the Database Location policy is associated with the Intermediate Server with Database, remove the policy. 2. After changing the role, configure the Workstation Inventory policy so that the workstations that you have attached will be scanned for.
Leaf Server, Leaf Server with Database, or Standalone server	Workstation Inventory does not allow you to change the Intermediate Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Changing the Role of the Intermediate Server with Database & Workstations

Follow the actions specified in the following table:

To Change the Role of the Intermediate Server with Database & Workstations to ...	Tasks:
Root Server	Perform the following tasks: 1. Before changing to this role, remove the Roll-Up policy. 2. Remove the Workstation Inventory policy associated with the server so that the workstations will not send the scan files to this server.

To Change the Role of the Intermediate Server with Database & Workstations to ...	Tasks:
Root Server with Workstations	Perform the following task: 1. Before changing to this role, remove the Roll-Up policy.
Intermediate Server	Perform the following tasks: 1. Remove the Workstation Inventory policy associated with the lower-level servers that roll-up to the Intermediate Server with Database & Workstations server. 2. Remove the Database Location policy.
Intermediate Server with Database	Perform the following task: 1. Remove the Workstation Inventory policy of the Intermediate Server with Database & Workstations or reconfigure the policy.
Intermediate Server with Workstations	Perform the following task: 1. Before changing the role, remove the Database Location policy associated with the Intermediate Server with Database & Workstations.
Leaf Server, Leaf Server with Database, Standalone Server, or Intermediate Server with Workstations	Workstation Inventory does not allow you to change the Intermediate Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Changing the Role of the Intermediate Server with Workstations

Follow the actions specified in the following table:

To Change the Role of the Intermediate Server with Workstations to ...	Tasks:
Root Server	Perform the following tasks: 1. Before changing to this role, remove the Roll-Up policy. 2. Remove the Workstation Inventory policy associated with the server so that the workstations attached will not send the scan files to this server. 3. After changing the role, configure the Database Location policy for the server.
Root Server with Workstations	Perform the following tasks: 1. Before changing to this role, remove the Roll-Up policy. 2. After changing the role, configure the Workstation Inventory policy for those workstations attached to the lower-level server that roll up to this server. 3. Configure the Database Location policy

To Change the Role of the Intermediate Server with Workstations to ...	Tasks:
Intermediate Server	Perform the following task: 1. Before changing to this role, remove the Workstation Inventory policy associated with the server.
Intermediate Server with Database	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy associated to the server attached to this Inventory Service object. 2. After changing the role, configure the Database Location policy for the server.
Intermediate Server with Database & Workstations	Perform the following task: 1. After changing the role, configure the Database Location policy for the server.
Leaf Server, Leaf Server with Database, Standalone Server, or Intermediate Server with Workstations	Workstation Inventory does not allow you to change the Intermediate Server to these servers because these changes affect the complete inventory system. If you want to assign these roles, you should reinstall and set up the Workstation Inventory component.

Change the Role of the Leaf Server

Follow the actions specified in the following table:

To Change the Role of the Leaf Server to ...	Tasks:
Root Server	Perform the following tasks: 1. Before changing to this role, remove the Roll-Up policy. 2. Remove the Workstation Inventory policy associated with the server. 3. After changing the role, configure the Database Location policy for the Root Server.
Root Server with Workstations	Perform the following tasks: 1. After changing the role, Configure the Database Location policy. 2. Remove the Roll-Up policy.
Intermediate Server	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy for those workstations associated with the server or reconfigure.
Intermediate Server with Database	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy for those workstations associated with the lower-level servers that roll up to this server or reconfigure the policy. 2. After changing the role, configure the Database Location policy for the server.

To Change the Role of the Leaf Server to ...	Tasks:
Intermediate Server with Database & Workstations	Perform the following task: 1. After changing the role, configure the Database Location policy for the server.
Intermediate Server with Workstations	This change of role does not require any specific policy modifications.
Leaf Server with Database	Perform the following task: 1. After changing the role, configure the Database Location policy for the server.
Standalone Server	Perform the following task: 1. Remove the Roll-up policy.

Changing the Role of the Leaf Server with Database

Follow the actions specified in the following table:

To Change the Role of the Leaf Server with Database to ...	Tasks:
Root Server	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy associated with the Leaf Server with Database. 2. Remove the Roll-up policy.
Root Server with Workstations	Perform the following task: 1. Remove the Roll-up policy.
Intermediate Server	Perform the following task: 1. Before changing to this role, remove the Workstation Inventory policy and the Database Location policy associated with the Leaf Server with Database.
Intermediate Server with Database	Perform the following task: 1. Before changing to this role, remove the Workstation Inventory policy associated with the Leaf Server with Database.
Intermediate Server with Database & Workstations	This change of role does not require any specific policy modifications.
Intermediate Server with Workstations	Perform the following task: 1. Before changing to this role, remove the Database Location policy associated with the Leaf Server with Database.
Leaf Server	Perform the following task: 1. Before changing to this role, remove the Database Location policy associated with the Leaf Server with Database.

To Change the Role of the Leaf Server with Database to ...	Tasks:
Standalone Server	Perform the following task: 1. Before changing to this role, remove the Roll-Up policy.

Changing the Role of the Standalone Server

Follow the actions specified in the following table:

To Change the Role of the Standalone Server to ...	Tasks:
Root Server	Perform the following task: 1. Before changing to this role, remove the Workstation Inventory policy associated with the Standalone Server.
Root Server with Workstations	This change of role does not require any specific policy modifications.
Intermediate Server	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy and the Database Location policy associated with the Standalone Server. 2. After changing the role, configure the Roll-Up policy.
Intermediate Server with Database	Perform the following tasks: 1. Before changing to this role, remove the Workstation Inventory policy associated with the Standalone Server. 2. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from the Intermediate Server with Database.
Intermediate Server with Database & Workstations	Perform the following tasks: 1. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from the Intermediate Server with Database & Workstations.
Intermediate Server with Workstations	Perform the following tasks: 1. Before changing to this role, remove the Database Location policy associated with the Standalone Server. 2. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from the Intermediate Server with Workstations.
Leaf Server	Perform the following tasks: 1. Before changing to this role, remove the Database Location policy associated with the Standalone Server. 2. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from the Leaf Server.

To Change the Role of the Standalone Server to ...	Tasks:
Leaf Server with Database	Perform the following task: 1. After changing the role, configure the Roll-Up policy to specify the next-destination server for roll-up of data from the Leaf Server with Database.

Assigning Trustees to the Database Object

You must have administrative privileges for any inventory operations from ConsoleOne. An administrator can assign the users as trustees of the database object.

To assign trustees to the database object:

1. Log in as an administrator to the tree and context where you have installed ZfD.
2. In ConsoleOne, right-click the existing database object > click Trustees of this object > click Add Trustee.
3. Browse to the user objects or container that contains the user objects > click the user objects that need to be the trustees or click the container > click OK.
4. Click All Attributes Rights > select Read rights > click OK twice.

Migrating ZENworks 2 Inventory Information

In ZfD 3.2, you can use the existing inventory information of ZENworks 2.

If you have configured ZENworks 2 for a large number of workstations, you need not disrupt the inventory process when upgrading to ZfD 3.2. You need to follow this procedure to continue using the inventory information:

1. Migrate the Inventory policies in ZfD 3.2.
2. Migrate the ZENworks 2 database

The following sections will help you migrate your ZENworks 2 inventory information to ZfD 3.2.

- “Using ZENworks 2 Inventory Policies” on page 391
- “Migrating the Inventory Information from the ZENworks 2 Database” on page 392
- “Scenarios: Migration of ZENworks 2 Inventory Information” on page 395

After successfully migrating the policies and the database, the inventory information of ZENworks 2 should exist in ZfD 3.2. Also, the inventory information in ZENworks 2 and ZfD 3.2 can coexist. The workstation inventory is stored in the ZENworks 2 database as specified in the ZENworks 2 Inventory policies. The inventory information is also stored in the ZfD 3.2 database. You can configure the Inventory policy settings to ensure a full scan of the workstations.

Using ZENworks 2 Inventory Policies

If you have a large number of workstations associated with Inventory policies in ZENworks 2, you can continue to use the same policies in ZfD 3.2. Migrating ZENworks 2 Inventory policies is an easy method of importing the same policy settings for the associated workstations to ZfD 3.2.

The Inventory policy migration tool associates the workstations that were associated with the Inventory policy in ZENworks 2. After you migrate, you may need to further configure the policy settings in ZfD 3.2.

The Inventory policy migration tool does not remove the Inventory policies in ZENworks 2.

To migrate ZENworks 2 Inventory policies:

1. Migrate the Workstation Inventory Package in ZfD 3.2. See Migrating Workstation Inventory from ZENworks 2 in Workstation Inventory in *Deployment*.
2. In ConsoleOne, click the Inventory Service object to which the workstations are attached.

   You must select an Inventory Service object that supports the role of an inventory server.
3. Click Tools > Inventory Policy Migration.
4. Specify the following options:

   Server Address IP/DNS: If your ZENworks 2 inventory server is a NetWare® 4.*x* server, specify the Server Address.

   NDS Search Context: Specify the context for searching the Workstation Inventory object. By default, this tool will search the Workstation object in the current root context.
5. Click Find.

   If any ZENworks 2 Inventory policies are found, these policies are listed in the Reports window.
6. Click Migrate.

   All the listed Inventory policies will be migrated. You can see the list of the Inventory policies that were migrated in the Report window.

   To ensure that the migration is successful, open the Inventory policy in ZfD.

   In ConsoleOne, double-click the Inventory Service object for which you have migrated the policies > click the Workstation Inventory policy tab. You will see the same inventory settings as specified in ZENworks 2.

Migrating the Inventory Information from the ZENworks 2 Database

The Database Migration tool migrates the existing inventory information from the ZENworks 2 database to the ZfD 3.2 database. The Migration tool provides an easy way to migrate a large amount of existing data into the ZfD 3.2 database. Once you migrate the database, you can choose when you want to rescan the workstations in the inventory policies.

The migration tool migrates the following list of inventory information:

- Mouse, BIOS, bus, user, inventory scanner, keyboard, unitary computer system, monitor, software, processor, CD ROM, operating system, parallel port, serial port, general information, hard disk, floppy disk, NIC information, IP address and subnet mask, IPX™ information, DNS information, modem information, and memory information.

NOTE: The migration tool does not migrate the DMI scan data.

When you install ZfD 3.2, the migration tool that uses the DBMIGRATE.NCF file is installed on NetWare servers. This file is in the SYS:\SYSTEM directory on a NetWare server and in the PUBLIC\ZENWORKS\WMINV\BIN on a Windows* NT/2000 server. On Windows NT/2000, the batch file, DBMIGRATE.BAT is installed.

The contents of DBMIGRATE.NCF file are as follows:

```
envset
JDBC_DRIVER=SYS:\PUBLIC\ZENWORKS\LIB\JDBCDRV.ZIP;SYS:\PUBLIC\ZENWORKS\LIB\C
LASSES111.ZIP

envset
WORKING_PATH=SYS:\PUBLIC\ZENWORKS\WMINV\LIB\STATUSLOG.JAR;SYS:\PUBLIC\ZENWO
RKS\WMINV\LIB\DESKTOPCOMMONUTILITY.JAR; SYS:\PUBLIC\ZENWORKS\MWUTILITY.JAR

envset CLASSPATH=.;$JDBC_DRIVER;$WORKING_PATH;$CLASSPATH

#

# Running the DBMigrate Utility

# *********

# To run the DBMIGRATE Utility, do the following:

#

#1. Check if the environment variable JDBC_DRIVER points to the path where
JDBCDRV.ZIP is present.

#2. Check if the environment variable WORKING_PATH points to the path where
ZENINVSERVER.JAR, STATUSLOG.JAR, and DESKTOPCOMMONUTILITY.JAR are present.

# 3. Enter the IP address ZENworks for Desktops 3 Inventory database server
after the switch -DBLOC. For example, $CLASSPTH -dbloc 164.99.156.184

# 4. Enter the IP address of ZENworks 2 Inventory database after the switch
-zen2dbloc. For example, $classpath -dbloc 164.99.156.134 -zen2dbloc
164.99.156.135

# **********

# If the ZENworks for Desktops 3 Inventory database is running on Oracle, then
uncomment the below the line and comment the Sybase line.

# java -ns com.novell.zenworks.desktop.inventory.migration.database.Loader -
classpath $classpath;$tmppath -nds -dbloc 164.99.135.198 -zen2dbloc
164.99.156.42 -oracle -sid abuorcl -Logfilename sys:\etc\dbmigrte.log

# If the ZENworks for Desktops 3 Inventory database is running on Sybase, then
uncomment the below line and comment the above Oracle line.

-classpath $classpath;$tmppath -nds -dbloc 164.99.156.42 -zen2dbloc
164.99.145.53 -Logfilename SYS:\ETC\DBMIGRATE.LOG
```

The contents of DBMIGRATE.BAT are as follows:

```
echo .

IF "%1"=="" goto no3

IF "%2"=="" goto no3

call InvEnv.bat

java -
Xbootclasspath:..\..\lib\vbjapp.jar;..\..\lib\vbjorb.jar;%java_dir%\lib\rt.
jar -mx128m -classpath %tmppath%;%classpath%
com.novell.zenworks.desktop.inventory.migration.database.Loader -nds -dbloc
%1 -zen2dbloc %2 -logfilename dbmigrate.log

goto end
```

```
:no3

echo Migration source and destination addresses not specified.

echo Incorrect parameters.

echo USAGE : DBMIGRATE "ZfD3 database IPAddress" "ZfD2 database IPAddress"

:end

echo .
```

You must modify the file to specify the location of the ZENworks 2 database server and the ZfD 3.2 database and the path settings.

To migrate a database from ZENworks 2:

1. Ensure that the Inventory database is installed when you install ZfD 3.2.
2. Stop the Inventory Gatherer in ZENworks 2.

   Also, ensure that all the .STR files are stored in the database. If the .STR file data is updated in the database, the directory containing the .STR files (ZENWORKS\STRDIR) will be empty. For more information about unloading the Inventory Gatherer, see the ZENworks 2 documentation Web site (http://www.novell.com/documentation).
3. In ZfD 3.2, stop the Service Manager.
4. Modify the settings on the server as follows:

   - If the database server is on a NetWare server, modify the settings in the DBMIGRATE.NCF file. At the database server console, enter **DBMIGRATE.NCF**. On a NetWare 4 server console, enter **DBMIGRAT.NCF**.
   - If the database server is on a Windows NT/2000 server, at the database server console, run the DBMIGRATE batch file for Sybase database:

     dbmigrate *ipaddress_of_zfd3.2_database server* *ipaddress_of_zenworks2_database_server*

     By default, the commands in the DBMIGRATE.BAT file apply to the Sybase* database on Windows NT/2000. If you have an Oracle* database you must modify the following entry in DBMIGRATE.BAT:

     ```
     java -Xbootclasspath:..\..\lib\vbjapp.jar;
     ..\..\lib\vbjorb.jar;%java_dir%\lib\rt.jar -mx128m -classpath
     %tmppath%;%classpath% com.novell.zenworks.
     desktop.inventory.migration.database.Loader -nds -dbloc %1 -zen2dbloc
     %2 -logfilename dbmigrate.log
     ```

     Between these two parameters, %2 and -logfilename, type **-oracle -sid *sid***.

     sid refers to the Oracle database ID. An example for sid is orcl.

