Managing NetWare

Web Servers

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Preface

NetWare® Web Manager is the tool you use to manage global preferences for all other Novell® Web Services, including the NetWare Enterprise Web and News Servers. Using any Web browser such as Netscape* Navigator* or Communicator*, you can manage your Novell® Web Services from any place on the Internet.

With Novell® Directory Services® (NDS®), you can manage users, groups, and resources from a common directory where information is only stored once.

What's in This Documentation?

This documentation describes NetWare Web Manager and covers basic concepts common to all NetWare Web Services included in NetWare 5.1. It also describes how to configure NetWare Web Manager, contains in-depth information about command-line tools, and shows you how to

- Start and stop NetWare Web Manager

- Configure multiple NetWare Web Services from a single Web Manager (cluster management)

- Configure and use a local database, LDAP, or NDS mode to manage users and groups for access control to your servers

- Build access control lists to restrict who can use your servers.

Web Browser Requirements

To configure any of the NetWare Web Services, you need a Web browser, such as Netscape Navigator or Navigator Gold* 3.0 or later, Netscape Communicator, Internet Explorer* or any other browser that supports Java* and JavaScript*. If you don't have a browser installed on your computer, install the version of Netscape Navigator from your Novell CD. You must enable Java or JavaScript in your Web browser because all of the configuration forms in Web Manager and the server managers use one or both of these forms of Java to function.

To enable Java in Netscape Navigator:

1 From the browser window, click Options > Network Preferences.

2 Select the Language tab and make sure Java and JavaScript are checked.

3 Click OK.

To enable Java in Netscape Communicator:

1 From the Communicator browser window, click Edit > Preferences.

2 Select the Advanced category in the left column.

3 Check the Enable Java and Enable JavaScript check boxes.

4 Click OK.

To enable Java in Internet Explorer 4 or higher:

1 From the Internet Explorer browser window, click Tools > Internet Options.

2 Select the Advanced tab.

3 Under Java VM, check Java JIT Compiler Enabled.

4 Click OK.

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1 NetWare Web Manager Basics

This section describes the concepts behind NetWare® Web Manager and the Server Manager forms you use to configure Web services. For help on using specific forms in a Server Manager, click the Help button at the bottom of each form.

Because every NetWare Web Service is configured using NetWare Web Manager and the Server Manager forms, you can easily configure your servers remotely, using any computer in your network.

Figure 1   Remotely Configuring NetWare Web Services

You can use any computer in the network to access NetWare Web Manager and the configuration forms.

Network

One computer runs both NetWare Web Manager and other Web Services.
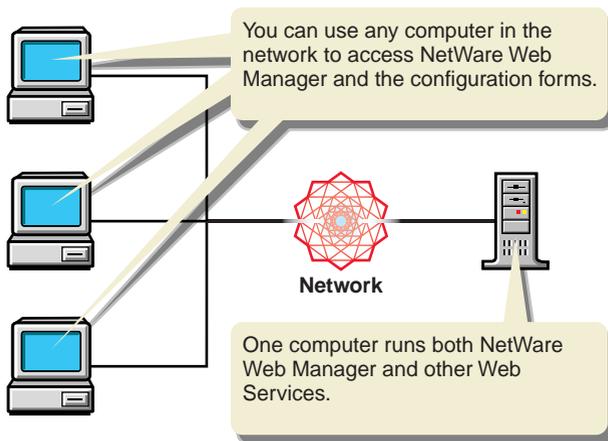
Using NetWare Web Manager

NetWare* Web Manager is the browser-based management tool you use to configure and manage the following NetWare Web services:

- *NetWare Enterprise Web Server*: An HTTP server used to serve up Web pages to the Internet or to an intranet.

- *NetWare News Server*: A news server used to manage Internet or intranet newsgroups for discussing and sharing information.

- *NetWare Web Search Server*: A search server used to build indexes for adding searching capabilities to your Internet or intranet Web sites and can index content located on file or Web servers.

- *NetWare Multimedia Server*: A multimedia server used to serve up multimedia content to Web browsers.

NetWare Web Manager also allows you to manage your users and groups using a local database, LDAP, or Novell Directory Services* (NDS*), manage one or more Web services from a single Web browser, and enable or disable Secure Sockets Layer (SSL).

When you install additional NetWare Web services, they are managed from within NetWare Web Manager. Because the forms for each Web service have a consistent look and feel, you can quickly learn to configure and manage any other service.

NetWare Web Manager is installed when you install your first NetWare Web Service. The directory where you install the servers is called the server root directory.

After installing a server and NetWare Web Manager, use your browser to navigate to NetWare Web Manager, then click its forms to configure your servers. When you submit a form, the Web Manager modifies various configuration files on your NetWare server for the server you are administering.

The URL you use to navigate to NetWare Web Manager depends on the computer hostname and the port number you choose when you install any NetWare Web Service. For example, if you installed NetWare Web Manager on port 2002, the URL might look like this:

https://myserver.novell.com:2002

or

https://137.95.65.150:2002

Before you can access NetWare Web Manager, you are prompted to type a username and password. You set up the administrator username and password when you install the first NetWare Web Service and NetWare Web Manager on your computer.

The first page you see when you access NetWare Web Manager is called the General Administration page (see "The Server Administration Page" on page 16). Your General Administration page might look different depending on the Web Services you have installed.

- The General Administration page contains buttons for configuring NetWare Web Manager settings, which are global settings that affect all other installed Web Services.

- Servers Supporting General Administration displays all of the Web Services installed on the computer (in the same server root directory).