     Save the file. On the database server console, run the DBMIGRATE batch file:

     dbmigrate *ipaddress_of_zfd3.2_database server* *ipaddress_of_zenworks2_database_server*

You will see a list of workstations that have been successfully migrated into the ZfD database.

On NetWare server, the database migration tool creates a log file (DBMIGRATE.LOG) in the SYS:\ETC directory. On Windows NT/2000, this log file is in the same directory where you run the DBMIGRATE.BAT file.

If you have installed more than one ZfD 3.2 database, you must migrate the ZENworks 2 database to each database, repeating the database migration procedure for each database.

The database information from the ZENworks 2 database will not be removed.

Deleting the Inventory Information from ZENworks 2 database

You can remove the inventory information from the ZENworks 2 Inventory database, ZENINV.DB, using the Delete tool.

Before you run this tool, ensure that the ZENworks 2 and ZfD 3.2 databases are not loaded. You can run this tool on any inventory server that has the ZENworks 2 and ZfD 3.2 databases connected to the server.

To run this tool:

1. Modify the MGMTDBS.NCF file.

   1a. Insert the -d parameter in the MGMTDBS.NCF after the dvsrv7 switch.

   The contents of this file should be as follows:

   ```
   dbsrv7 -d -gm 50
   ```

   1b. Save the changes.

2. Load the ZfD 3.2 database. At the server prompt, enter **mgmtdbs**.

   This will also load the ZENworks 2 database (ZENINV.DB).

3. Stop the Naming server.

   On NetWare servers, at the inventory server prompt, to view the ID of the Naming server, enter **JAVA -show**

   Enter **JAVA -KILL*id_of_the_naming_server***

4. At the server prompt, enter **zen2remove**.

   Displays the message that the inventory information is being deleted.

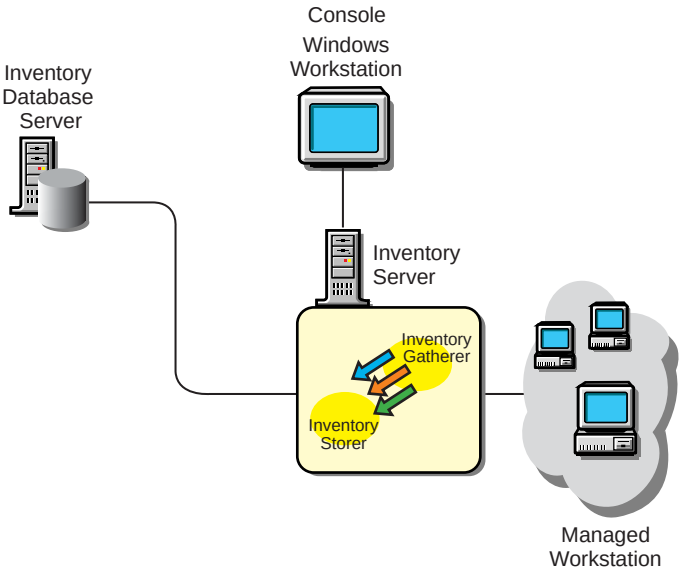
   On completing the removal of inventory information from the ZENINV.DB database, the status of the deletion is displayed. To view the log file for the Delete tool, open the file DROPZEN2.LOG file in the SYS:\ETC directory.

5. Remove the modifications in the MGMTDBS.NCF file.

   Delete the -d parameter in the MGMTDBS.NCF file and save the changes.

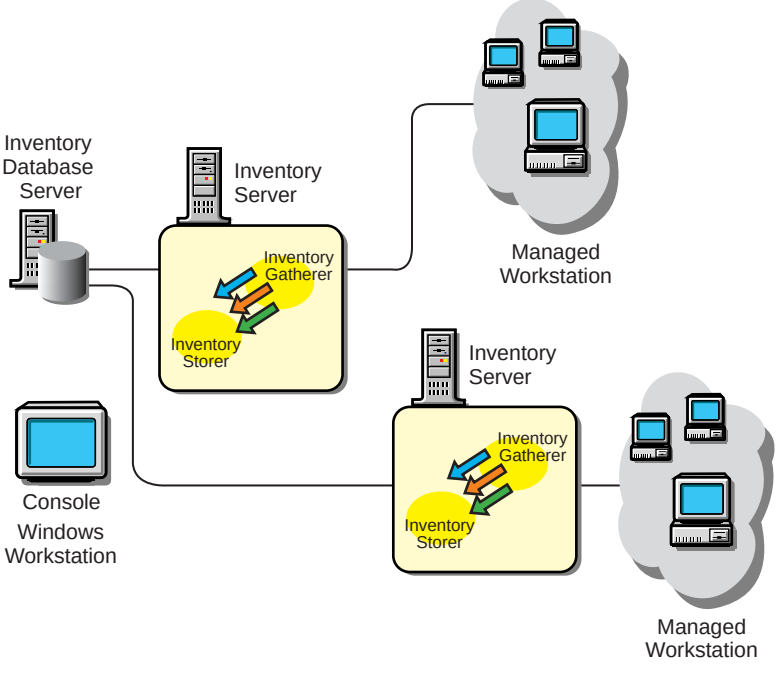
Scenarios: Migration of ZENworks 2 Inventory Information

In this type of inventory configuration in ZENworks 2, the inventory server components and the database are located on different servers. The scenario is illustrated in the following figure:



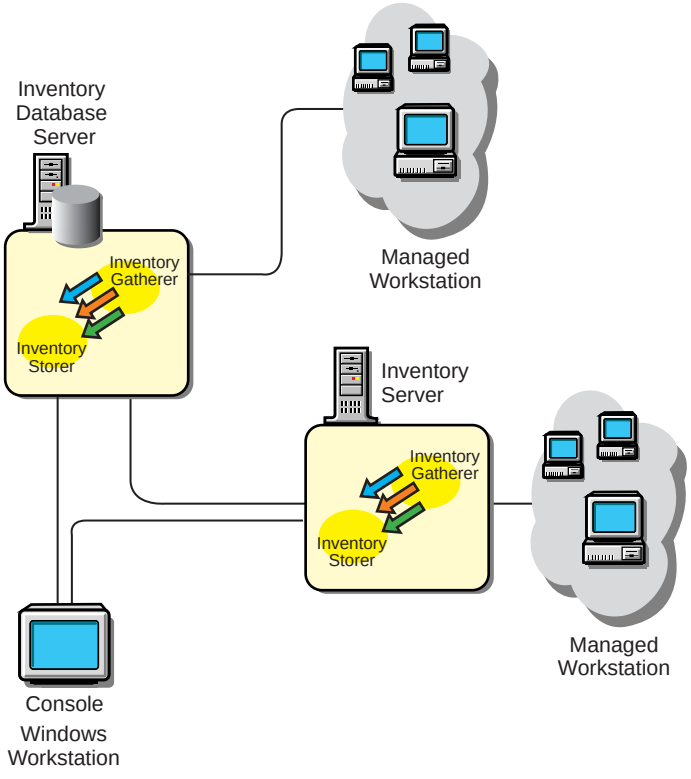
To migrate the inventory information, you need to migrate the Workstation Package and the Workstation Inventory policies associated with the inventory server. Later you migrate the Inventory database and configure the Database Location policy.

In another type of inventory configuration in ZENworks 2, there is more than one inventory server. These inventory servers are connected to one Inventory database server. The scenario is illustrated in the following figure:



To migrate the inventory information, you migrate the Workstation Package and the Workstation inventory policies associated with each inventory server. Later you migrate the Inventory database and configure the Database Location policy.

In the following inventory configuration in ZENworks 2, there is more than one inventory server. Also, an inventory server has an Inventory database; the other inventory servers connect to this inventory server with the database. The scenario is illustrated in the following figure:



To migrate the inventory information, you need to migrate the Workstation Package and the inventory policies associated with the inventory server with a database. Later, you migrate the other inventory servers. You must stop the Inventory components (Inventory Gather and Inventory Storer) on the server.

Setting up the Inventory Database

The following sections contain detailed information to help you set up your Inventory database:

- “Configuring the Sybase ODBC Driver for ZfD 3.2 Inventory Database” on page 409
- “Optimizing the Performance of the Oracle Database” on page 398
- “Organizing the Database Spaces for a Sybase Database on NetWare or Windows NT/2000 Servers (AlterDBSpace Tool)” on page 398
- “Using an Optimal Database Cache Size on the Inventory Database Server to Improve Performance” on page 400
- “Using the Inventory Database Service Configuration Tool for Windows NT/2000” on page 400
- “Deleting the Inventory Information from the Inventory Database” on page 401
- “Synchronizing the Inventory Database with eDirectory (NDS-DB Sync Tool)” on page 401
- “Backing Up the Inventory Database” on page 402

- "Using the ZfD 3.2 Inventory Database on Oracle 8i for Linux and Solaris" on page 405
- "Upgrading the ZfD 3.2 Inventory Database on Oracle 8.1.x" on page 408

Optimizing the Performance of the Oracle Database

If you have an Inventory database on Oracle, you can improve the performance of the database when you generate the inventory reports or query the database.

You use the database buffer cache to store the most recently used data blocks. The database cache is determined as DB_BLOCK_BUFFERS * DB_BLOCK_SIZE. These parameters are specified in the INIT.ORA file in the ZENWORKS\DATABASE directory on the database server.

DB_BLOCK_BUFFERS specifies the number of database buffers. DB_BLOCK_SIZE specifies the size of each database buffer in bytes.

The size of each buffer in the buffer cache is equal to the size of the data block.

Oracle recommends that the database buffer cache for any Online Transaction Processing Application (OLTP) should have a hit ratio of about 90%, which is optimal.

The ZfD Inventory database on Oracle has an approximate 88% hit ratio with a database cache size of 24 MB for 128 MB RAM, which is about 20% of total memory.

If there is additional memory, you configure the database cache size by increasing the DB_BLOCK_BUFFERS parameter in the INIT.ORA file.

Organizing the Database Spaces for a Sybase Database on NetWare or Windows NT/2000 Servers (AlterDBSpace Tool)

If there are more volumes on the multiple physical disks of the database server, placing the Sybase database space files on separate volumes improves the performance while accessing the database.

When you install the Sybase database component of ZfD 3.2, the System Database file and the Database Spaces are installed in the volume on the database server you specify. On loading the Inventory database server, the System Database file (MGMTDB.DB) is loaded. This MGMTDB.DB file references the inventory information in the Database Spaces files. The Database Spaces files (MGMTDB1.DB, MGMTDB2.DB, MGMTDB3.DB, MGMTDB4.DB, MGMTDB5.DB, MGMTDB6.DB, MGMTDB7.DB, MGMTDB8.DB and MGMTDB9.DB) contain the inventory information.

The ALTERDB.PROPS file is installed on the database server in the PUBLIC\ZENWORKS\WMINV\PROPERTIES. You modify the sections in the file to specify the location of the Database Spaces on the volumes.

The contents of the ALTERDB.PROPS file is as follows:

```
#Database Space Properties

count=9

mgmtdb1=volume_location_of_mgmtdb1

mgmtdb2=volume_location_of_mgmtdb2

mgmtdb3=volume_location_of_mgmtdb3

mgmtdb4=volume_location_of_mgmtdb4
```

mgmtdb5=*volume_location_of_mgmtdb5*

mgmtdb6=*volume_location_of_mgmtdb6*

mgmtdb7=*volume_location_of_mgmtdb7*

mgmtdb1=*volume_location_of_mgmtdb8*

mgmtdb1=*volume_location_of_mgmtdb9*

.....

To organize the database spaces:

1. Ensure that the database is not loaded.
2. Ensure that the Inventory Service Manager is not running on the server.
3. Manually move the Database Space files on the server volume.

   Move the Database Space files in the following way for better performance:

   - MGMTDB1 and MGMTDB2 on the same volume
   - MGMTDB3 and MGMTDB6 on the same volume
   - MGMTDB5 and MGMTDB7 on the same volume
   - MGMTDB8 and MGMTDB4 on the same volume
   - MGMTDB9 on a volume
4. Modify the location of the nine Database Space files in the ALTERDB.PROPS file.

   For example, enter **mgmtdb3=*SYS:**ZENWORKS**DATABASE***
5. Load the database. Enter **mgmtdbs** on NetWare servers. On Windows NT/2000 servers, run the database service.

   5a Stop the Naming server.

   On NetWare servers, at the inventory server prompt, to view the ID of the Naming server, enter **JAVA -show**.

   Enter **JAVA -KILL*id_of_the_naming_server***.

   On Windows NT/2000, close the Naming server window.

   Ignore the error messages displayed on the console. These messages are displayed because the database space files are not loaded.
6. Ensure that the Database Location policy has been configured.
7. On the server console, run the AlterDBSpace service. Enter **AlterDBSpace**.

   On the inventory server, the AlterDBSpace tool runs as a service.

   You will see a message that the database is adjusted.
8. Exit the database and then load the database.

   Ensure that while loading the database there are no errors. Errors indicate that the specified volume location of the database space files are incorrect or do not exist. Ensure that the path of the Database Spaces is correct in the ALTERDB.PROPS file and repeat the procedure to organize the Database Spaces.

   IMPORTANT: If you place the Database Spaces in different volumes, the log file should be placed in the same volume as the System database file (MGMTDB.DB).

Using an Optimal Database Cache Size on the Inventory Database Server to Improve Performance

Improving the database cache size improves database performance.

You can improve the performance of the Inventory database maintained in Sybase on NetWare or Windows NT/2000 servers. The default database cache size is 16 MB; however, this database cache size may not be adequate for large databases with more than 10,000 workstations.

You should change the database cache size to an optimum size. We recommend a database cache size that is one-fourth of the database size. You must also consider server memory size while assigning a cache size. For example, if you have 128 MB RAM, then a cache size of 32 MB is recommended.

To change the database cache size on a NetWare server:

1. Close all connections to the Inventory database.
2. Quit the Sybase server.
3. Open the MGMTDB.NCF file in the SYS:\SYSTEM directory.
4. Modify the -c parameter.

   For example, -c 64M sets the cache size to 64 MB.
5. Save the file.
6. On the server console, load the Inventory database. Enter **MGMTDBS.**

To change the database cache size on a Windows NT/2000 server:

1. Run the NTDBCONFIGURE.EXE file from PUBLIC\ZENWORKS.
2. Modify the -c parameter.
3. Save the file.
4. Restart the server so that the Inventory database service (Adaptive Service Anywhere - ZENworks for Desktops 3) starts up.

Using the Inventory Database Service Configuration Tool for Windows NT/2000

The Inventory Database service configuration tool lets you modify the startup parameters to optimize the Sybase database on Windows NT/2000 servers.

To run this tool:

1. Run NTDBCONFIG.EXE located in the ZENWORKS directory on the database server.
2. Modify the parameters as per the Sybase specification.

   Ensure that you specify valid values for the parameters.
3. Click OK.
4. Restart the database service (ASA Adaptive Anywhere).

Sybase Database Startup Parameters

The parameters are as follows:

- **-c:** Sets the initial memory reserves for caching database pages and other server information. For example, -c 32M reserves 32 MB cache size.
- **-gc:** Sets the maximum length of time in minutes that the database server runs without doing a checkpoint on each database. The default value is 60 minutes. For example, -gc sets the checkpoint time as 120 minutes.
- **-m:** Deletes the transaction log when a checkpoint is done, either at shutdown or as a result of a checkpoint scheduled by the server.
- **-n:** Specifies the name of the database server. For example, -n WARTHOG names the server WARTHOG.
- **-ti:** Disconnects the connections that have not submitted a request for a certain number of minutes. The default is 240 (4 hours). A client machine in the middle of the database transaction locks until the transaction ends or the connection terminates. The -ti option is provided to disconnect inactive connections and to free their locks. For example, specify -ti 400.
- **-x:** Specifies a communication link. For example, -x tcpip indicates a TCP/IP link.