Figure 2   The Server Administration Page
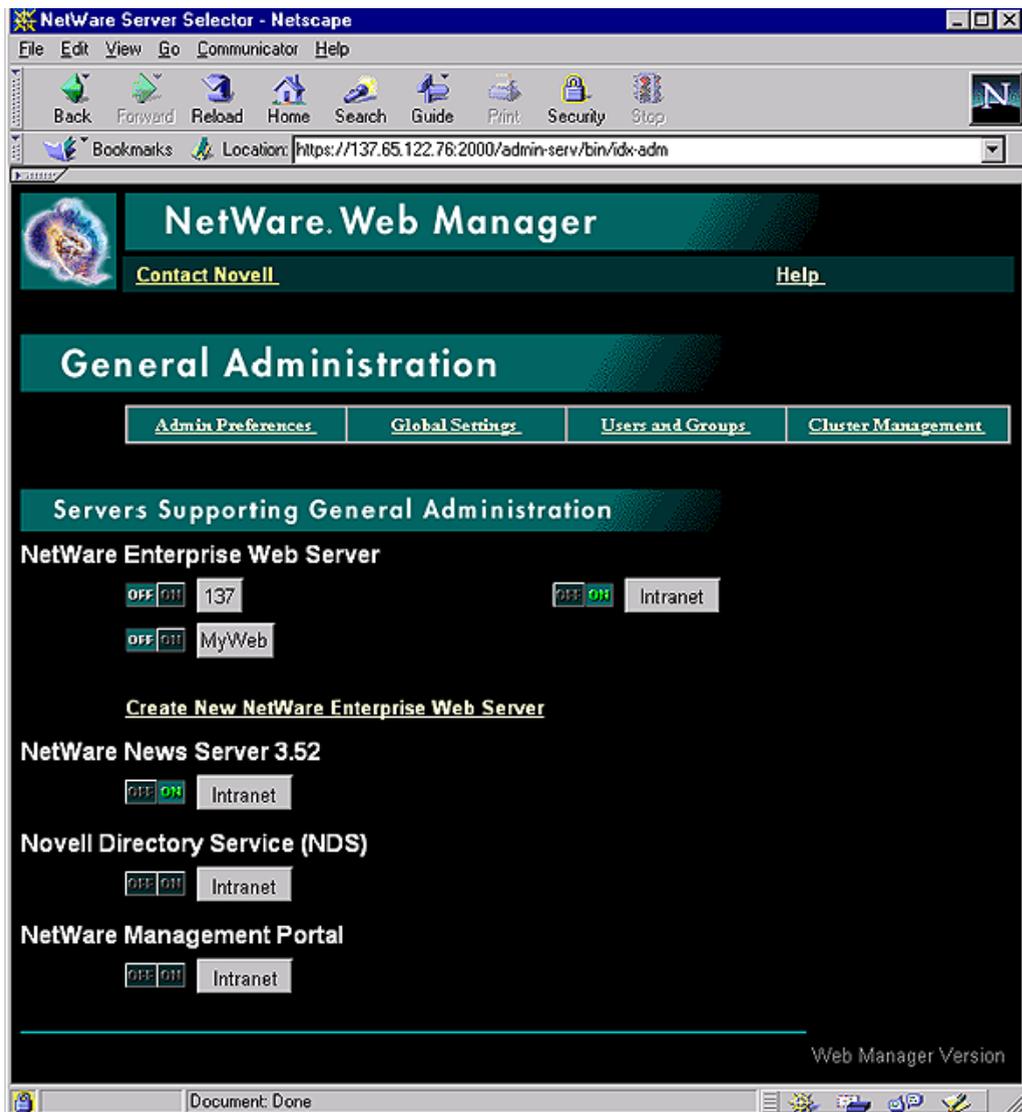
Using the Server Manager Forms

The collection of forms used to configure a single server is called the Server Manager. NetWare Web Manager contains a Server Manager for each Web Service installed on the computer, including one for NetWare Web Manager itself.

The Server Administration page, shown in Figure 2, "The Server Administration Page," on page 16, contains links to each Server Manager.

- ◆ To configure general server preferences, click one of the links on the NetWare Web Manager page.

- ◆ To configure a specific server, click the *server name* button. For help configuring a particular server, see that server's documentation or click Help in any online form.

After clicking a button, you'll see a Server Manager for the server name you clicked. A Server Manager appears as a three-framed page with buttons in the top frame and links in the left frame (see Figure 3, "Enterprise Server's Server Manager Page," on page 18).

Figure 3   Enterprise Server's Server Manager Page
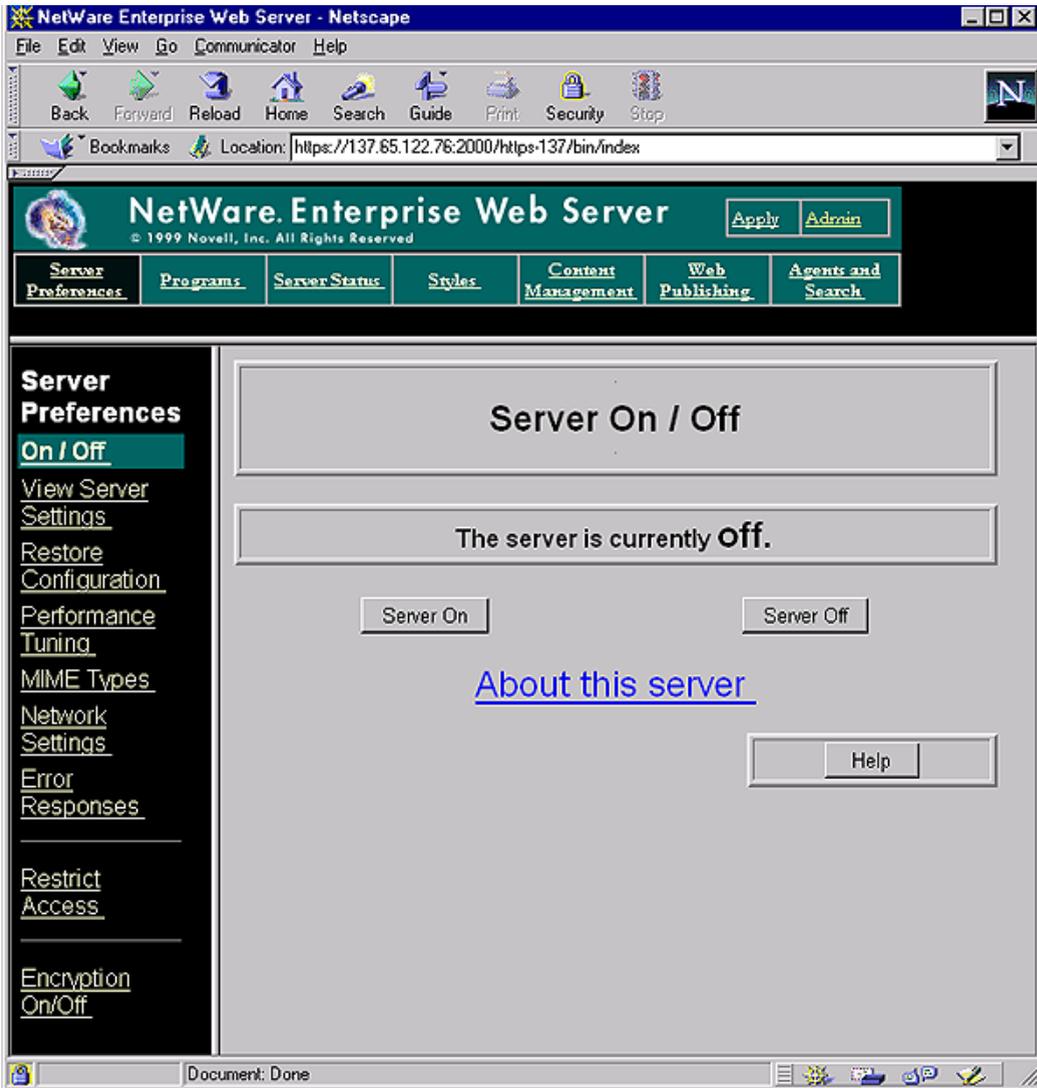
To use the Server Manager, click a category button in the top frame (for example, Server Preferences), then click a link in the left frame (for example, Network Settings). A form appears in the remaining frame where you select options and specify values that configure the server. To submit your changes in the form, click OK. Click Help in any form to get specific directions on using that form.

To return to the Server Administration page, click the Server Administration button in the top frame of the Server Manager.

Stopping NetWare Web Manager

If you enable enduser access to NetWare Web Manager, you should keep NetWare Web Manager running as much as possible. If you don't enable enduser access, consider shutting down NetWare Web Manager when you aren't using it. This minimizes chances of a break in, which could happen if someone learns any of your administrator passwords.

To shut down NetWare Web Manager:

1 Under General Administration, click Admin Preferences > Shut Down Web Manager.

2 Click Shut Down the Administration.

2 Configuring NetWare Web Manager

This section describes the forms in the Admin Preferences and Global Settings categories of General Administration.

Configuring the System User and Port Number

Network settings affect the way NetWare® Web Manager runs. You can change the system user account that runs the Web Manager. This is a user account you set up with your computer's operating system (by default, the user is Admin).

You can also change the port number NetWare Web Manager listens to. The port number can be any number between 80 and 65,535, but it is typically a random number greater than 2000. For security reasons, consider changing the port number regularly.

To change NetWare Web Manager's port number:

1 From the General Administration page, click Admin Preferences > Network Settings.

2 In the Web Manager Port field, type the port number you want NetWare Web Manager to use.

3 Click OK.

4 Restart the server for the settings to take effect.

Securing Web Manager

Secure Sockets Layer (SSL), enabled by default when NetWare Web Manager is installed, is used to secure your NetWare Web Manager. Once enabled, you must use HTTPS to access Web Manager.

Once SSL is enabled, you can then use ConsoleOne to install Public Key Infrastructure Services (PKIS). When you install the Novell Certificate Server (during the NetWare installation), a Key Material Object (KMO) was created by default. A KMO, also called a server certificate object, includes a server certificate and key pair files.

To enable or disable SSL in Web Manager:

1 From the General Administration page of Web Manager, click Admin Preferences > Turn On/Off SSL.

2 Click On to enable, or Off to disable SSL.

3 From the Server Certificate drop-down list, select the Server Certificate object you want to use for SSL encryption.

   HINT: See ConsoleOne Help for more information about configuring security and PKIS.

4 Click OK.

For more information on installing and configuring the Novell Certificate Server, refer to the Novell Documentation Web site (http://www.novell.com/documentation) for the Novell Certificate Server Installation Guide and the NetWare Enterprise Web Server Administration Guide.

Configuring Distributed Administration

Distributed administration lets multiple administrators change specific parts of the server.

An administrator can bypass the Server Administration page and go directly to the Server Manager forms for a specific server, including NetWare Web Manager. An administrator can perform limited administrative tasks and can make changes that affect other users, such as adding users or changing access control.

Working with Log Files

Server log files can help you monitor your server's activity. You can use these logs to monitor your server and troubleshoot problems. Server logs are in a Common Log file Format, a commonly supported format that provides a fixed amount of information about the server.

The ERROR log file, located in ADMIN/LOGS in the server root directory, lists all the errors the server has encountered.

The ACCESS log file, located in ADMIN/LOGS in the server root directory, records information about requests to the server and the responses from the server. You can specify what is included in the ACCESS log file under General Administration.

To configure logging options for NetWare Web Manager:

1 Under General Administration, click Admin Preferences > Logging Options.

2 In the Log Accesses To field, type a path to the directory where you want NetWare Web Manager to store the ACCESS log file.

You can type either an absolute path or a path relative to your server root directory. Leaving this field blank deactivates access logging.

3 Click OK.

Viewing an Access Log File

You can view the server's active and archived access log files under General Administration.

To view an access log:

1 Under General Administration, click Admin Preferences > View Access Log.

2 In the list below the OK, Reset, and Help buttons, select the access log file you want to see.

Active log files for resources and archived log files appear in the list.

3 In the Number of Entries field, type the number of lines you want the access log to display.

4 In the Only Show Entries With field, type the particular word you want to filter the access log entries for.

Case is important. If you use this search feature, the Number of Entries field determines how many entries to search, not how many will display.

5 Click OK.

The following is a sample of an access log in the Common Log file Format:

```
a.nov.com - [16/May/1999:21:18:26 -0800] "GET /admin-serv/
    icons/dot.gif HTTP/1.0" 200 2575

a.nov.com - [17/May/1999:11:04:38 -0800] "GET /admin-serv/
    bin/frames?index+pref HTTP/1.0" 204 342

a.nov.com - [20/May/1999:14:36:53 -0800] "GET /admin-serv/
    manual/ag/config.htm HTTP/1.0" 200 890

arrow.a.com -[20/May/1997:14:36:53 -0800] "GET /admin-serv/
    manual/ag/so.gif HTTP/1.0" 401 571
```

Table 1   Last Line of Access Log

ACCESS Log Field	Example
Hostname or IP address of client	user.novell.com In this case, the hostname is shown because the server is using DNS lookups; if DNS cannot resolve the name or if DNS lookups are disabled, the client's IP address would appear.
Username	john (username entered by the client for authentication)
Date/time of request	29/Mar/1998:4:36:53 -0800
Request	GET /help
Protocol	HTTP/1.0
Status code	401
Bytes transferred	571

Viewing the Error Log File

The ERROR log file contains errors the server has encountered after the log file was created. It also contains informational messages about the server, such as when the server was started and who tried unsuccessfully to login to the server.

To view the ERROR log file:

1 Under General Administration, click Admin Preferences > View Error Log.

2 In the Number of Errors to View field, type the number of lines you want to see.

3 In the Only Show Entries With field, type the particular word that you want to filter the error messages for.

This field is case sensitive.