Deleting the Inventory Information from the Inventory Database

If you delete the Workstation object in ConsoleOne, the inventory information for that Workstation object is deleted from the Inventory database server it is attached to. Also, the inventory information is deleted from all the next-level servers for that particular Inventory database server.

Synchronizing the Inventory Database with eDirectory (NDS-DB Sync Tool)

ZfD provides a database sync tool to synchronize the Workstation objects stored in the Inventory database with the Workstation objects in eDirectory. This tool removes the workstations that do not exist in eDirectory from the Inventory database. The excess workstations in the Inventory database exist because these workstations may have been deleted from eDirectory; however, the corresponding workstations were not removed from the database.

Use this tool regularly to maintain the database in a consistent state with eDirectory. You must run this tool for each Inventory database.

HINT: You must ensure that the Service Manager is loaded when you run the Inventory database sync tool.

To run this tool:

1. Generate a lookup file in the NDS Lookup Phase.

   ZfD compares the list of workstations in the database with those in eDirectory and generates a lookup file. This file contains the list of workstations to remove from the database.

   The server property file contains the [NDSLookupForDB Service] section with the lookup filename in the ARGUMENTS parameter. The default lookup filename (WSDELETE.LOK) file is located in the PUBLIC\ZENWORKS\WMINV\LOG directory.

   The lookup filename in this section and the [DBDelete Service] section of the server property file should be the same.

   1a. At the inventory server console prompt, enter:

```
StartSer NDSLookupForDB
```

2 Delete workstations in the lookup file from the Inventory database in the Database Delete Phase.

2a In the [DBDelete Service] section of the properties file, specify the lookup filename.

2b At the inventory server console, enter:

```
StartSer DBDelete
```

The WSDELETE.LOG log file located in the \PUBLIC\ZENWORKS\WMINV\LOGS directory contains the status of deletion. This file contains information as to whether the database was synchronized successfully with eDirectory.

Backing Up the Inventory Database

ZfD provides an option to back up the Inventory database from the server. We recommend that you back up the database on a weekly basis. However, if you are tracking the inventory of workstations frequently, increase the frequency of backup.

The following sections contain additional information to help you back up the Inventory database.

- "Backing Up the Inventory Database (Sybase)" on page 402
- "Backing Up the Inventory Database (Oracle)" on page 403

Backing Up the Inventory Database (Sybase)

You can back up the database files and the transaction log to the location relative to the SCANDIR path.

To use this tool:

- Run the backup tool on the inventory server to which you have associated a database server. If you deployed more than one database server, you must run the backup tool for each database server.
- The database that you back up should be configured in the Database Location policy.
- In the [DBBackup Service] section of the server property file, you modify the location of the backup destination in the ARGUMENTS parameter. The backup files are relative to the SCANDIR path. For example, if the SCANDIR path is SYS:\ZENWORKS\SCANDIR, the database is backed up in SYS:\ZENWORKS\DATABASE*directory_you_specify*. You must the modify the server property file located on the server on which you are running the backup tool. Modify the server property file corresponding to the role of the server. For example, if you are running the backup tool on the Leaf Server with Database, modify the server property file, LEAF_DB_WKS.PROPERTIES.
- Ensure that the Service Manager is loaded when you run the backup tool.

To run the backup tool on NetWare or Windows NT/2000 servers,

1 At the inventory server console, enter **`StartSer DBBACKUP`**.

View the status of the backup in the backup log file.

The database will be copied to SYS:\ZENWORKS\DATABASE*directory_you_specify*.

To restore the database:

1. If the Inventory database server is up, stop the Storer service. At the database server console, enter **StopSer Storer**.
2. Exit the Sybase database.

   On NetWare servers: At the database server prompt, enter **q** to stop the Sybase database.

   On Windows NT/2000: Stop the Sybase service (Adaptive Service Anywhere - ZENworks for Desktops 3).
3. Copy the backup files, overwriting the working database files.
4. Restart the database server.

The backup tool creates a log file, BACSTATUS.TXT, located in the ZENWORKS\DATABASE directory on NetWare and Windows NT/2000 servers. The log records the status of the backup operation. Open this text file to view the status of the backup. This file increases in size for every backup operation. Remove the existing contents of the file if you do not require the details.

Backing Up the Inventory Database (Oracle)

ZfD provides an option to back up the Inventory database from the server. However, if you have a database backup and restore method such as Recovery Manager, we recommend that you continue to use your existing backup method.

To back up the database:

1. If the Inventory database server is up, stop the Storer service. At the database server console, enter **StopSer Storer**.
2. Load the Oracle Server Manager.

   On NetWare server with Oracle 8i, enter **svrmgr31**.

   On NetWare server with Oracle 8.0.4, enter **svrmgr30**.

   On Windows NT/2000 server with Oracle 8i Enterprise Edition, from the taskbar, click Start > Run > enter **svrmgrl**.
3. Enter the following commands:

   set instance *databasevername-databaseinstance-IPC*, where *databaseinstance* refers to the database instance that you have set up earlier. See Loading the Inventory Database as a Separate Oracle Instance in Workstation Inventory in *Deployment*.

   For example, **set instance *austr-zfd3-ipc***.
4. Connect as an administrator. For example, if the administrator's internal name is *internal*, at the Server Manager prompt, enter **connect internal/*password***.

   where *password* is the password created earlier. See Loading the Inventory Database as a Separate Oracle Instance in Workstation Inventory in *Deployment*.

   4a At the Server Manager prompt, enter **select name from v$datafile;**

   This displays the list of the datafiles that Workstation Inventory uses.
5. Ensure that no other databases are mounted. At the prompt, enter **shutdown normal**.
6. Disconnect and exit from the Server Manager. At the Server Manager prompt, enter **disconnect;**

   Enter **exit;**
7. Copy the complete ZFD3\ORACLE directory to a backup volume or disk.

After the backup is done, ensure that the backup copy of the database matches the original copy. Perform database verification to verify the integrity of the backup.

To verify the database integrity on a NetWare server with Oracle 8i, enter **load DBV81.NLM FILE=***path_to_the_database_file* **BLOCKSIZE=*4096***

To verify the database integrity on a NetWare server with Oracle 8.0.4, enter **load DBV80.NLM FILE=*path_to_the_database_file* BLOCKSIZE=*4096***.

To verify the database integrity on a Windows NT/2000 server with Oracle 8i, enter **DBV.EXE FILE=*path_to_the_database_file* BLOCKSIZE=*4096***

Example: enter **DBV.EXE FILE=*d:\zfd3\oracle\database\cim1.ora* BLOCKSIZE=*4096***

Also, run this command for the following files: CIM1.ORA, CIM2.ORA, CIM3.ORA, CIM4.ORA, CIM5.ORA, CIM6.ORA, CIM7.ORA, CIM8.ORA, CIM9.ORA, SYS1.ORA, and CTL1.ORA.

If the database backup is successful, ensure that there are no error messages on the verified pages. Ensure that the following displayed parameters display a zero value: TOTAL PAGES FAILING (DATA)=*0*, TOTAL PAGES FAILING (INDEX)=0, and TOTAL PAGES MARKED CORRUPT=0.

To restore the database:

1. If the Inventory database server is up, stop the Storer service. At the database server console, enter **StopSer Storer**.
2. Load the Oracle Server Manager.

   On a NetWare server with Oracle 8i, enter **svrmgr31**.

   On a NetWare server with Oracle 8.0.4, enter **svrmgr30**.

   On a Windows NT/2000 server with Oracle 8i Enterprise Edition, from the taskbar, click Start > Run > enter **svrmgrl**.
3. Connect as an administrator. For example, if the administrator's internal name is *internal*, at the Server Manager prompt, enter **connect internal/*password_for_administrator***.
4. Ensure that no other databases are mounted. Enter **shutdown normal**.
5. Disconnect and exit from the Server Manager. At the Server Manager prompt, enter **disconnect;**

   Enter **exit;**
6. Copy the database from the backup location.

   If you copy the database to a different location than the earlier location, modify the location in the following files to specify the new path:

   - Edit the INIT.ORA file located in \ZFD3\ORACLE\DATABASE to specify the new path for the following parameters:

     `control_files=`*`location_of_CTLl.ORA\CTL1.ORA`*

     `background_dump_dest=`*`location_of_TRACE_dir\TRACE`*

     `user_dump_dest=`*`location_of_TRACE_dir\TRACE`*

- Edit the _START.SQL file in the SYS:\SYSTEM to specify the location of INIT.ORA file in the following parameter:

  ```
  startup pfile=location_of_the_INIT.ORA\INIT.ORA
  ```

- Modify the location in the \ZFD3\ORACLE\ALTERCTRL.SQL to specify new path.

  For example, modify the existing DATA:\ZFD3\ORACLE\DATABASE path to ORACLE:\ZFD3\ORACLE\DATABASE in ALTERCTRL.SQL.

  In this .SQL file, modify the path for the following parameters, if required.

  ```
  startup nomount pfile=oracle:\zfd3\oracle\database\INIT.ORA
  logfile group 1 'oracle:\zfd3\oracle\database\log1.ora' size 256K,
  logfile group 2 'oracle:\zfd3\oracle\database\log2.ora' size 256K
  datafile 'oracle:\zfd3\oracle\database\sys1.ora',
  'oracle:\zfd3\oracle\database\rbs1.ora',
  'oracle:\zfd3\oracle\database\cim1.ora',
  'oracle:\zfd3\oracle\database\cim2.ora',
  'oracle:\zfd3\oracle\database\cim3.ora',
  'oracle:\zfd3\oracle\database\cim4.ora',
  'oracle:\zfd3\oracle\database\cim5.ora',
  'oracle:\zfd3\oracle\database\cim6.ora',
  'oracle:\zfd3\oracle\database\cim7.ora',
  'oracle:\zfd3\oracle\database\cim8.ora',
  'oracle:\zfd3\oracle\database\cim9.ora',
  'oracle:\zfd3\oracle\database\tmp1.ora'
  ```

  Save the changes.

7 Load the restored database.

Using the ZfD 3.2 Inventory Database on Oracle 8i for Linux and Solaris

Ensure that the following requirements are met:

- Oracle version

  On Linux* 6.0 or above: Oracle 8i (8.1.5 or above) Enterprise Edition

  On Solaris* 6.2 or above on Sparc*/Intel*: Oracle 8i (8.1.5 or above) Enterprise Edition

- System requirements

  Hard disk free space: 500 MB or above

  Primary memory: 256 MB or above

Follow the instructions in these sections:

- "Starting the Inventory Database" on page 406
- "Initializing the Inventory Database" on page 407

- “Configuring the Inventory Database” on page 407

Starting the Inventory Database

Follow these steps:

1. Log in to the Linux box as Oracle DBA user.
2. Create a ZfD3 directory. Change to this directory.
3. Extract the file from the \ZENWORKS\PRODUCTS\DATABASE \ORACLE directory into ZfD3 directory.

   On a Linux / Solaris(Intel) server, extract INVORACLE8IUNIXINTEL.TAR.GZ file.

   On a Sparc Solaris server, extract INVORACLE8ISPARCSOL.TAR.GZ file.
4. Enter the following commands:

   On a Linux/Solaris(Intel) server, enter **`$ gunzip InvOracle8iUNIXintel.tar.gz`**

   Enter **`$ tar -xvf InvOracle8iUNIXintel.tar`**

   On a Sparc Solaris server server, enter **`$ gunzip InvOracle8iSparcSol.tar.gz`**

   Enter **`$ tar -xvf InvOracle8iSparcSol.tar`**

   This extracts the Inventory database in the *home*/ZfD3/zenworks directory, where *home* is the home directory of the Oracle user you logged in as.
5. Edit the _START.SQL file in ZfD3/ZENWORKS directory. This file contains commands to start the Inventory database.

   If required, edit the file based on your Oracle settings. For example, if you are starting the Inventory database along with other Oracle databases, create a Oracle database instance for the Inventory database. Set the Oracle instance name in _START.SQL. Otherwise, shut down any existing databases.
6. Ensure that Oracle is up and running.

   To run the Oracle Server Manager, enter **`$ svrmgr1`**

   This command loads the Oracle Server Manager.
7. From the Server Manager, start the Inventory database.

   At the Server Manager prompt, enter the following commands:

   Type **`@$HOME/ZfD3/zenworks/_start`**

   This command starts the Oracle instance, mounts the Inventory database, and displays the following output information.

   ```
   ORACLE instance started.Total System Global Area ... Fixed Size
   ... Variable Size... Database Buffers... Redo Buffers... Database
   mounted. Database opened.
   ```

   While mounting the database, you may see the following error: `End-of-file on communication channel`. Resolve this error by creating a new control file and using it to open the Inventory database.

   To create a new control file:

   7a Open the ALTERCTRL.SQL file in the ZENWORKS directory.

   7b Ensure that the specified path settings in the file are correct.

7c Run the Oracle Server Manager and connect as an Internal user.

7d At the Server Manager prompt, run ALTERCTRLSQL.

Type **`@$HOME/ZfD3/zenworks/alterctrl`**

7e Start the Inventory database.

Initializing the Inventory Database

Before using the Inventory database, initialize the database. Initializing the Inventory database assigns a unique site ID and site name to the database. Using these details, the Inventory database can be identified at the enterprise level.

Follow these steps:

1. Ensure that the Inventory database is mounted.
2. Specify a site ID and site name that uniquely identify your Inventory database in the ZENworks tree.

   Open the _DBINIT.SQL file in the ZFD3/ZENWORKS directory. This file contains a dummy site ID and site name as:

   ```
   siteid:=255;
   siteName:='example-site';
   ```

   Change the site ID and site name variables with your site ID and site name and save the file.

   IMPORTANT: Do not use an already existing site ID and site name.
3. Run the Oracle Server Manager. At the Server Manager prompt, enter the following commands:

   3a Enter **`connect mw_dba/novell`**

   3b Enter **`@$HOME/ZfD3/zenworks/_dbinit`**

   This command initializes the database with the provided site ID and site name. To verify this, at the Server Manager prompt, enter **`select * from zenworks.site;`**

   While initializing the database, you may see the following error: `Declare * ORA-06553: PlS-908: The stored format of SYS.STANDARD is not supported by this release.`

   This error indicates that the Oracle version that is in use is later than 8.1.5.

   To correct this problem, upgrade the Inventory database to initialize the Inventory database.

   Follow the steps in "Upgrading the ZfD 3.2 Inventory Database on Oracle 8.1.x" on page 408.

Configuring the Inventory Database

Create an identity for the Oracle Inventory database server in the ZENWORKS tree. This makes the database available for access by the inventory components.

1. Create a ZENworks Inventory Database object and a Database Location policy. In the policy, indicate the Oracle Inventory database server as the designated server for hosting Inventory database. See Configure the Policies for the Database in Workstation Inventory in *Deployment*. Ensure that you specify the IP address of the Oracle Inventory database server in the Database policy.