4 Click OK.

The following is an example of an error log:

```
[13/May/1999:16:56:51] info: successful server startup

[13/May/1999:16:56:51] info: NetWare Web-Administrator
  97.117.0455

[13/Mar/1999:19:08:52] security: for host user.mozilla.com
  trying to GET /admin-serv/bin/index, acl-state reports:
  access of /usr/suitespot/bin/admin/admin/bin/index denied
  by ACL admin-serv directive 3

[13/May/1999 20:05:43] failure: for host ceo.mozilla.com
  trying to POST /admin-serv/bin/distadm, cgi-parse-output
  reports: the CGI program /usr/suitespot/bin/admin/admin/
  bin/distadm did not produce a valid header (program
  terminated without a valid CGI header. Check for core dump
  or other abnormal termination)
```

3 Managing Clusters

This section describes how to manage clusters of servers and explains how you can use clusters to share configurations among various types of servers. The online help contains directions for creating and managing clusters. In the NetWare® Web Manager, click the Help button at the bottom of the cluster management form.

The NetWare Web Manager stores the information about clusters and provides the interface for managing the servers in the clusters. It also lets you

◆ Share one or more configuration files between servers of the same type

◆ Create a central place for administering many different Web Services servers

What Are Clusters?

Clusters are groups of servers that can be administered from a single NetWare Web Manager. All servers in a cluster must be of the same type (Web, proxy, mail, directory, and so on), and the NetWare Web Manager can store a cluster for each type of server. This enables you to have a central NetWare Web Manager to administer all of your NetWare Web Services servers. The servers can be installed on any computer in a network, but the NetWare Web Manager containing the clusters must have access to each of the NetWare Web Managers for each of the servers in the cluster, as shown in .

Figure 4   Sharing Configurations in a Cluster

You can use a single Web Manager to configure multiple NetWare Web or News servers.

A cluster of NetWare Web or News servers can share a configuration. For example, they can all use the same access control rules.
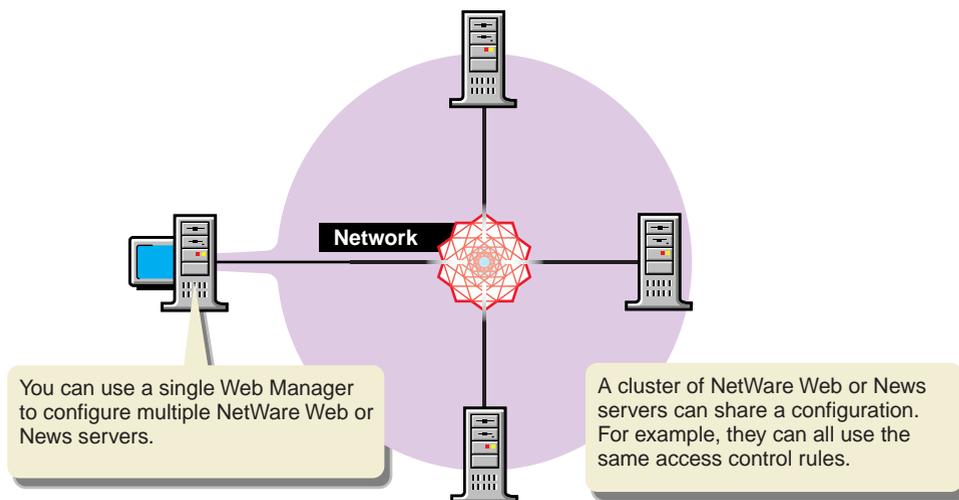
Before Using Clusters

When you configure a cluster, the NetWare Web Manager containing the cluster (the master NetWare Web Manager) communicates with the Web Managers for each of the servers in the cluster. Because of this, each Web Manager in the cluster must have an administrative user and password that the master Web Manager can use to authenticate itself. When you log in to your Web Manager and you supply a username and password, that information is sent to any remote Web Managers in a cluster, as shown in .

IMPORTANT: We recommend that all clustered services reside on physical servers that are in the same NDS tree and context.

Figure 5   Logging In with One Password
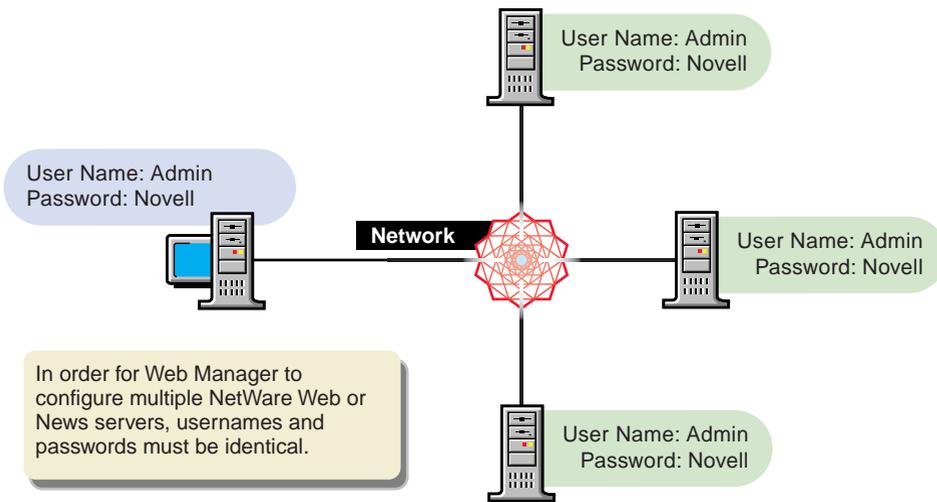
Before you can create a cluster, you must first install all of the servers you want to include in the cluster. For example, if you want one NetWare Web Manager where you can configure two NetWare Enterprise Web Servers, and a NetWare News Server, you first need to install all of the servers (and their respective NetWare Web Managers). Then configure one of the NetWare Web Managers as the master for the clusters. In this example, you'd have one NetWare Web Manager with a cluster containing three Enterprise Web Servers. Remember that a cluster must be of the same type. It doesn't matter which NetWare Web Manager you choose as the master.

The following list offers some guidelines to follow when configuring a cluster:

- ◆ Install the Web Services servers and their respective NetWare Web Managers.

- ◆ Make sure each NetWare Web Manager has a username and password that matches one used in the master NetWare Web Manager. If you are using an LDAP directory, such as a Netscape Directory Server™, you must set up the administrators group first, making sure there is at least one user in the directory that will be used for cluster administration. You can use the distributed administration feature to set up multiple administrators on each NetWare Web Manager.

  If you change the protocol of one NetWare Web Manager in a cluster, you must change the protocols for all NetWare Web Managers, and then you need to update the cluster information by modifying the servers in the cluster.

Setting Up a Cluster

To set up a cluster, first install the servers on the computers you want to include in the cluster. Make sure the NetWare Web Managers for each of the servers have a username and password that the master NetWare Web Manager will use for authentication. You can do this either by using the default username and password or by setting up distributed administration. Install the server product that will contain the master NetWare Web Manager, making sure the username and password matches the one set during installation.

Adding Clusters to the Server List

When you add a server to a cluster, you specify its NetWare Web Manager and port number. If that NetWare Web Manager contains more than one server, all of its servers are added to the cluster. (You can remove the individual servers later.) For example, if a remote NetWare Web Manager has a NetWare News Server and a NetWare Enterprise Web Server, then both servers are added to the cluster in the master NetWare Web Manager.

If the remote NetWare Web Manager contains a cluster, the servers in the remote cluster are not added. The master NetWare Web Manager adds only those servers that are physically installed on the remote NetWare Web Manager computer; it doesn't add servers that might be installed in a cluster on the remote NetWare Web Manager.

To add a server to the cluster list:

1 Under General Administration, click Cluster Management > Add Server.

2 In the Web Manager Hostname field, type in the hostname of the server you want to add.

If your DNS can resolve hostnames, you don't need to type the fully qualified domain name; otherwise type the full host and domain name. For example, type

```
www.company.com
```

3 In the Web Manager Port field, type in the port number of the server you want to add.

4 Click OK to add the remote server.

5 Click Reset to clear all fields if you want start over.

6 After changing the configuration for a remote server, restart the remote server.

If the server information for the new cluster is correct, the server identifiers appear on the form for each server installed on the remote NetWare Web Manager. If you have two or more servers on different computers that use the same identifier, the form shows the server identifier and the hostname for the computer. If both server identifier and hostnames are the same, the form shows the port number. If you don't want all of the servers in the cluster, you can remove individual servers. Servers in a cluster appear on the form with links to their respective Server Manager forms.

Modifying Cluster Information

If you change an NetWare Web Manager's hostname, port number, or protocol (HTTP or HTTPS), you also need to modify the information about that NetWare Web Manager that is stored in the cluster.

To modify information about a server in a cluster, perform the following:

1 Under General Administration, click Cluster Management > Modify Server.

2 Click the Product Selector drop-down list > select the type of server you want to change.

All servers of the type you select appear listed by their unique server identifier.

3 Check the servers you want to modify. You can change the information for all servers in the cluster by clicking

   ◆ Select All to select all the remote servers you have created to the cluster

   ◆ Reset Selection to clear all server options you want to add to your cluster

4 Select the NetWare Web Manager option protocol that the remote NetWare Web Manager uses, if it has changed.

5 If applicable, type the new hostname for the remote NetWare Web Manager in the Web Manager Hostname field.

6 If applicable, type the new port number that the remote NetWare Web Manager uses in the Web Manager Port field.

7 Click OK.

8 Click Reset to clear all fields if you want start over.

Removing Servers from a Cluster

To remove a server from the cluster:

1 Under General Administration, click Cluster Management > Remove Server. The Remove Servers from Cluster Database form will appear.

2 Under the Product Selector drop-down list, select the type of server you want to remove.

3 Check the servers you want to modify. You can change the information for all servers in the cluster by clicking

- ◆ Select All to select all the remote servers you have created to the cluster

- ◆ Reset Selection to clear all server option you want to add to your cluster.

4 Click OK.

The form displays a status saying the servers are removed from the cluster database and are no longer available for cluster control. You can still access the removed servers using their NetWare Web Manager; you just can't access them from the cluster.

Administering Clusters

Once you have created remote servers (see "Adding Clusters to the Server List" on page 30), perform the following steps to control the clusters under your server:

To administer a cluster:

1 Under General Administration, click Cluster Management > Cluster Control.

2 Click the Product Selector drop-down list > select the server software product you want your servers to run.

For example, when you select NetWare Enterprise Web Server, a list of all installed Enterprise servers appear in the form. The cluster form changes to display fields that apply to that server type.

3 Within Check Servers to Control, check the servers you want, then click the button that applies:

- ◆ Select All to select all the remote servers you have created to the cluster.

- ◆ Reset Selection to reset the servers you want to add to your cluster

4 Click Start to start all servers.

5 Click Stop to stop all servers.

6 Click Restart to restart all servers.

7 Click View Access to view the logins of all servers > type in the number of lines the access log will show.

The default is 20.

8 Click View Error to view all server errors.

9 Click Status to view the status of your cluster servers.

4 User and Group Management

NetWare® Web Manager lets you manage the users and groups that access the services provided by your Web Services servers. Because you manage users and groups from the NetWare Web Manager, you use the same interface for user and group management regardless of the type of servers or the number of servers that you are running at your site. This common management scheme provides simplified server administration by letting you maintain a single directory of users for all your Web Services.

This section contains basic information about the differences between using a local database, an LDAP directory service, and Novell® Directory Services® (NDS®).

NOTE: For more information about implementing LDAP with NDS, visit the Novell Support Connection Web site (http://support.novell.com).

The Directory Service

Under General Administration, the Users & Groups area is actually an interface to a directory service. Directory services are a type of software that allows you to maintain information, such as contact information or identification information for the people in your organization. You use a directory service in NetWare Web Manager to store user information, such as user IDs, e-mail addresses, and certificates. This information is typically used when controlling access to a server.

You have a choice of the type of directory service you can use with NetWare Web Manager: You can use a local directory, an LDAP server, or NDS, which is a new option available in NetWare Web Manager. When configured to use NDS, users and groups are maintained by NetWare administration utilities. Thus the Users & Groups area of NetWare Web Manager is disabled. However, in this mode, all access control comes from NetWare file system trustees rights and available NDS usernames and passwords for http authentication.

The Local Directory

The local directory is bundled with each NetWare Web Manager and provides many of the core directory functions available from the directory server. The local directory is intended for sites running stand-alone Web Services, such as the NetWare Enterprise Web Server or NetWare News Server.

The local directory has the following limitations when compared to the Netscape Directory Server LDAP:

- The local directory cannot communicate across the network. It does not use the LDAP protocol. This means your users cannot use an LDAP client to perform directory access. They can, however, access the information through NetWare Web Manager.

- The local directory supports no more than 1,000 entries.

- The local directory is slower on lookups than the directory server because the local directory does not cache entries.

- The local directory does not perform schema checking. This means that the directory will not stop you from using object classes and attributes that are unknown to it.

- The local directory does not perform any kind of access control checking; however, you can configure access to the directory using NetWare Web Manager.

- The local directory cannot be replicated.

You can use only the following two directory server command-line utilities with the local directory.