Upgrading the ZfD 3.2 Inventory Database on Oracle 8.1.*x*

When you are mounting ZfD 3.2 Inventory database on a server with Oracle 8.1.*x*, initializing the database using _dbinit.sql may be unsuccessful and you may see the following error message:

```
DECLARE * ORA-06553: PLS-908: The stored format of SYS.STANDARD is not
supported by this release.
```

In this scenario, it is not possible to use the Inventory database. To resolve this problem, upgrade the Inventory database to the existing Oracle version.

1. Configure and mount the Inventory database.

   On NetWare and Windows NT/2000 servers, follow the instructions in Configuring the Inventory Database for Oracle in Workstation Inventory in *Deployment*. Do not follow the last step in the procedure, which instructs you initialize the database on the server.

   On UNIX* servers, see "Using the ZfD 3.2 Inventory Database on Oracle 8i for Linux and Solaris" on page 405.

2. Run the Oracle Server Manager.

   On a NetWare server: From the server prompt, enter **`load svrmgr31.nlm`**.

   On a Windows NT/2000 server: From the taskbar, click Start > Run. Enter **`svrmgrl.exe`**.

   On a UNIX server: Log in as an Oracle administrator. At the login prompt, run **`svrmgrl`**.

3. At the Oracle Server Manager prompt:

   Enter **`connect internal`**/*password* where *password* is the Oracle internal user password. On NetWare or Windows NT/2000 servers, enter **`spool`** ***`path`*****`\upgrade81X.log`**

   `@%`*`oracle_home`*`%\rdbms\admin\u801050.sql`

   On UNIX-based servers, enter the following commands: **`spool $HOME/upgrade81X.log`**
   `@%`*`oracle_home`*`%\rdbms\admin\u801050.sql`

   The upgrade tool starts upgrading the Inventory database. Wait until the upgrade tool completes the upgrade. The upgrade tool may take some time to complete.

4. At the Oracle Server Manager prompt,

   4a Enter **`spool off`**

   4b Enter **`disconnect`**

   4c Enter **`exit`**

   The Inventory database will be upgraded to Oracle 8.1.*x*. The status of update is logged in the UPGRADE81X.LOGfile.

5. Initialize the Inventory database.

6. Update with the Oracle JDBC driver.

   The Oracle JDBC driver that is shipped as part of ZfD 3.2 is for Oracle 8i (8.1.5). If you are using a later version of Oracle, we recommend that you use the JDBC driver for the same version. Oracle JDBC driver is located on the server in the *oracle_home*/JDBC/LIB directory, where *oracle_home* is the directory where Oracle is installed. The name of the driver file is CLASSES111.ZIP. Alternatively, you can download the file from Oracle Web site. After you get the correct JDBC driver, update the file on ZfD 3.2 inventory servers and consoles.

Follow these steps:

1. To update all ZfD 3.2 consoles, copy CLASSES111.ZIP to the \CONSOLEONE\1.2\CONSOLEONEEXT and CONSOLEONE\1.2\LIB\ZEN directories
2. To update all inventory servers, copy CLASSES111.ZIP to the ZENWORKS\LIB directory.

Configuring the Sybase ODBC Driver for ZfD 3.2 Inventory Database

This section describes how to install and configure the Sybase ODBC driver in order to access the ZfD 3.2 Inventory database.

Sybase ODBC driver version 7.0.0.313 is available on the ZfD 3.2 *Companion* CD shipped with ZfD 3.2.

To configure Sybase ODBC driver for the ZfD 3.2 Inventory database:

1. Ensure the following prerequisites are met:
   - Windows 95/98/NT/2000 with minimum 64MB RAM.
   - 32-bit ODBC drivers version 3.5 or above.
2. Install the Sybase ODBC Driver.
   - **2a** Extract the files from \ODBC\SybaseODBC.zip from the ZfD 3.2 *Companion* CD to a drive.
   - **2b** Copy the files from the directory where you have extracted the files to \PROGRAMFILES\SYBASE directory.

     \PROGRAM FILES\SYBASE\ADAPTIVE SERVER ANYWHERE 7.0\WIN32\DBCON7.DLL

     \PROGRAM FILES\SYBASE\ADAPTIVE SERVER ANYWHERE 7.0\WIN32\DBLGEN7.DLL

     \PROGRAM FILES\SYBASE\ADAPTIVE SERVER ANYWHERE 7.0\WIN32\DBODBC7.DLL

     \PROGRAM FILES\SYBASE\ADAPTIVE SERVER ANYWHERE 7.0\WIN32\DBODTR7.DLL

     \PROGRAM FILES\SYBASE\ADAPTIVE SERVER ANYWHERE 7.0\WIN32\DBPORT6.DLL
   - **2c** Double-click the SYBASEODBC.REG file. The following message *Information in SybaseODBC.reg has been successfully entered into the registry* should be displayed.

     SYBASEODBC.REG contains the required registry settings for Sybase ODBC driver. Modifying this file may corrupt system registry settings, thus making your server unusable.
3. Configure the Sybase ODBC driver
   - **3a** From the ODBC Data Source Administrator, click Start > Settings > Control Panel > ODBC Data Sources.
   - **3b** From the ODBC data Source Administrator, select User Data Sources > Sybase ODBC > click Configure.

     This will display the ODBC Configuration for Adaptive Server Anywhere dialog.
   - **3c** Click the Login tab.

     Ensure that you have entered a user id and password as follows:

     User ID: mw_dba

Password: novell

3d Click the Database tab.

Enter the following details.

Server Name: IP address of the server on which Sybase is running.

Database Name: Database Name: mgmtdb

3e Click the Network tab > check the TCP/IP option.

3f Specify the host name or IP Address of the server.

The format should be host=*IP_address* where *IP_address* is the IP address or host name of the server on which Sybase is running.

3g Click ODBC tab > Test Connection.

The message *Connection Successful* should be displayed. This message indicates that the Sybase ODBC driver has been configured correctly. If there is an error message, repeat Step 3.

Removing the ZENworks 1.*x* Inventory Attributes from Workstations

If you are upgrading from ZENworks 1.*x* to ZfD 3.2, the 1.*x* inventory attributes are replaced in the Directory Services schema by ZfD attributes during the installation. However, the 1.*x* attributes are not removed from Directory Services. You can use the Remove ZENworks 1.*x* Inventory Utility to remove these attributes from Directory Services. Though removal of the 1.*x* inventory attributes is not necessary to run inventory in ZfD, removing the attributes will free up space for other attributes and applications in Directory Services.

To remove the ZENworks 1.x attributes:

1. Run REMINV1X.EXE.

   The REMINV1X.EXE file is found on the ZfD 3.2 *Program* CD in the \PRODUCTS\ZENWORKS\CORE\CONSOLEONE\BIN directory.

2. Type the context for the workstations for which you want to purge the 1.*x* attributes.
3. Check the Include Subcontainers check box to include workstations located in the subcontainers of the selected context.
4. Click OK to run the utility.

   A message box displays indicating that the attributes have been removed.

5. Click OK.

26 Using Workstation Inventory

This section contains the following information:

Viewing the Servers Deployed for Inventory

Using ConsoleOne®, you can view the servers and databases that you configured for collecting inventory.

To view the servers deployed for inventory:

1. In ConsoleOne, click a container > View > Complete Tree View.

   A Complete Tree View displays all the servers within the container.

2. In ConsoleOne, right-click an Inventory Service object > click View > click Up Tree View.

   An Up Tree View displays all the servers from the selected server up to the highest level (Root Server), including the database servers.

Displaying Inventory Information

The following sections will help you configure the Inventory database to display inventory information and explain the various types of information you can view:

- You can list hardware and software components found on the managed workstation and any custom information you have specified for the workstation.

  The Workstation Inventory window displays the inventory items for a managed workstation. This window displays the data from the last inventory scan for the managed workstation.

  For more information about viewing the inventory information of a managed workstation, see "Viewing the Workstation Inventory Summary of a Managed Workstation" on page 412.

- You can list managed workstations with the inventory information from the Inventory database satisfying the criteria you specify in the Inventory Query window. You form a query by specifying the component and its attribute for workstations within the selected database sites.

  For more information about querying the Inventory database, see "Viewing Inventory Information of Managed Workstations by Querying the Database" on page 419.

- You can list minimal information stored in the eDirectory Workstation object is available.

For more information, see "Viewing the Minimal Inventory Information from an NDS Object" on page 421.

- You can use a list of reports that generate the inventory information from the Inventory database specific to your needs.

  For more information about the types of reports, see Inventory Reports.

Configuring the Inventory Database

If you want to view the inventory information of the database from ConsoleOne, you must configure the database. The inventory information from the Inventory database that you configure will be used for generating inventory reports, viewing inventory information, and for querying the inventory information from the database.

To configure the Inventory database:

1. In ConsoleOne, click a container.
2. Click Tools > Configure DB.
3. Select an existing ZENworks Database object from the list of Database objects.

   This Database object contains the database settings such as the protocol, port in use by the database, and others.
4. Click OK.

The database you configured is used for data retrieval unless you change it again using this same procedure.

Viewing the Workstation Inventory Summary of a Managed Workstation

ZfD provides the following inventory information collected from the managed workstations:

Scan Data Group	Scan Data Item	Description
HardwareSoftware Inventory > General	Asset Tag	Asset tag number that the ROM-based setup program creates
	Computer Model	Identifying information of the computer; for example, Compaq*, Dell*, and others.
	Computer Type	Type of computer, such as IBM* PC, and others
	Machine Name	DNS name of the workstation
	ModelNumber	Serial number value for the computer, assigned during manufacture
	Primary Owner Contact	The phone number of the primary user of this system
	Primary Owner Name	The name of the primary user or owner of this system
HardwareSoftware Inventory > General > Login Details	Current login user	User logged in to the Primary Novell® eDirectory™ tree when the workstation was scanned
	Last login user	User logged in last to the Primary eDirectory tree when the workstation was scanned

Scan Data Group	Scan Data Item	Description
Software > Software Vendors	Software Vendor Name	Name of the software manufacturer
	Name	Name of the software application
	Version	Version of the software
Software > Operating System	Code Page	Language Code Page of the operating system
	Description	Operating system description
	Install Date	Install date of the operating system
	Name	Operating system name. For example, Windows* 95/ Windows 2000
	Size Stored in Paging Files	Page file size
	Version	Version of the operating system
Software > Inventory Scan Information	Inventory Server	Name of the inventory server to which the scans are sent
	Version	Version of the Scanner
Hardware > Mouse Driver	Name	Name of the mouse driver
	Version	Version number of the mouse driver
Hardware > Modem	Caption	Modem label
	Description	Additional information about the modem
	Name	Identifying information of the modem
Hardware > Processor	Device ID	Special hexadecimal string identifying the processor type
	Current Clock Speed (in MHz)	Current clock speed of the processor
	Maximum Clock Speed (in MHz)	Maximum clock speed of the processor
	Other Family Description	Additional description about the Processor Family, such as Pentium* Processor with MMX technology
	Processor Family	Identification of the processor family such as Pentium II, Pentium III, and others
	Processor Stepping	Single-byte code characteristic provided by microprocessor vendors to identify the processor model
	Role	Type of processor such as central processor, math coprocessor, and others
	Upgrade Method	The method by which this processor can be upgraded, if upgrades are supported
Hardware > BIOS	BIOS Identification Bytes	Byte in the BIOS that indicates the computer model

Scan Data Group	Scan Data Item	Description
	Install Date	The manufacturing date of the BIOS
	Manufacturer	BIOS vendor name
	Name	BIOS label
	Primary BIOS	True state indicates Primary BIOS
	Serial Number	Serial number of the computer, assigned during manufacture
	Size	Size of the BIOS
	Version	Version or revision level of the BIOS
Hardware > Bus	Protocol Supported	Bus protocol indicates PCI, ISA, and others
	Version	Version of the bus supported by the motherboard
Hardware > Keyboard	Delay	Delay before the repeat of a key
	Description	Description of the keyboard, such as IBM Enhanced 101 or 102 keys
	Layout	Layout of the keyboard
	Number of Function Keys	Total number of function keys
	Subtype	Type of the keyboard
	Typematic Rate	Rate of processing the keys
Hardware > Display	Current Bits Per Pixel	Number of adjacent color bits for each pixel
	Current Horizontal Resolution	Number of horizontal pixels shown by the display
	Current Vertical Resolution	Number of vertical pixels shown by the display
	Description	Description of the monitor
	Max Memory Supported	Maximum memory that the display adapter supports for VIDEO RAM
	Max. Refresh Rate	Maximum refresh rate of the monitor for redrawing the display, measured in Hertz
	Min. Refresh Rate	Minimum refresh rate of the monitor for redrawing the display, measured in Hertz
	Number of Color Planes	Number of color planes supported by the video system
	Video Architecture	The architecture of the video subsystem in this system, for example, CGA/VGA/SVGA/8514A
	Video Memory Type	The type of video memory for this adapter, for example, VRAM/SRAM/DRAM/EDO RAM
Hardware > Adapter	Description	Adapter description

Scan Data Group	Scan Data Item	Description
Hardware > Display > Video Driver	Install Date	The Video BIOS release date
	Is Shadowed (True or False)	If True, the Video BIOS is currently being shadowed
	Manufacturer	Vendor name
	Version	The version number or version string of the Video BIOS
Hardware > Ports > Parallel Ports	Parallel Port Name	The logical name of the input-output device on this parallel port, under this operating environment
	DMA Support (True or False)	If True, DMA is supported
	Address	Base I/O address for this parallel port
	IRQ	IRQ number of the parallel port
Hardware > Ports > Serial Ports	Address	Base input-output address for this serial port
	IRQ Number	IRQ number of the serial port
	Name	The logical name of the I/O device on this serial port, under this operating environment
Hardware > Disk > Floppy > Floppy Drive	Drive Letter	Mapped drive name of the floppy drive
Hardware > Disk > Floppy > Floppy Disk	Capacity	Floppy drive capacity
	Description	Floppy drive description
	Manufacturer	Vendor name
	Physical Cylinders	Floppy drive cylinders
	Physical Heads	Floppy drive R/W heads
	Sectors/Track	Floppy drive sectors per track
Hardware > Hard Disk	Capacity	Hard disk capacity
	Description	Description
	Manufacturer	Vendor name
	Physical Cylinders	Cylinders
	Physical Heads	Heads
	Sectors/Track	Hard disk drive sectors per track
Hardware > Hard Disk Logical Drive	Caption	Hard disk volume label
	Drive Letter	Letter name of the drive
	Size	Drive's actual size in MB

Scan Data Group	Scan Data Item	Description
	Free Disk Space	Drive's available space in MB
	Volume Serial Number	Hard disk volume serial number
Hardware > Battery	Chemistry	The battery chemistry, for example, lithium-ion or nickel metal hydride
	Design Capacity	The design capacity of the battery in mWatt-hours
	Design Voltage	The design voltage of the battery in mVolts
	Install Date	The battery manufacture date
	Manufacturer	The name of the company that manufactured the battery
	Name	Device name for this battery, for example, Duracell* DR-36
	Serial Number	The serial number for this battery
	Smart Battery Version	The Smart Battery Data Specification version number supported by this battery
Hardware > Memory	Total Virtual Memory Size	Indicates the total number of bytes in the virtual address space of the calling process
	Physical Memory Size	Total physical memory of the workstation
Hardware > Sound Card > Sound Adapter	Description	Description of the multimedia component for the workstation
	Manufacturer	Vendor name
Hardware > Multimedia Card	Description	Description of the multimedia component for the workstation
	Manufacturer	Vendor name
	Name	Label of Multimedia card
Hardware > Backup Disk	Description	Description of the backup device for the workstation
	Name	Name of the backup device vendor
Hardware > Backup Disk > Logical	Drive Letter	Name of the mapped drive to the backup device
Hardware > Inventory	Physical Memory (size in KB)	Total physical memory of the workstation
Hardware Software Inventory	Primary Owner Contact	Phone number of the primary user of this system
	Primary Owner Name	Name of the primary user or owner of this system
Hardware > Power Supply	Description	Expanded description of the input voltage capability for this power supply
	Total Output Power (in MilliWatts)	Attribute value that represents the total output power of the power supply
Hardware > Mouse	IRQ Number	Interrupt assigned to this device

Scan Data Group	Scan Data Item	Description
	Name	Identifying information of the mouse
	Number of Buttons	Number of buttons on the mouse
Hardware > CDROM	Caption	CD-ROM Label
	Description	Description of the CD-ROM
	Manufacturer	Vendor Name
Hardware > CD ROM > Logical Drives	Drive Letter	Drive letter used for CD drives
Hardware > Local File System	File System Type	File system associated with this partition, for example, FAT/ NFS
	Name	Name that the system uses to identify the partition, usually this is the drive letter
	Size	Size of the partition
Hardware > Network Adapter Driver	Description	Description of the network adapter driver
	Name	Name of the network adapter driver
	Version	Version of the network adapter driver
Hardware > Network Adapter	Max. Speed	Rate at which the data is transferred over the LAN
	Name	Network adapter name
	Permanent Address	Node address stored permanently in the adapter
Network	IP Address	The unique address assigned to a computer on an IP Internet
	Subnet Mask	The subnet mask of the workstation paired with an IP address specifies to an IP router which octets or bits in the IP address are the network ID and which octets or bits are the node ID
	DNS Name	The DNS name of the workstation
	IPX Address	The IPX™ address of the workstation
	MAC Address	Unique node address permanently coded in the network adapter that identifies a specific computer on a network
Network	NetWare® Client Version	Version of the Novell Client™ software installed on the workstation
System Information > System Cache	Associativity	Defines the system cache associativity (direct-mapped, 2-way, 4-way)
	Cache Type	Defines the system cache type, for example, Instruction, Data, Unified
	Capacity	Size of the data store where the cache information is kept

Scan Data Group	Scan Data Item	Description
	Error Methodology	Error correction scheme supported by this cache component, for example, Parity/Single Bit ECC/MultiBit ECC
	Level	Indicates the cache level; internal cache that is built in to the microprocessors; external cache that is between the CPU and DRAM
	Line Size	Size in bytes of a single cache bucket or line
	Read Policy	Indicates whether the data cache is for read operation
	Replacement Policy	Algorithm that the cache uses to determine which cache lines or buckets should be reused
	Speed	Speed of this System Cache module in nanoseconds
	Write Policy	Indicates the two different ways (Write-Back and Write-Through Cache) that the cache can handle to write to the memory
System Information > Motherboard	Number of Slots	The number of expansion slots in the motherboard for adding more memory, graphic capabilities, and support for special devices
	Version	Version of the motherboard
System Information > System IRQ	IRQ Number	Number of the Interrupt Request Line (IRQ), from 0 to 15
System > System DMA	Description	Name of the logical device that is currently using this DMA channel
	DMA Burst Mode	A data transmission mode in which data is sent faster than normal
	DMA Channel Number	Number of the Direct Memory Access (DMA) channel that a computer uses for transferring data to and from devices quicker than from computers without a DMA channel
	IRQ Availability	Indicates whether Virtual Direct Memory Access (DMA) is supported
System > Slot	Description	Card currently occupying this slot
	Max Data Width	Maximum bus width of cards accepted in the slot
	Thermal Rating	Maximum thermal dissipation of the slot in milliwatts

This window displays the data from the last inventory scan for the managed station.

For more information about the DMI/WMI data display, see "Viewing the DMI/WMI Data in the Inventory Summary Information" on page 419.

To view the inventory information of a managed workstation:

1. In ConsoleOne, click Tools > Configure DB.

   For more information, see "Configuring the Inventory Database" on page 412.

2. Right-click a managed workstation > click Actions > click Inventory.

Viewing the DMI/WMI Data in the Inventory Summary Information

The following list contains the DMI/WMI components that are scanned if they are instrumented and available in the DMI/WMI database on the workstation:

- BIOS Characteristics
- Disks
- DMA
- IRQ
- Keyboard
- Network Adapter Driver
- Network Adapter Hardware
- Operating System
- Parallel Ports
- Pointing Device
- Power Supply
- Processor
- Serial Ports
- SubComponent Software
- System Cache
- System Contact Information
- System Enclosure
- System Hardware Security
- System Memory Settings
- System Power Controls
- System Resource DMA Info
- System Slot
- Temperature Probe
- Video
- Video BIOS
- Video Output Device
- Voltage Probe

For more information on DMI, see the DMTF Web site (http://www.dmtf.org).

Viewing Inventory Information of Managed Workstations by Querying the Database

Using ConsoleOne, you can query the Inventory database to display the hardware and software components of managed workstations that you want to view. The Inventory Query window displays the information satisfying the criteria you specify.

The Inventory database stores inventory data (hardware, memory, and environmental information) for each managed workstation. Querying the Inventory database helps to create groups of similar devices and to focus your reports on specific types of machines. For example, you can query the database to find machines that have an i486D processor and a VGA card.

NOTE: If you are generating inventory reports from an Inventory database that has inventory information of more than 2,000 workstations, we recommend that you use the Data Export tool for better performance. The Data Export tool generates the inventory information in to a comma separated value (.CSV) file. Use this .CSV file along with any standard reporting tool such as Seagate* Crystal Reports.

To query the Inventory database for inventory information:

1. In ConsoleOne, click a container.
2. Click Tools > Configure DB.

   For more information, see "Configuring the Inventory Database" on page 412.
3. Click Tools > Inventory Query.
4. Specify the criteria for query:

   Find In: Choose a site name from the list. The query locates all workstations within the specified site satisfying the query expression.

   Search Entire Database: Check this option to include all database sites while querying. The query locates all workstations in all sites satisfying the query expression.

   Find Type: Select Quick or Advanced. Click Quick to specify a simple query. When you choose a Quick query, you specify one attribute, relational operators, and the value of the attribute. Choose Advanced query to specify many attributes. Combine multiple query groups in which each group defines a set of query criteria. For example, use the Advanced query to run a query to discover all devices in the database with 486 processors and use query connectors, and add another query to discover which of these workstations have a VGA color video adapter.

   Attributes: Select the component attributes. Attributes that you can specify to query the managed workstations are as follows:

   - Software (Name, Vendor, Version)
   - Operating System (InstallDate, Name, Version, Code Page)
   - Scanner Information (Version, LastScanDate, NumberofFilesScanned)
   - NetWare Client details
   - Hardware Information (mouse, keyboard, video BIOS, display adapter, BIOS, processor, memory (virtual, physical), disk, floppy drives, hard disk, CD-ROM drive, backup disk drives, ports (serial ports, parallel port), bus, modem, sound card, battery, power supply, cache)
   - Network (IP address, IPX address, MAC address, DNS)
   - System (Motherboard, IRQ, Slot, DMA)

   Operator: Form query groups that will be combined with the previous query group by using the relational operator specified between the query groups.

   Value: Description values are the possible values of an inventory component. For example, 6.0 is a possible value for the DOS-Version attribute. Description values are not case-sensitive. Use the wildcard character % to substitute any number of characters, or the ? character to substitute one character in the Value field.

The list of description values displayed for an Inventory component is taken from the Inventory database corresponding to the component.

Save and Load the Existing Query Files: Save the queries in a file and load the query file as required.

5 Click Find.

This will query based on the query criteria you specify and display the workstations that match the query in the Query Results window.

In the Query Results window, double-click the workstation to view the inventory information of the workstation.

Viewing the Minimal Inventory Information from an NDS Object

The scanners store minimal scan data as an eDirectory Workstation object. You can view this minimal information from ConsoleOne. The Minimal Information page lists the inventory information of the scanned managed workstations.

For more information about the listed items in this page, see "Mapping Between Minimal Information Attributes and Attributes in the Inventory Database" on page 421.

To view the inventory information stored in eDirectory:

1 Right-click a managed workstation that has been successfully scanned > click Properties > click the ZENworks Inventory tab > click Minimal Information.

If you click More Workstation Information in this page, the Workstation Inventory window will be displayed.

Mapping Between Minimal Information Attributes and Attributes in the Inventory Database

The following table shows the mapping between minimal information attributes and attributes in the Inventory database:

Minimal Information	Inventory Database
Asset Tag	Scanned Inventory - Asset Tag
BIOS Type	Hardware - BIOS - Type
Computer Model	Scanned Inventory.Computer Model
Computer Type	Scanned Inventory.Computer Type
Disk Information	Hardware - Disk - Hard Disk - Drive Letter
IP Address	Network - IP Address
IPX Address	Network - IPX Address
Last Scan Date	Date and time when the workstation was scanned
MAC Address	Network - MAC Address
Memory Size	Hardware - Memory - Total Extended Memory
Model Number	Scanned Inventory.Model Number

Minimal Information	Inventory Database
NIC Type	Hardware - Network Adapter Driver - Description
Novell Client	Novell Client version
OS Type	Software - Operating Systems - OS - Name
OS.Version	Software - Operating Systems - OS - Version
Processor	Hardware - Processor
Serial Number	Workstation Serial Number
Subnet Mask	Network - Subnet Mask
Video Type	Hardware - Display - Type

Running Inventory Reports

You can run reports to gather inventory information from the Inventory database.

The inventory information is taken from the Inventory database you configure. For more information, see "Configuring the Inventory Database" on page 412.

Once you have configured the database, you access the hardware and software reports through the Tools menu from ConsoleOne. You can select from a predefined set of report forms to generate a report. The inventory report is displayed in the viewer window.

You can print or export the report as desired. Remember that any reports you generate will be empty if you haven't configured ZfD to start populating the Inventory database with the data you want.

Before running the inventory reports, you must configure the inventory database. See "Configuring the Inventory Database" on page 412. The inventory reports always use the Inventory database you configured as the data source for your reports unless you change it later as described in "Configuring the Inventory Database" on page 412.

To generate the inventory report:

1. In ConsoleOne, click a server object.
2. Click Tools > Inventory Reports.
3. Click the report you want to generate.

   The description for the report is displayed on the right side of the screen.

   See the table with listing of simple Inventory lists and listing of the comprehensive inventory reports.
4. Specify the selection criteria.

   For example, if you want to view the inventory information of all database sites, select the report type you want and specify % as the Database Site Name. The report will display the inventory information of any database sites within the configured Inventory database. You can also specify the database site that you want.

   Depending on the type of report you want, you can filter the information. For example, to view all workstations of a particular database site with the Windows NT operating system, you

select the Workstation Operating System Listing and specify the selection criteria Operating System Type as Windows NT, Operating System Version as 3.0, and the database site.

See the table with selection criteria for the Inventory Reports.

5 Click Run Selected Report.

A status box appears displaying the progress of the report generation. When the report is generated, it appears in the viewer. Use the buttons on the toolbar to page through, print, or export the report.

The following table lists the selection criteria for the inventory reports.

Report Name	Selection Criteria
Workstation Scan Time Listing	Database Site Name
Workstation Operating System Listing	Operating System Type, Operating System Version, Database Site Name
Workstation BIOS Listing	BIOS Install Date, Database Site Name
Workstation Processor Listing	Processor Family, Database Site Name
Workstation Processor Speed Listing	Lower Bound of Processor (in MHz), Upper Bound of Processor (in MHz), Database Site Name **NOTE:** Ensure that the value for Lower Bound of Processor is less than the value for Upper Bound of Processor.
Workstation Video Adapter Listing	Video Architecture, Database Site Name
Workstation Network Adapter Listing	Network Adapter Name, Database Site Name
Workstation Software Listing	Software Name, Software Version, Database Site Name
Workstation Memory Listing	Lower Bound of Blocks of Memory (in MB), Upper Bound of Blocks of Memory (in MB), Database Site Name **NOTE:** Ensure that the value for Lower Bound of Blocks of Memory is less than the value for Upper Bound of Blocks of Memory.
Software Summary Listing	Software Name, Software Version, Database Site Name
General Workstation Inventory Report	DN of the workstation, Database Site Name
Asset Management Report	DN of the workstation, Database Site Name
Hardware Inventory Report	DN of the workstation, Database Site Name
Networking Information Report	DN of the workstation, Database Site Name
Software Inventory Report	DN of the workstation, Database Site Name
Software Inventory Report for the Entire Site	Database Site Name

If the Reporting dialog box allows wildcards, you can use an asterisk (*) and question mark (?), or their SQL equivalents, percent (%) and underscore (_). The wildcard characters can be used for character data only.

The following table lists examples of wildcards.

Example	Specifies to Include
%	All items
wNT%	All items starting with "wNT"
wNT_cpq	All items starting with "wNT" followed by any character and "cpq"
wNTcpq.xcorp	The single named item, in this case a workstation

You can generate the types of reports described below, assuming you have already configured ZfD to start populating the inventory database with the data you want. The following table lists the Simple Inventory lists that provide information on individual aspects of workstation inventory, such as operating system.

Report Name	Information Provided
Workstation Scan Time Listing	Date and time of the last inventory scan on each workstation
Workstation Operating System Listing	List of all the workstations with an OS type, an OS version, and the total number of such workstations
Workstation BIOS Listing	List of all the workstations with a BIOS release date, and the total number of such workstations
Workstation Processor Family Listing	List of all the workstations with a processor family (such as Pentium Pro), and the total number of such workstations
Workstation Processor Speed Listing	List of all the workstations within a range of processor speed (such as 200-400 MHz), and the total number of such workstations
Workstation Video Adapter Listing	List of all the workstations with a video adapter (such as MGA 2064W), and the total number of such workstations
Workstation Network Adapter Listing	List of all the workstations with a network adapter (such as 3Com* Fast EtherLink*) and the total number of such workstations
Workstation Software Listing	List of all the workstations with a software name, version, and the total number of such workstations
Workstation Memory Listing	List of all the workstations within a range of memory, and the total number of such workstations
Software Summary Listing	Lists the total number of workstations with a particular software and version

The following table lists the Comprehensive Inventory Reports that combine several aspects of workstation inventory into each report, such as memory, hard disk, and processor.

Report Name	Information Provided
General Workstation Inventory Report	BIOS, computer description, OS description, display details, NIC, physical disk drive, IP address, and MAC address for each workstation
Asset Management Report	BIOS, computer description, processor, and OS description for each workstation
Hardware Inventory Report	Memory, processor, display details, physical disk drive, and modem for each workstation
Networking Information Report	OS Description, MAC address, NIC, and IP description for each workstation
Software Inventory Report	Software with product name, version, and vendor for each workstation
Software Inventory Report for the Entire Site	All softwares with product name, version, and vendor for the entire database site

To print a report:

1. Generate and view the report.
2. On the toolbar, click the printer icon.
3. In the Print dialog box, select the print options you want > click OK.
4. In the next Print dialog box, click OK to print in the default orientation mode.

   To change the mode, click Properties > click Orientation > select the mode (Landscape/ Portrait) > click OK twice.

The Inventory Lists are designed to be printed in portrait mode; all the other reports are designed to be printed in landscape mode.