- LDAPSEARCH: Allows you to search the directory

- LDAPMODIFY: Allows you to add, delete, and modify directory entries

Netscape Directory Server

Based on an open-systems server protocol called the Lightweight Directory Access Protocol (LDAP), Netscape Directory Server is a versatile, scalable server designed to manage an enterprise-wide directory of users and resources. Using the directory server, you can manage all of your user information from a single source. You can also configure the directory server to allow your users to retrieve directory information from multiple, easily accessible network locations.

The use of a directory server to manage your servers' users and groups is recommended for large organizations consisting of up to one million users. The directory server is also ideal for organizations spread across physically different locations and for organizations where balancing the access load to their directory is important. Finally, the directory server is recommended for those organizations interested in enhancing directory availability by placing their directory services on multiple servers.

Novell Directory Services

Novell Directory Services (NDS) is installed with every NetWare 4.*x* system during setup and provides a repository for user and group information that is used to control access to NetWare server resources. The NetWare Enterprise Web Server provides a native NDS integration mode that allows access to Web resources to be protected by native NetWare file system trustee assignments and allows users to log in from an HTTP client using their NDS usernames and passwords.

HTTP access to a file or resource in NDS mode is evaluated using NetWare file system trustee assignments depending on the http method used. defines the NetWare file system trustees required to grant access to Web resources in NDS mode given an HTTP method.

Table 2   HTTP Methods and Associated Netware Trustee Assignment Requirements

HTTP Method	NetWare Trustee Assignment Required for Access
GET	Read
PUT	Create on parent directory if file is being created, or WRITE if file is being replaced
MKDIR	Create
EDIT	Write
HEAD	File Scan
DELETE	Erase
POST	Read on the CGI executable file
INDEX	File Scan
MOVE	Erase and Read on source, Create on destination
COPY	Read on source, Create on destination

When NDS mode is selected:

- Use the Novell administration utilities to maintain user and group information.
- Users will be required to log in from the Web browser to gain access to any Web resources.
- Make sure SSL is enabled if you do not want NDS passwords passed over the wire in the clear.
- The NetWare Web Manager's Users & Groups area is disabled.
- NetWare file system trustees assignments are available exclusively to control access to Web resources.
- Web Manager's Restrict Access area is disabled.
- None of the LDAP command line utilities work natively with NDS.
- NetWare Enterprise Web Server access control lists (ACLs) are disabled.

HINT: NDS provides an intranet solution that allows access to file system resources using a Web browser. NDS mode is not recommended as a configuration.

Directory Service Clients

You must use a directory service client to obtain information from and to put information into a directory service. If you are using the Netscape Directory Server, then any directory client that can use the LDAP protocol can use your directory. This is one of the primary differences between a true directory service and the local database bundled with NetWare Web Manager: the database can communicate only with the local Web Manager, whereas the directory server can communicate with any LDAP-capable client.

Gateways

NetWare Web Manager is actually a type of directory service client known as a gateway. NetWare Web Manager acts as a gateway between the communication protocol used by your Web browser (HTML) and the protocol used by the directory server (LDAP). Of course, if you are using the local database, then the gateway skips the LDAP protocol and accesses the local database directly.

When you first install NetWare Web Manager, you must configure your server to communicate either with the local directory or with the directory server. If you use a directory server, you need to make sure it has at least one user account that NetWare Web Manager can access. This is usually the administrator. Beyond that, you'll experience no difference when using the Users & Groups forms.

For help using the Users & Groups forms, click the Help button at the bottom of any of the Users & Groups forms found in NetWare Web Manager.

Command-Line Clients

Both the directory server and the local directory offer command-line utilities that allow you to search the directory and perform directory modifications from the command line. This allows you to create custom shell scripts or batch files to perform routine, automated tasks on your directory.

The local directory provides two tools for your use: ldapmodify and ldapsearch. These are actually identical to the ldapmodify and ldapsearch command-line tools shipped with the directory server, except that the -C option has been added so that they can work with the local directory. Netscape Directory Server provides many command-line tools to help you administer and maintain your directory. NetWare Administrator provides the NDS to maintain the directory. The NetWare Administrator and RIGHTS.EXE maintain file system trustees.

For more information on the LDAPMODIFY and LDAPSEARCH command-line tools bundled with NetWare Web Manager, see

Authenticating Users to Directory Services

Anytime you perform an operation on a directory service, you must identify yourself to the service. This identification process is known as authentication. You can also think of this process as logging into the directory service.

Authentication allows a directory service to know if you have sufficient permissions to perform operations in the directory. Examples of directory operations are

- Searching the directory
- Adding entries (such as users and groups) to the directory

- Deleting entries from the directory

- Modifying entries in the directory

Usually authentication is not required if all you want to do is search the directory. When you access a directory without providing authentication credentials, you are performing anonymous access.

When you log in to NetWare Web Manager, the username and password that you provide are automatically used by the Users & Groups forms when they communicate with a directory server.

IMPORTANT: If you need to change your administrator password, make sure you change it in the directory server before you change it in NetWare Web Manager.

Distinguished Names

A distinguished name (DN) is the string representation for the name of an entry in a directory server or in a local directory. You use DNs when naming entries using the LDAP Data Interchange Format (LDIF) and the LDAP command-line clients, and when configuring the directory server and so forth.

Traditionally, a DN consists of the following items, in this order:

- Common name or a user ID

- List of regional or organizational attributes

- Country designation

This string of identifying attributes uniquely locates the entry within your directory. If you choose, you can also use this naming structure to uniquely identify your entries within the global directory tree as defined in the X.500 standard.

Distinguished Name Syntax

The traditional syntax for a DN string representation is the following:

```
cn=common name, street=address, l=locality, st=state or
  province, ou=organizational unit, o=organization,
  c=country name
```

A DN can consist of virtually any attributes you want to use. However, if you are using the LDAP server and schema checking is turned on, then the attributes must be recognized by the directory server, and the attribute must be allowed by the entry's object classes.

For more information on object classes and attributes, and your directory server's schema, visit the Knowledgebase on the Novell Support Connection Web site (http://support.novell.com).

Generally, however, a DN begins with a specific common name and gives increasingly broader areas of identification, ending with the country name. However, the DN attributes you use and the order in which you organize them is up to you. The only requirement is that DN attributes must be separated by a comma and can optionally use a space following the separator.

Using UID-Based Distinguished Names

One common variation on the traditional distinguished name identified here is to use a user ID (UID) in the place of a common name (CN). Because user IDs are typically unique values across an enterprise, basing your distinguished name on user IDs allows you to avoid CN collision problems caused by people who share the same name. By default, NetWare Web Manager uses CN-based distinguished names, but you can change this behavior so that it creates UID-based distinguished names instead. You do this by editing the file

server_root/ADMIN-SERV/CONFIG/DSGW-ORGPERSON.CONF

and setting the useUidForDN variable to true.