To export an inventory report to a file:

1. Generate and view the report.
2. On the toolbar, click the Export Report icon.
3. In the dialog box, specify the location and file format > click OK.

Exporting the Inventory Data to CSV Format

You can customize the inventory data you want to export from the ZfD Inventory database in to a comma separated value (CSV) file.

You select the inventory components that should be exported, such as the Operating System Name and Version. You can further filter the workstations whose attributes will be exported. For example, you can export only those workstations with a particular processor speed. The Data Export tool will export all workstations satisfying these query conditions into a CSV file.

If you want to reuse the same data export settings for export, you can save the data export configurations.

The following sections will help you use the Data Export tool:

Invoking the Data Export Tool

To invoke the Data Export tool:

1. In ConsoleOne, click a container.
2. Click Tools > click Configure DB > select a ZENworks Database object. > click OK.
3. Click Tools > Data Export.

Exporting the Inventory Data to a CSV File

To export the inventory data to a CSV file:

1. Open the Data Export tool. See "Invoking the Data Export Tool" on page 426.
2. Select Create a New Database Query.

   This option lets you add a new query that defines the inventory components such as hardware, software, network, and others that you want to export. You can also specify the criteria to limit the workstations and the database sites to be included in the query. Based on the inventory components and criteria you specify, the inventory data from the database is exported to a CSV file.

   Click Next.
3. Select the database fields from the list of Database Fields > click Add.

   If you select a group component, all subcomponents of the group are added. For example, if you select the Software component group, the subcomponents of Software such as vendor name, product name, and version are added.

   Click Next.
4. Specify the filter conditions for workstations > click Edit Query. See "Forming the Query and Setting the Filter Conditions" on page 427.

   Click Next
5. View the data export settings.

   5a. Click Save Configuration to save the configurations settings to an .EXP file > specify the filename for the EXP file > click Save.

   The configuration file (.EXP) contains the settings such as the inventory components you selected, and also the query formed for filtering the workstation data export. You create an .EXP file so that you can reload the configuration settings and generate the .CSV files any time you need to.

   5b. Click Next.

6 Click Perform the Query from This Computer to run the data export processing from the workstation computer. This option will access the Inventory database on the specified database server and export the data in to a CSV file.

To run the data export tool from a server, click Perform the Query on a Remote Server. See "Running the Data Export Program From the Server" on page 429.

7 Click Finish.

8 Specify the .CSV filename > click OK.

This generates the .CSV file in the specified directory. Open the .CSV file in Microsoft* Excel or any other CSV-supported viewer to view the exported data.

Forming the Query and Setting the Filter Conditions

To form the query and set the filter conditions for the data export:

1 In ConsoleOne, open the Data Export tool. See "Invoking the Data Export Tool" on page 426.

2 Select Create a New Database Query.

3 Set the following filter conditions.

Selecting the database sites: In the Find In option, select the database sites names from the list.

The Data Export tool will export the data from the Inventory database sites you select. This tool locates all workstations satisfying the filter conditions within the selected database sites.

Click the Browse button to select one or more database site names from the list. In the Select Sites window, click one or more database sites. The selected site names are shown in double quotes.

To include all database sites for data export, check the Search Entire Database check box. The data export tool will locate those workstations satisfying the filter conditions in all database sites.

Selecting the attributes of the Inventory Components: Click the Browse Attribute button to select component attributes in the Select Attribute window. For example, to specify the version of BIOS as a component in the data export, select BIOS as the component, and select Version as the component attribute.

Components are as follows: General, Software, Hardware, Network System.

Operator: Relational operators show the relationship between the component and the value. Use the Matches option to specify the wildcard characters in the Value field.

Specifying the values for the inventory attributes: Description values are the possible values of an inventory component. For example, 6.0 is a possible value for the DOS-Version attribute. Description values are not case-sensitive. Use the wildcard character % to substitute any number of characters, or the ? character to substitute one character in the Value filed.

The list of description values displayed for an Inventory component is taken from the Inventory database corresponding to the component.

Specifying the query connectors and controls: The connectors and controls available for building filter conditions include the following:

AND: The expressions before and after the AND must be true.

OR: Either the expression before the OR or the expression after the OR must be true.

Insert Row: Lets you build the filter condition for this current row.

Delete Row: Deletes the row.

New Group: Lets you form a new filter condition group and specify the criteria for it. This group will be combined with the previous group by using the relational operator specified between the groups.

End: Ends the filter condition.

4 Click OK.

Loading Existing Configuration File

You can load an existing configuration file (.EXP). An .EXP file contains the settings such as the inventory components you selected, and also the query formed for filtering the workstation data export.

After you load the .EXP file, you can modify the settings for data export and then export the data to a .CSV file.

To load existing configuration settings for data export:

1 Ensure that you have generated the data configuration files.

Complete the procedure outlined in "Exporting the Inventory Data to a CSV File" on page 426. This procedure generates the .CSV file and the data configuration files.

2 In ConsoleOne, open the Data Export tool. See"Invoking the Data Export Tool" on page 426.

3 Select Open a Saved Database Query > click Next.

The default directory for .EXP files is CONSOLEONE\version\REPORTING\EXPORT. Click Browse to open an existing .EXP file.

If the database setting specified in the .EXP file are not valid, the data export tool uses the default setting, which includes all databases for data export.

4 Click a saved database query from the list.

If you want to modify the existing query, click Edit. Otherwise, to proceed with the existing query, click Next.

5 View the data export settings. Click Next.

6 Click Perform the Query from this Computer to run the data export processing from the workstation computer. This option will access the Inventory database on the specified database server and export the data in a .CSV file.

To run the data export tool from a server, click Perform the Query on a Remote Server. See "Running the Data Export Program From the Server" on page 429.

Click Finish.

7 Specify the .CSV filename > click OK.

This generates the .CSV file in the specified directory. Open the .CSV file in Microsoft Excel or any other CSV-supported viewer to view the exported data.

Running the Data Export Program From the Server

Running the Data Export program from a server is recommended if you are exporting data from a large database with more than 10,000 workstations or if you have specified complex queries with more than 20 database fields selected for exporting.

To run the data export program from the server:

1. Ensure that you have generated the data configurations files.

   Follow the Step 1 to Step 5 outlined in "Exporting the Inventory Data to a CSV File" on page 426 and ensure that you save the settings in the .EXP file.

   When you save an EXP file, a corresponding data configuration file is created in the same directory with the same filename as the .EXP file and with the .CFG file extension.

2. Click Perform the Query on a Remote Server to run the data export program from any server that has Workstation Inventory components installed > click Finish.

3. Copy the .EXP file and .CFG file to the server.

   These two files should exist in the same directory on the server.

   From the server console, run DBEXPORT.NCF on NetWare® servers or DBEXPORT.BAT on Windows* NT*/2000 servers, enter **DBEXPORT *"configuration_filename.EXP" "csv_filename.CSV"***

   where *configuration_filename.EXP* is an existing file that contains the data export settings. The data exported from the database will be stored in the *CSV_filename.CSV*.

   In the above command, you must enter the *configuration_filename.EXP* and the *CSV_filename.CSV* filenames within double quotes.

   The corresponding .CFG file for the .EXP file should be in the same folder as the .EXP file. The .CFG file contains the list of the database attributes to be exported.

4. Choose the Inventory sites.

   - To export the data from all database sites, satisfying the filter conditions, type 0.
   - To choose the database sites, type the numbers corresponding to the site names in the displayed list.
   - To select multiple site databases, separate the site numbers corresponding to the site names by commas.

   The data export displays the number of workstations that satisfy the query and filter conditions for export.

   Open the .CSV file in Microsoft Excel or any other CSV-supported viewer to view the exported data.

27 Troubleshooting Workstation Inventory with Status Logs

Novell® ZENworks® for Desktops lets you track whether the scan or the roll-up of information is successful by viewing the log files and scan history.

The inventory components report the status of the inventory scanning and roll-up of scan information in Novell eDirectory™.

For example, when you view the scan logs, you can determine whether the scan was successful or if there were any errors while scanning the workstation or at the time of roll-up.

You can view the following status information:

Viewing the Scan History of a Workstation

The Scan Status reports the history of the scans done at the workstation. For example, you view the Scan Status window to determine whether the scan was successful for the workstation, or whether the Storer has stored the .STR files of the workstation in the database. The inventory components (Scanner and Storer) write the scan information in the Status log.

The Scan Status displays the history of the latest ten scans of the selected workstation.

The following table lists the details of the log:

Status Information	Details
Time of Scan	Displays the date and time of the scan.
Message	Displays the message reported by the inventory components while scanning the workstation and storing the scan data in the database. For more information, see Workstation Inventory Error Messages in *Error Messages.*

You can export the log file as a .CSV or TAB-delimited file.

To invoke the Scan Status window:

1 In ConsoleOne®, right-click the workstation > click Properties > click the ZENworks Inventory tab > click Scan Status.

If the scan is disabled in the Inventory policy, the Scanner does not log any status messages in the Status Report log.

Viewing the Roll-Up History of the Server

The Roll-Up Status reports the status of the roll-up information from the server that initiated the roll-up of data. For example, if your inventory setup consists of a Leaf Server which initiates the roll-up of data to the next-level Root Server, the Roll-Up log displays the roll-up history of the Leaf Server.

The inventory components of the server (Sender, Receiver, and Storer) write the scan information in the Roll-Up Status. For example, you view the Roll-Up log to determine whether there were any errors during roll-up of scan data from the server. This log also displays the most recent roll-up time of the scan data that was stored in the database on the topmost level server (Root Server). This log displays the history of the ten previous roll-up sessions done from the server.

The following table lists the details of the log:

Status Information	Details
Roll-Up Start Time	Displays the date and time of the roll-up.
Message	Displays the message reported by the inventory component while moving the scan data across the servers. For more information, see Workstation Inventory Error Messages in *Error Messages*.

You can export the file as a .CSV or TAB-delimited file.

To invoke the Roll-Up Status window:

1 In ConsoleOne, right-click the Inventory Service object, from which the roll-up is done > click Properties > click Status Report tab > click Roll-Up Status.

Viewing the Status of Inventory Components on a Server

The Server Status window reports the status of the inventory server components on the selected server. You can view the Server Status log for any Inventory Service object. For example, you can determine whether the Sender sent the files to the Receiver or whether the Storer was able to establish the connection with the database successfully. The Server Status window displays the details of the ten latest status messages logged by the inventory server components.

If the inventory server components (Sender, Receiver, Selector, Storer, Service Manager, Roll-Up Scheduler) are not up and running on the server, the status of the server displays the information.

The following table lists the details of the log:

Status Information	Details
Time of Log	Displays the date and time when the message was reported by the inventory components.
Source	Displays the inventory component that has logged the status message.
Message Type	Displays the severity of the message.
Message	Displays the message reported by the inventory components. For more information, see Workstation Inventory Error Messages in *Error Messages*.

You can export the log file as a .CSV or TAB-delimited file.

To view the Server Status window:

1 In ConsoleOne, right-click the Inventory Service object > click Properties > click Status Report > click Server Status.

Viewing the Status of the Last Scan in the Workstation Scan Log

The Workstation Scan log reports the status of the latest scan done at the workstations associated with the selected Container. For example, you view the Workstation Scan log to determine whether the latest scans were successful for the workstations or whether the Storer has stored the workstation .STR files in the database. The inventory components (Scanner and Storer) write the scan information in the Status log.

You can also choose whether to display error, warning, and informational status messages of the workstations.

The following table lists the details of the log:

Status Information	Details
Scanned Workstation Name	Displays the DN of the workstation.
Time of Scan	Displays the date and time the status was logged.
Message Type	Displays the severity of the message.
Message	Displays the message reported by the inventory components while scanning the workstation or storing the inventory information in the database. For more information, see Workstation Inventory Error Messages in *Error Messages*.

You can export the file as a .CSV or TAB-delimited file.

NOTE: If the scan is disabled in the Inventory policy, the Scanner does not log any status messages in the Status Report log.

To view the Workstation Scan log window:

1. In ConsoleOne, click the container > Tools > Workstation Scan Log.
2. Click the message severity type > OK.

When the Scanner creates a .STR file of a workstation and the Selector processes this file, the inventory components also log the status of the scanning in the Workstation Status log. It is possible that at the same time, the Storer is processing the .STR files of another workstation. Meanwhile, the Scanner continues scanning and updates the Workstation Status log for the next scan. The Selector merges the .STR files of the previous scan and the current scan. In this scenario, the Storer processes the merged .STR files and updates the Workstation Scan log for the corresponding last scan.

Viewing the Roll-Up Log for Servers

The Roll-Up log reports the status of the latest roll-up from the Inventory Service objects in the Container. For example, you view the Roll-Up log to determine whether the latest roll-up of information from the Roll-Up server for the Inventory Service object was successful. The inventory components (Sender, Receiver, and Storer) write the roll-up information in the Roll-Up log. You can also choose to display error, warning, and informational status messages of the Intermediate servers.

The following table lists the details of the log:

Status Information	Details
Roll-Up Initiated From	Displays the DN of the Intermediate server that initiated the roll-up.
Roll-Up Start Time	Displays the date and time the roll-up of information was initiated.
Source	Displays the inventory component that logs the status.
Message Type	Displays the severity of the message.
Message	Displays the message reported by the inventory components while scanning the workstation. For more information, see Workstation Inventory Error Messages in *Error Messages*.

You can export the log as a .CSV or TAB-delimited file.

To invoke the Roll-Up Log window:

1. In ConsoleOne, click the container that contains the Inventory Service object > Tools > Roll-Up Log.
2. Click the severity type of the messages you want to view > OK.

Exporting the Inventory Status Log Files

You can store the details of the log files as Comma-Separated-Value reports or as a TAB-delimited file.

To save the log as a file:

1. In ConsoleOne, open the Status window.

2 Click Export > choose the file type > type the filename > click OK.

Overview of Status Logs and Scan Logs

The following table lists the status logs and scan logs:

Status/Scan Log	Inventory Components that Log the Status	Details of the Log	How to View the Log File in ConsoleOne
Workstation Scan Log	Scan program, Storer	Scanned workstation name, time of scan, inventory component, message type, and status message	Click the container > Tools > Workstation Scan Log
Roll-Up Log	Sender, Receiver, Storer	Roll-up initiated from, roll-up start time, inventory component, message type, status message	Click the container for the Inventory Service object > Tools > Roll-Up Log
Workstation Scan Status	Scan program, Storer	Time of scan and status message	In ConsoleOne, right-click the workstation > click Properties > the ZENworks Inventory tab > Scan Status
Status of Inventory components on Server	Sender, Receiver, Selector, Storer, Service Manager, Roll-Up Scheduler	Time of log, source, message type, message	In ConsoleOne, right-click the Inventory Service object > click Properties > Status Report > Server Status
Roll-Up Status	Sender, Receiver, Storer	Roll up start time, message	In ConsoleOne, right-click the Inventory Service object > click Properties > Status Report > Roll-Up Status

Viewing the Status Log in XML Format

All inventory components log the status messages in a log file maintained in XML (Extensible Markup Language) format. Unlike the status logs that contain a history of the ten latest status messages, the status XML log stores all status messages.

The log file contains the following data:

- Inventory module name
- Date and time of status logging
- Severity of the message
- Message text and status message number
- DN name, if the inventory module is associated with a particular DN object in eDirectory
- Product specific details of the module

The format of the log file is as follows:

```
?xml version="1.0" encoding="UTF-8"?>
?xml stylesheet type="text/xsl" href="inventorylog.xsl"?
<message_log>
```

```
 <message_entry>
   <module_name>Scanner</module_name>
   <severity>Critical</severity>
   <date_time>8/3/00 12:49 PM</date_time>
    <message_tag>unable to create scan data files</  message_tag>
    <dn_name>Inv_server</dn_name>
  </message_entry>
  </module_name>Storer</module_name>
    <severity>Critical</severity>
    <date_time>8/3/00 12:49 PM</date_time>
    <message_tag>unable to update the database</message_tag>
    <dn_name>Inv_server</dn_name>
</message_entry>
..
</message_log>
```

A sample style sheet and Document Type Declaration (DTD) file are located in SYS:\PUBLIC\ZENWORKS on the server.

The INVENTORYLOG.XML log file is located in the SYS:\PUBLIC\ZENWORKS\WMINV\LOGS directory on NetWare® and Windows* NT*/2000 servers.

By default, the maximum size of the log file is 100 KB. To modify the maximum size of the log file, edit the INVENTORYLOG.INI file. On NetWare and Windows NT/2000 servers, this file is in the SYS:\PUBLIC\ZENWORKS directory.

The contents of INVENTORYLOG.INI is as follows:

```
max_file_size=100 KB
```

Modify the MAX_FILE_SIZE parameter, if required.

If the file size exceeds the value specified in the MAX_FILE_SIZE parameter, the file is archived as *filename*_OLD.XML. The latest messages will be in the current log file.

To view the log data file, use a third-party XML browser.

If you want to view the XML log file in languages other than English, see Unable to view the inventory status reports (XML format) in languages other than English in Workstation Inventory in *Troubleshooting*.

C Documentation Updates

This section lists updates to the Workstation Inventory part of the *Administration* guide that have been made since the initial release of Novell® ZENworks® for Desktops (ZfD) 3.2. The information will help you to keep current on documentation updates and, in some cases, software updates (such as a Support Pack release).

The information is grouped according to the date when the *Administration* guide was updated and republished:

October 31, 2002 (ZfD 3.2 Support Pack 1)

Location	Update
"WMI-Compliant Scanners" on page 298	Updated the link to the Microsoft WMI Web site.

October 10, 2003

Location	Update
"Running the Data Export Program From the Server" on page 429	Updated Step 3 on page 429.

VII Integrating ZfD 3.2 or ZfD 3.2 SP1 with Novell Cluster Services

This document contains information that will help you understand the tasks necessary for successfully installing and configuring Novell® ZENworks® for Desktops (ZfD) components in a Novell Cluster Services™ (NCS) environment. The topics include:

28 Installation Prerequisites

Before you install and configure Novell® ZENworks® for Desktops (ZfD) to run with Novell Cluster Services™ (NCS), make sure that all of the hardware and software requirements for the respective products are met, including:

- ❑ At least two NetWare® 5.1 or NetWare 6 servers (also called "nodes") where NCS can be installed
- ❑ NCS installed and running on the NetWare servers that will be part of the cluster
- ❑ A cluster volume created and cluster-enabled (this is called a virtual server)

  For more information on clustering, see the Novell Cluster Services documentation (http://www.novell.com/documentation).

In addition to these prerequisites, you must also perform the following procedures before you run the ZfD installation program on each cluster:

- Authenticate to cluster nodes that service the NCS virtual server. Authentication to each node facilitates updating that node with the software required by ZfD.

  HINT: It is necessary to authenticate only to those nodes that do not appear in the NetWork Neighborhood window.

- Prepare each cluster node for ZfD.

To authenticate to each node:

1. From a Novell Client™ login, use the Admin user and password to log in to the NCS virtual server.
2. Browse the directory tree where the cluster nodes are located.
3. Right-click a node object > click Authenticate.
4. Enter the user account (probably Admin) and the password necessary to authenticate.

To prepare cluster nodes for ZfD:

1. Upgrade each node to ConsoleOne® 1.3.2.

   ConsoleOne 1.3.2 (or later), included on the ZfD 3.2 *Companion* CD must be installed on each cluster node for ZfD to work properly. For more information, see Obtaining and Installing ConsoleOne in Installation and Setup in *ZENworks for Desktops 3.2 Getting Started Guide*.

   If you want to install ZfD 3.2 Support Pack 1, upgrade each node to ConsoleOne 1.3.3.

2. Unload Java* on each node.

   To avoid an error message displayed by the ZfD installation program if Java is running on the server (that is, the cluster node), you should unload Java before you begin the ZfD installation there. To do this, you need to have System console access to each servicing node. At the system console for each node, enter the following command:

```
unload java
```

3. For NetWare 5.*x* or NetWare 6 servers, see "Obtaining and Setting Up CVSBIND on Each Node for NetWare 5.x or NetWare 6 Servers" on page 442.

4. Install the Novell Client on the workstation. For more information about installing the appropriate client, see Obtaining and Installing the Novell Client in Installation and Setup in *ZENworks for Desktops 3.2 Getting Started Guide*.

Obtaining and Setting Up CVSBIND on Each Node for NetWare 5.*x* or NetWare 6 Servers

The Cluster Virtual Server Bindery (CVSBIND) utility advertises cluster virtual servers in the bindery and supports access to cluster volumes through a UNC pathname. Because the ZfD Workstation Inventory component uses UNC paths to roll up its data, CVSBIND must be set up before you install Workstation Inventory.

1. Download the CVSBIND self-extracting .ZIP file from Novell Support Web site (http://support.novell.com/cgi-bin/search/tidfinder.cgi?2957434). Double-click the file to extract these files: CVSBIND.NLM, CVSBIND.TXT, and CVSBIND_README.DOC.

2. Set up CVSBIND.

   2a. Down the cluster. At the system console of any node in the cluster, enter:

   ```
   cluster down
   ```

   2b. Unload NCS. At the system console of each node in the cluster, enter:

   ```
   uldncs
   ```

   2c. Copy CVSBIND.NLM to SYS:\SYSTEM on each server in the cluster.

   2d. On each cluster node, load CVSBIND. In the SYS:\SYSTEM\LDNCS.NCF, add the following command after the `cmon` command, but before the `cluster join` command.

   ```
   cvsbind
   ```

   2e. On each cluster node, unload CVSBIND. In the SYS:\SYSTEM\ULDNCS.NCF, add the following command after the `cluster leave` command, but before the `unload cmon` command.

   ```
   unload cvsbind
   ```

   2f. At the system console of each node in the cluster, enter the following command to restart the cluster:

   ```
   ldncs
   ```

3. In ConsoleOne, edit the commands in the cluster volume resource load and unload scripts.

   CVSBIND.NLM supports commands that can add or delete bindery service entries in the SLP namespace to emulate the NetWare bindery.

   In the load and unload scripts, add the commands with the NCS virtual server name and its corresponding IP address, so that the Service Location Protocol URL service (bindery.novell) can emulate the bindery. The command syntax is similar to the NUDP ADD and NUDP DEL commands already found in the scripts:

   ```
   cvsbind add SERVER_NAME IP_address
   ```

   ```
   cvsbind del SERVER_NAME IP_address
   ```

NOTE: The simplest way to add the commands to the scripts is to copy and paste the appropriate NUDP command and substitute CVSBIND for NUDP.

Here is an example of the edited cluster volume resource load script:

```
nss /activate=TESTVOLmount TESTVOL VOLID=254trustmig TESTVOL watchCVSBIND
ADD CLUSTER_TESTVOL_SERVER 10.10.10.10NUDP ADD CLUSTER_TESTVOL_SERVER
10.10.10.10add secondary ipaddress 10.10.10.10
```

The following is an example of the edited cluster volume resource unload script:

```
del secondary ipaddress 10.10.10.10NUDP DEL CLUSTER_TESTVOL_SERVER
10.10.10.10CVSBIND DEL CLUSTER_TESTVOL_SERVER 10.10.10.10trustmig TESTVOL
unwatchdismount TESTVOL /forcenss /forcedeactivate=TESTVOL
```

NOTE: The CVSBIND command is not case-sensitive but the server name should be entered in upper-case letters.

You can inspect the SLP namespace with the following console commands:

```
display slp services
```

```
display slp attributes service:bindery.novell:
```

29 Installing ZfD Components in the Cluster

Because of some limitations of the current Novell® ZENworks® for Desktops (ZfD) installation procedure for installing in a cluster environment, you must change the ZfD installation procedure to account for the install location of ZfD files, the ZfD Inventory database mechanism and service, and the behavior of the Novell Client™ required for ZfD.

This information in the following sections will help you to install ZfD 3.2 or ZfD 3.2 SP1 in a clustered environment:

General ZfD 3.2 Installation Procedure

To install ZfD in a network configured with Novell Clustering Services (NCS):

1. From a network workstation configured with the proper Novell Client, log in as Admin to the directory tree where your cluster resides and map a drive to a previously configured cluster node.

   IMPORTANT: Make sure that this workstation and all other administrative workstations are not running ConsoleOne while the ZfD installation is running.

2. At the workstation, insert the ZfD *Program* CD.

   The WINSETUP.EXE program will autorun. If it does not autorun, run it from the root of the CD.

3. Click English > Install ZENworks to launch the Novell Installation Service (NIS) program.

   NOTE: You have the option of clicking Back to change your install preferences at any time while the NIS setup program is running.

4. Click Next to display the End User License Agreement for the ZfD software > read the agreement > click Accept if you agree with the terms of the license and the limited warranty.

   If you do not agree with the terms of the software agreement, do not install the software.

5. In the Install Prerequisites screen, check to see that the cluster node to which you are installing meets the minimum requirements listed > click Accept when you have read the list.

6. In the ZENworks Install Types dialog box, click Custom > Next.

7. In the Components dialog box, click the check boxes for the ZfD components that you want to install > click Next.

   NOTE: If you choose to install Workstation Imaging and PXE (that is, Preboot Services software) on the cluster nodes, the ZENworks installation program does not currently allow the installation of PXE on two or more servers with the same operating system. It is necessary to perform the PXE installation separately for every node in the cluster.

8. In the ZENworks Part Selection dialog box, click the check boxes for the parts you want to install, or uncheck the parts you don't want to install (files, schema extensions, directory objects) > click Next.
9. In the ZENworks List of Trees dialog box, click the check box for the name of the Novell eDirectory™ tree > click Next.
10. In the ZENworks List of Servers dialog box, click the check box for the name of the cluster node or nodes > click Next.
11. In the Inventory Database Server Selection dialog box, select the virtual server where you want to install the ZENworks Inventory database (you can also choose not to install the database at this time) > click Next.
12. If you choose to install the Inventory database, a dialog box will be displayed where you can choose the cluster volume. Click the check box for the name of the cluster volume > Next.
13. In the Languages dialog box, click the language of the files that you have chosen to be installed to the server > Next.

    NOTE: English is chosen by default and must be installed in addition to any other language you choose.
14. In the Automatic Workstation Import Management dialog box, select the Import (or Import/Removal) role for all of the servers where you are installing ZfD that will be part of the cluster > click Next.

    NOTE: All of the servers participating in the cluster should have exactly the same role for Automatic Workstation Import. You should also make sure that the HOSTS file on the workstations being imported points to the IP address of the virtual server.

    For more information about server roles in Automatic Workstation Import, see Installing Automatic Workstation Import and Removal in Automatic Workstation Import and Removal in *ZENworks for Desktops 3.2 Deployment Guide*.
15. In the Inventory Server Roles dialog box, select the assignment you want to give to each cluster node > click Next.

    NOTE: All cluster nodes participating in the cluster should have exactly the same role for Inventory.
16. In the ScanDir Volume dialog box, select a cluster volume where you want the scan data (.STR) files to be stored > click Next.
17. If you previously chose to install the database, enter a unique site ID and name in the Site ID for Database dialog box > click Next.
18. In the Summary dialog box, review the list of the products to be installed and the disk space that each product will consume when installed > click Finish to begin the installation process.

General ZfD 3.2 SP1 Installation Procedure

To install ZfD 3.2 SP1 in a network configured with Novell Clustering Services (NCS):

1. From a network workstation configured with the proper Novell Client, log in as Admin to the directory tree where your cluster resides and map a drive to a previously configured cluster node.

   IMPORTANT: Make sure that this workstation and all other administrative workstations are not running ConsoleOne while the ZfD installation is running.
2. Download and install the ZfD 3.2 SP1 server-side update from TID 2963839 at Novell Support Web site (http://support.novell.com).

For more information on how to install the ZfD 3.2 SP1 server-side update, see the ZfD 3.2 SP1 server-side Readme at the ZfD 3.2 documentation Web site (http://www.novell.com/documentation/lg/zdfs/index.html).

3. Run INSTALL.EXE from the directory where you downloaded ZfD 3.2 SP1.
4. Click English > Install ZENworks to launch the Novell Installation Service (NIS) program.

   NOTE: You have the option of clicking Back to change your install preferences at any time while the NIS setup program is running.
5. Click Next to display the End User License Agreement for the ZfD software > read the agreement > click Accept if you agree with the terms of the license and the limited warranty.

   If you do not agree with the terms of the software agreement, do not install the software.
6. In the Install Prerequisites screen, ensure that the cluster node to which you are installing meets the minimum requirements listed > click Accept when you have read the list.
7. In the ZENworks List of Trees dialog box, click the check box for the name of the eDirectory tree > click Next.
8. In the ZENworks List of Servers dialog box, click the check box for the name of the cluster node or nodes > click Next.
9. In the Languages dialog box, click the language of the files that you have chosen to be installed to the server > Next.

   NOTE: English is chosen by default and must be installed in addition to any other language you choose.
10. In the Summary dialog box, review the list of the products to be installed and the disk space that each product will consume when installed > click Finish to begin the installation process.

30 Configuring ZfD Components after Installing Clustering Services

After you have completed the Novell® ZENworks® for Desktops (ZfD) installation, you can continue preparing for using ZfD in Novell Cluster Services™ (NCS) by completing various other configuration tasks, including:

General Configuration Procedure

During the ZfD installation, some files are copied to the SYS:PUBLIC directory of the server where ZfD is installed. These ZfD files must reside on the cluster volume for ZfD to function properly with NCS. To avoid problems after the installation, copy the entire SYS:PUBLIC directory to the cluster volume.

Configuring Application Management

Application Object Templates (AOTs) must be stored on the cluster volume. Some AOTs are installed automatically by ZfD. You must move these AOTs to the cluster volume and update their SOURCE_PATH macro to point to the cluster volume. For more information about modifying Application object macros, see Chapter 14, "Application Object Settings," on page 115.

Configuring Workstation Imaging

This section contains the following information:

Creating a Server Policy Package that has an Imaging Policy

If you create a Server Policy package that includes an Imaging policy, the ZfD imaging engine will not recognize the policy package if it is associated to a virtual server. To work around this limitation, you should associate this Server Policy Package to all of the nodes that are involved in the failover process for the virtual server in the cluster.

Configuring Option 60

By default, a NetWare® 5.1 server will not support both the NetWare DHCP server (DHCPSRVR.NLM) and the ZENworks 3.2 PXE proxy DHCP server on the same server. If both are loaded, the DHCP server will not be able to hand out addresses. This can be corrected by using components shipped with NetWare 6. These updates are also included NetWare 5.1 SP4.