Distinguished Name Usage

Once you have organized your directory structure, you must always specify the DN attributes in the same order because a DN represents a path through the directory tree. For example, the following DNs do not represent the same entry:

```
cn=Ralph Swenson, ou=Accounting, o=Ace Industry, c=US
  cn=Ralph Swenson, o=Ace Industry, ou=Accounting, c=US
```

Also, distinguished names representing branch points in the directory do not typically begin with a common name value. Rather, they usually begin with some sub-element in the directory path. For example, if your directory contained entries of the form

```
cn=name, ou=Marketing, o=Ace Industry, c=US
```

then your directory would also contain the entries,

```
o=Ace Industry, c=USou=Marketing, o=Ace Industry, c=US
```

These two entries must appear in the directory before the entries represented by a common name can appear.

Distinguished Name Examples

The following are some examples of distinguished names:

```
cn=Wally Henderson,ou=Product Development,o=Bait and Tackle
  Inc, st=Minnesota,c=US
```

```
cn=Ashley Sweeny, ou=Product Test, o=Bait and Tackle Inc,
  st=Michigan, c=US
```

```
cn=printer3b, l=room 308, o=Acme Programming Ltd,
  c=USDistinguished name attributes
```

The various standard attributes that comprise a DN are in the following table:

Attribute	Name	Definition
c	Country	Identifies the name of the country under which the entry resides. Must be the two-letter country code, for example, c=USc=GB
cn	Common Name	Identifies the person or object defined by the entry, for example, cn=Wally Hendersoncn = Database Administratorscn= printer3b
uid	User Id	Identifies the person or object defined by the entry. DNs based on UIDs are often preferred over CN-based DNs because they avoid duplicated distinguished names caused by people who share the same name.

Attribute	Name	Definition
l	Locality	Identifies the locality in which the entry resides. The locality could be a city, county, township, or other geographic region, for example, l=Tucson or l=Pacific Northwest.
o	Organization	Identifies the organization in which the entry resides, for example, o=Novell Inc, or o=Public Power & Gas.
ou	Organizational Unit	Identifies a unit within the organization, for example, ou=Sales, or ou=Manufacturing.
st	State or province name	Identifies the state or province in which the entry resides, for example, st=Iowa, or st=British Columbia.
street	Street address	Identifies the street address at which the entry resides, for example, street=494 Rice Creek Terrace.

Using Commas in Distinguished Names

If a distinguished name contains a comma, then the part of the name that uses the comma must also be enclosed in double-quotation marks. For example, to include the string Ace Industry, Corp in your distinguished name, type it as follows:

```
o="Ace Industry, Corp", c=US
```

Planning Your Directory Structure

Directories are usually organized in a tree-like structure. The top of the tree is known as the root.

A typica tree has several branch points below the root. These branch points usually represent major organizational units within the larger organization.

For more information about trees, visit the Novell Documentation Web site (http://www.novell.com/documentation).

The following sections discuss the pros and cons of creating subdivisions within your directory.

Disadvantages of Organizational Units

Be aware that the flatter the structure of a directory, the easier your directory is to manage. The following are some of the reasons:

- ◆ Moving directory entries from one organizational unit to another involves deleting the entry from the original organizational unit and recreating it under the new organizational unit.

- ◆ To delete or rename organizational units, you must delete every entry from beneath the organizational unit, rename or delete the unit, and then recreate all of the deleted entries in another part of the directory tree. Because this task is tedious, you should be careful about creating organizational units in your directory tree if your company tends to reorganize frequently.

If you are using Netscape Directory Server, then you can create tools to perform these tasks, either by using shell scripts or batch files to call the appropriate command-line utilities or by writing programs that make use of the Netscape Directory Server client SDK.

Advantages of Organizational Units

A directory tree with many subdivisions has many advantages. An obvious one is that you can easily search for everyone who works for a specific organization. If you are using a directory server, there are several other benefits to a subdivided directory.

- ◆ If you are using replication, then you can manage sub-trees on servers local to the organizations that they represent. This allows for local control of organizational information.

- You can also replicate specific sub-trees to other directory servers. If you have certain entries that you want other organizations to view and other entries that you want to remain private, then you can easily provide access to the public entries by replicating them to a public directory server. This strategy is especially useful if you want to make some information available outside of a firewall, while making other information available only inside the firewall.

- Even if replication is not in use, you can easily restrict or allow access to entries representative of an organization if they are logically organized together in the directory tree.

For information on replication and directory access control, see Controlling Access to Your Server in the NetWare Enterprise Web Server Administration Guide.

Recommendations for Using Organizational Units

A flat directory structure is the easiest to administer, but not necessarily the easiest to use. You should therefore consider the following when planning your directory:

- Use a directory structure that is subdivided along the lines of the major functional activities in your organization. These subdivisions can represent actual division names but refrain from using these names if your organization tends to frequently reorganize.

- If you work for an organization that frequently reorganizes or if your organization is young and still growing, then use generic names to represent major activities. For example, if your company has the following organizations:

  - Product Marketing for Product 1
  - Product Marketing for Product 2
  - Product Development and Documentation for Product 1
  - Product Development and Documentation for Product 2
  - Product Sales-East Coast
  - Product Sales-West Coast

then try to use generic divisions within your directory, such as the following:

- ◆ Marketing

- ◆ Development

- ◆ Sales

◆ Consider geographic divisions as an alternative to organizational divisions, especially if your organization has major geographic points of activity. For example, if you have business offices in several cities, consider using branch points based on the city names.

◆ Try not to divide your directory down to the smallest business unit or department name. This detailed level of division creates maintenance difficulties. For the same reason, try to avoid branching your directory to more than two or three levels deep.

Configuring Directory Services

To organize your users and groups, you can choose the local directory, LDAP server, or NDS modes. When you first install NetWare Web Manager, you configure the server to use either the local directory or a directory server. NDS is selected by default.

You can change this configuration after NetWare Web Manager is installed. The following sections describe how to configure NetWare Web Manager to use these three directory services.

IMPORTANT: Regardless of which directory service you choose to use, access to NetWare Web Manager is still handled by NDS. If you choose LDAP or local directory modes, you will be required to enter a fully distinguished name as the user name, when prompted.

Using the Local Directory

To configure a local directory:

1 Under General Administration, click Global Settings > Configure Directory Service.

2 Select Local Database.

A dialog box appears to warn you that you will lose your directory service configuration information.

3 Click OK.

4 In the Base DN field, type the distinguished name that will be used as a suffix for your local directory and also as the point from which directory lookups will occur by default.