Use the following steps to enable PXE Proxy DHCP services and configure Option 60 on the same server that runs the Novell DHCP server:

1. Install the DNS-DHCP client from NetWare 6.
2. Copy DHCPSRVR.NLM, DNIPINST.NLM and NDDPREFS.DAT files from the SYS\SYSTEM directory on the NetWare 6 CD to the SYS:SYSTEM directory on the server. (You might want to back up these files first.)
3. Using the DNS-DHCP console, export the DNS and DHCP records.

   Note the NDS locations of the DNS-DHCP locator and group objects and the DNS zone objects.
4. At the system console, type **`load DNIPINST -R`** to remove DNS, DHCP and related schema extensions.
5. At the console, load DNIPINST to install the updated DNS-DHCP and schema extensions.
6. Using the DNS-DHCP console, import the DNS and DHCP records.
7. Using the DNS-DHCP console add Option 60 (global options or subnet) and set the text string to PXEClient.
8. At the system console type **`load NAMED`**.
9. At the system console, type **`load DHCPSRVR`**.
10. If you have not already done so, install ZENworks 3.2 imaging services with PXE support.
11. Using a text editor, make the following changes to SYS:SYSTEM\PDCHP.INI:

    ```
    Set USE_DHCP_PORT to 0.

    Make sure USE_BINL_PORT is set to 1.
    ```
12. Unload and reload PDHCP.NLM.

Configuring Workstation Inventory

This section explains how to configure Workstation Inventory after installing cluster services in the following scenarios:

- “Scenario 1: Configuring Workstation Inventory After Installing ZfD 3.2” on page 450
- “Scenario 2: Configuring Workstation Inventory After Upgrading From ZfD 3.2 to ZfD 3.2 SP1” on page 453

Scenario 1: Configuring Workstation Inventory After Installing ZfD 3.2

After installing ZfD 3.2, follow these steps to configure Inventory:

1. During the ZfD installation, some files are copied to the SYS:PUBLIC directory of the server where ZfD is installed. These ZfD files must reside on the cluster volume for ZfD to function

properly with NCS. To avoid problems after the installation, copy the entire SYS:PUBLIC directory to the cluster volume.

2 Configure the Inventory database object. If you have selected Sybase* during ZfD installation, the installation program creates the Database object (ZfDInventoryDatabase) and configures the properties of this object. Skip to Step 3. If you are using Oracle*, continue with step 2a.

2a If you are maintaining the Inventory database in Oracle, ensure that you have created the Database object and configured the properties. For more information, see Configure the Policies for the Database in Workstation Inventory in *Getting Started*.

3 To configure the Database object for a cluster environment: In ConsoleOne®, right-click the Database object > click Properties > click ZENworks Database > browse for the DN (NCP server object) of the virtual server or specify the IP address of the virtual server > click OK.

4 On the cluster node, edit the Sybase startup file (SYS:\SYSTEM\MGMTDBS.NCF file) to modify the IP address specified in this file. You should specify the IP address of the virtual server. This specifies the database on the cluster volume.

```
load SYS:\zenworks\Database\dbsrv7 -gn 50 -c 32M -tl 300 -ti 0 -m -n
ipaddress_of_the_server -x tcpip Clustervol:\Zenworks\Database\mgmtdb.db
SYS:\Zenworks\Database\nal.db
```

5 Copy the MGMTDBS.NCF file from the SYS:\SYSTEM directory to other cluster nodes that have Inventory installed.

6 To configure the Inventory server:

6a Edit the AUTOEXEC.NCF file on all cluster nodes that have Inventory installed.

The Workstation Inventory installation adds entries to the server's AUTOEXEC.NCF file that load certain ZENworks services. You must comment the following lines in the file:

```
search add sys:\java\njclv2\bin

zfdstart.ncf
```

Ensure that you comment all occurrences of these lines.

6b In the volume load script of the virtual server, append these entries:

```
search add sys:\java\njclv2\bin

zfdstart.ncf
```

6c On the cluster nodes that have Inventory installed, add the following line before the STARTINV.NCF entry in the ZFDSTART.NCF file:

```
SYS:\SYSTEM\MGMTDBS.NCF
```

Ensure that you make this change on all cluster nodes.

6d In the volume unload script of the virtual server, add the following entry as the first entry in the file:

```
zfdstop.ncf
```

6e On all the cluster nodes, edit the ZFDSTOP.NCF file.

Ensure that the entries in this file follow this exact sequence:

```
Java -killzenWSImp

Java -killzenWSRem
```

```
Java -killzenWSInv

delay time_in_seconds

Unload imgserv <<y

Unload dbsrv7.nlm <<y
```

where *time_in_seconds* is the delay time in seconds. We recommend that you set *time_in_seconds* to 8 seconds.

Comment out the following entries in the ZFDSTOP.NCF file:

```
ZENworks for Desktops 3.0 Settings

 --Remove Inventory services and the Inventory database.

StopSer *

ZENworks for Desktops 3.0 DB Settings
```

7 On all cluster nodes, configure the Inventory Server Property file.

You must modify the inventory server's property file if you have defined the role of the cluster node as one of the following:

Make the necessary modifications on all cluster nodes.

Server Type	Server Property File
Root Server	ROOT_DB.PROPERTIES
Root Server with Workstations	ROOT_DB_WKS.PROPERTIES
Intermediate Server	INT.PROPERTIES
Intermediate Server with Workstations	INT_WKS.PROPERTIES
Intermediate Server with Database	INT_DB.PROPERTIES
Intermediate Server with Database and Workstations	INT_DB_WKS.PROPERTIES

The Standalone Server does not require modifications in the properties file.

The server property file is located in the \PUBLIC\ZENWORKS\WMINV\PROPERTIES directory.

To edit the server property file on the cluster node, modify the Arguments entry in the [Receiver Service] section: `Arguments=Cluster`

8 Launch scanners from the cluster volume.

8a Ensure that you have copied the files from \SYS:\PUBLIC\ZENWORKS to the cluster volume as instructed in Step 1 on page 450.

8b The Inventory installation assigns the [Root] as a Trustee of the SYS:\PUBLIC\ZENWORKS directory with Read and File Scan rights. Ensure that this directory on the cluster volume has the Read and File Scan rights permissions.

9 Configure the Inventory settings.

Before following any of these tasks, ensure that you specify any one Inventory Service object for configuring inventory. When you configure the selected Inventory Service object, these settings will apply to other nodes.

You must also modify the \PUBLIC\ZENWORKS\WMINV \PROPERTIES\CONFIG.PROPERTIES file of all cluster nodes in the inventory setup to specify the DN of the Inventory Service object of the virtual server that has been configured for inventory.

9a In the CONFIG.PROPERTIES file, modify the InventoryServiceDN entry for all other cluster nodes:

```
NDSTree=tree_name

InventoryServiceDN=dn_of_the_inventory_service_object

SingletonPort=65433
```

10 Configure the Inventory Policy settings for the virtual server:

10a Ensure that you have configured the Inventory settings. This is required before you configure the Inventory Policy settings for the virtual server.

NOTE: You must configure the Inventory policy settings only for the virtual server. The Inventory policy should not be configured for other cluster nodes.

10b From ConsoleOne, click Tools > click Configure Inventory for Cluster.

10c Fill in the following details:

Virtual Server DN: Specify the DN of the virtual server.

Location of Inventory Scanner: Specify the directory location of the scanner executables (WINSCAN.EXE and NTSCAN32.EXE) on the cluster volume. On an inventory server, these files exist in the SYS:\PUBLIC\ZENWORKS directory. Specify the directory location on the virtual server.

Scan Directory Path: Specify the directory for storing the scan data files (.STR) on the virtual server.

The SCANDIR directory is created in the specified location on the cluster volume.

10d Click OK.

IMPORTANT: If you want to make any modifications to the Scan Directory path, you must use the Configure Inventory for Cluster window. Do not modify the Scan Directory path from the Inventory Service object property page.

Scenario 2: Configuring Workstation Inventory After Upgrading From ZfD 3.2 to ZfD 3.2 SP1

After upgrading from ZfD 3.2 to ZfD 3.2 SP1, follow these steps to configure Workstation Inventory:

To configure ZfD 3.2 SP1 Workstation Inventory in a clustered environment that has ZfD 3.2 Workstation Inventory installed and configured:

1. During the ZfD installation, some files are copied to the SYS:PUBLIC directory of the server where ZfD is installed. These ZfD files must reside on the cluster volume for ZfD to function properly with NCS. To avoid problems after the installation, copy the entire SYS:PUBLIC directory to the cluster volume.
2. Edit the AUTOEXEC.NCF file on all cluster nodes that have Inventory installed.

   The Workstation Inventory installation adds entries to the server's AUTOEXEC.NCF file that load certain ZENworks services. You must comment the following lines in the file:

```
search add sys:\java\njclv2\bin

zfdstart.ncf
```

Ensure that you comment all occurrences of these lines.

3 On all the cluster nodes, edit the ZFDSTOP.NCF file to do the following:

3a Comment out the following entry:

```
Unload dbsrv7.nlm <<y
```

3b Ensure that the entries in this file follow this exact sequence:

```
Java -killzenWSImp

Java -killzenWSRem

Java -killzenWSInv

delay time_in_seconds

Unload imgserv <<y

;Unload dbsrv7.nlm <<y

SYS:\SYSTEM\STOPDB.NCF

DELAY 10
```

where *time_in_seconds* is the delay time in seconds. We recommend that you set *time_in_seconds* to 8 seconds.

4 Launch scanners from the cluster volume.

4a Ensure that you have copied the files from \SYS:\PUBLIC\ZENWORKS to the cluster volume as instructed in Step 1 on page 453.

4b The Inventory installation assigns the [Root] as a Trustee of the SYS:\PUBLIC\ZENWORKS directory with Read and File Scan rights. Ensure that this directory on the cluster volume has the Read and File Scan rights permissions.

31 Troubleshooting ZfD in a Novell Clustering Environment

The purpose of this section is to identify issues that may arise with some of the Novell® ZENworks® for Desktops (ZfD) components when they are installed in a Novell Cluster Services™ (NCS) environment. The following information is included:

Workstation Imaging

The following events may occur as you attempt to use the Workstation Imaging component of ZfD in a clustering environment:

Imaging Session Fails

Problem: When the cluster-enabled volume is migrated to another node, a workstation currently pulling down or pushing up images loses its connection.

Explanation: When a workstation requests an image from the image proxy server (the virtual server), the workstation has, in effect, opened an imaging session. When the cluster-enabled volume is migrated to another node, that session is disconnected.

Action: Restart the workstation imaging process from the beginning.

Image Multicasting Does Not Work

Problem: Image multicasting will not work in a from a virtual server in a clustering environment.

Explanation: Although the virtual server's representation in the directory is identical to a physical node, the ZfD properties of a physical node that are normally visible to the image engine are not visible in the virtual server.

Action: Do not attempt to multicast images from a virtual server in a clustering environment.

Imaging Server Does Not Fail Over

Problem: When an imaging session is in progress in a clustering environment and a failover occurs, IMGSERV.NLM does not unload properly.

Explanation: The load and unload commands for IMGSERV.NLM are issued in the ZFDSTART.NCF and ZFDSTOP.NCF files, which are integrated to execute from the load and unload script of the virtual server. The <<y appendage in the script unloads IMGSERV.NLM properly if the unload command is issued through ZFDSTOP.NCF.

However, if IMGSERV.NLM is unloaded through the ZFDSTOP.NCF file from the virtual server unload script, the unload message is first sent to the shared resource console with an accompanying message: `Unload module Y/N?` The yes answer (already imbedded in the <<y appendage) is sent to the system console, where it is not expected. In this way, IMGSERV.NLM never unloads because it is waiting to receive the Yes command.

Action: Use the following steps to spell out the "unload imgserv.nlm <<y" in the shared resource unload script.

1. From ConsoleOne® running on a Windows workstation, click the cluster object > click the shared resource object > click the Unload Script tab to open the script.
2. At the beginning of the shared resource unload script, type the following commands:

```
Java -killzenWSImp
Java -killzenWSRem
Java -killzenWSInv
delay 8
Unload imgserv <<y
pxestop.ncf
```

3. Close the shared resource unload script.

Workstation Inventory Error Messages

The following sections contain detailed explanations of the error messages that may be generated while you are using the ConsoleOne snap-in for Workstation Inventory in NCS:

Unable to update virtual server DN in the directory

Source: Cluster snap-in

Severity: Critical

Explanation: The inventory settings for the server are stored in the directory. This error occurs if the attributes cannot be written to the directory.

Possible Cause: The network is down.

Action: Ensure that the network is up and the network connections are active.

Possible Cause: There may be a problem with the directory.

Action: See the Novell eDirectory documentation Web site (http://www.novell.com/documentation) for troubleshooting information about Novell eDirectory™ problems.

Action: Ensure that you have sufficient rights to modify the directory attributes.

Unable to update scanner location in the directory

Source: Cluster snap-in

Severity: Critical

Explanation: The inventory settings for the server are stored in the directory. This error occurs if the attributes cannot be written to the directory.

Possible Cause: The network is down.

Action: Ensure that the network is up and the network connections are active.

Possible Cause: There may be a problem with the directory.

Action: See the eDirectory documentation Web site (http://www.novell.com/documentation) for troubleshooting information about the directory problems.

Action: Ensure that you have sufficient rights to modify the directory attributes.

Unable to update the scan directory path in the directory

Source: Cluster snap-in

Severity: Critical

Explanation: The inventory settings for the server are stored in the directory. This error occurs if the attributes cannot be written to the directory.

Possible Cause: The network is down.

Action: Ensure that the network is up and the network connections are active.

Possible Cause: There may be a problem with the directory.

Action: See the eDirectory documentation Web site (http://www.novell.com/documentation) for troubleshooting information about directory problems.

Action: Ensure that you have sufficient rights to modify the directory attributes.

The selected virtual server DN does not represent a cluster. Select a valid virtual server

Source: Cluster snap-in

Severity: Critical

Explanation: You can open the Configure Inventory Cluster window for any Inventory Service object. This error occurs if you have not selected a virtual server DN that represents a cluster.

Action: Select a virtual server to configure the inventory settings.

Select a directory on the virtual server instead of volume

Source: Cluster snap-in

Severity: Warning

Explanation: To configure the Inventory Policy settings for the virtual server, you must specify the SCANDIR directory for storing the scan data files (.STR) on the virtual server. The SCANDIR directory is created in the specified location on the virtual server.

This error occurs when the specified scanner location or the scan directory path in the directory

contains the volume location instead of the directory location.

Action: Ensure that you specify a directory location on the virtual server.

D Documentation Updates

This section lists updates to the Integrating ZfD 3.2 with Novell Cluster Services part of the *Administration* guide that have been made since the initial release of Novell® ZENworks® for Desktops (ZfD) 3.2. The information will help you to keep current on documentation updates and, in some cases, software updates (such as a Support Pack release).

The information is grouped according to the date when the *Administration* guide was updated and republished:

October 31, 2002 (ZfD 3.2 Support Pack 1)

Location	Update
"General ZfD 3.2 SP1 Installation Procedure" on page 446	Added instructions to accommodate users of ZfD 3.2 SP1 who want to integrate Novell Clustering with the support pack release.
"Scenario 2: Configuring Workstation Inventory After Upgrading From ZfD 3.2 to ZfD 3.2 SP1" on page 453	Added instructions to accommodate users of ZfD 3.2 SP1 who want to integrate Novell Clustering with the support pack release.
Chapter 28, "Installation Prerequisites," on page 441	Added a paragraph to the first step to indicate the version of ConsoleOne used with ZfD 3.2 SP1.