An example of a suffix that you could enter here is

```
o=your company name, c=US
```

If you do not enter a value in this field, then your suffix will be a null string, and all searches will begin from the top or root point of the directory.

5 Click Save Changes.

Using the LDAP Server

IMPORTANT: Before switching to NDS mode, you must first enable unencrypted passwords by opening the properties of your LDAP Server object using NetWare Administrator.

To configure the LDAP server:

1 Under General Administration, click Global Setting > Configure Directory Service.

2 Click LDAP Directory Server.

A dialog box appears to confirm that you want to use a Directory Server.

3 Click OK.

4 In the Host Name field, type the hostname where the directory server is running.

You must enter a hostname even if the directory server is running on the local machine.

5 In the Port field, type the default number if your directory server is using a different port number than the default port number 389.

If you are going to use SSL communications with a directory server, then you should enter the port number that the directory server is using for SSL communications. By default, this is port number 636.

6 In the Base DN field, type the distinguished name that will be the point from which directory lookups will occur by default and will be the location where all NetWare Web Manager's entries will be placed in your directory tree.

An example of a base DN that you could enter here is

`o=`*`your company name`*`, c=US`

7 In the Bind DN field, type the bind DN that NetWare Web Manager will use to initially bind (or log in) to the directory server.

This bind DN only requires Read and Search access to the directory. Because this DN and the associated password (if any) is easily compromised, it is best to simply leave this field blank and then set up your directory server to allow anonymous search access. If you do not want to allow anonymous search access to your directory, then specify a bind DN entry here that only has Read and Search access to your directory.

IMPORTANT: Do not specify your directory server's unrestricted user (Root DN) in this field. This bind DN is used only to initially search for the username you typed in NetWare Web Manager authentication dialog box. Once the entry corresponding to this username is located, NetWare Web Manager rebinds to the directory server using the retrieved entry. Therefore, if the username you supplied when you first logged into NetWare Web Manager does not have access to the directory server, you will not have any access to the directory server, regardless of the bind DN information provided in this field.For more information on how NetWare Web Manager binds to the directory server, see "NetWare Web Manager Basics" on page 13.

8 In the Bind Password field, type the password for the bind DN entry, if you have entered a bind DN in the previous field.

9 Click Save Changes.

IMPORTANT: If you change directory service from a local file to a directory server and visa-versa, you need to restart all Web Services servers, including NetWare Web Manager.

Using Novell Directory Services

To configure the NetWare Enterprise Web Server to use NDS®:

1 Under General Administration, click Global Settings > Configure Directory Service.

2 Select Novell Directory Services.

A dialog box appears to confirm that you want to use NDS.

3 Click OK.

4 Click Insert Context to add a new search context.

5 Click Remove Context to remove one or more search contexts.

6 Click Float Context to move the selected context to a higher priority context.

7 Click Save Changes.

If you change directory service from a local or remote LDAP directory to NDS, you need to restart all Web Services servers. NetWare Web Manager does not need to be restarted because its configuration is dynamically updated to refer to the NDS operation mode.

HINT: NDS does not allow public access to files. All users must be authenticated before receiving any content.

5 Configuring Users and Groups

This section describes how to use the forms in the general administration Users & Groups area. This section covers creating and managing users, groups, and organizational units; importing a directory from LDAP Data Interchange Format (LDIF); and exporting a database to LDIF.

HINT: If you are using Novell® Directory Services® (NDS®) mode, you can use the NetWare® administration tools to manage users and groups, or you can now use NetWare Web Manager.

Creating Users

To create a user entry within the directory:

1 Under General Administration, click Users & Groups > *organization* > New User.

2 In the appropriate fields, type the requested information. At a minimum, you must specify the user's

* Surname

* User ID

HINT: The user ID is generated as the first initial of the user's first name followed by the user's last name. You can replace this user ID with an ID of your own choice if you want.

The user ID must be unique. NetWare Web Manager ensures that the user ID is unique by searching the entire directory from the search base (base DN) down to see if the user ID is in use. Be aware, however, that if you use the ldapmodify command-line utility to create a user, it does not ensure unique user IDs. If duplicate user IDs exist in your directory, the effected users will not be able to authenticate to the directory.

3 Click Create User to add a user.

4 Click Create and Edit User to add a user and then proceed to the Edit User form for the user you have just added.

For information on editing users, see .

Additional Information about User Entries

The following information may be of interest to the directory administrator concerning creating user entries:

- User entries use the inetOrgPerson, organizationalPerson, and person object classes. For more information on how these are used, search the Novell Support Connection Web site at (http://support.novell.com).

- By default, the distinguished name for users is as follows:

```
cn=full name, ou=organization, ...,o=base organization,
  c=country
```

For example, if a user entry for Sam Warden is created within the organizational unit Engineering, and the directory's suffix is o=Ace Industry, c=US, then the person's DN is

```
cn=Pamela Jensen, ou=Engineering, o=Ace Industry, c=US
```

However, you can change this format to a UID-based distinguised name. For information on how to set this default, see .

- Suffixes are optional if you are using the local directory. If you did not configure a suffix for your local directory, then you literally use the string "" (quote quote) to represent the search base on calls to ldapsearch.

- The values on the user form fields are stored as the following LDAP attributes:

User Field	Corresponding LDAP Attribute
Given Name	givenName
Surname	sn
Full Name	cn
User ID	uid
Password	userPassword
E-Mail Address	mail

The following fields are also available when editing the user entry:

User Field	Corresponding LDAP Attribute
Title	title
Telephone	telephoneNumber

Managing Users

You edit user attributes from the Manage Users form. From this form you can

- Find user entries
- Change user attribute values
- Change the user's password
- Manage the user's licenses
- Rename the user's entry
- Delete the user's entry
- Change some, but not all, product-specific information. Web Services servers add additional forms to this area that allow you to manage product-specific information. For example, if a News Server is installed under NetWare Web Manager, then an additional form is added that allows you to edit News Server-specific information. See NetWare News Server Administration Guide for more details.

The following sections describe these activities in detail.

For more information regarding user entries when using a directory server, see

Finding User Entries

Before you can edit a user entry, you must display the entry.

To find an entry if running LDAP or Local Directory modes:

1 Under General Administration, click Users & Groups > Manage Users.

2 In the Find User field, type some descriptive value for the entry that you want to edit. You can enter any of the following in the search field:

- A name: Type a full name or a partial name.
- A user ID.

- ◆ A telephone number.

- ◆ An e-mail address: Any search string containing an at (@) symbol is assumed to be an e-mail address.

- ◆ An asterisk (*): Type an asterisk to see all of the entries currently in your directory. You can achieve the same effect by simply leaving the field blank.

- ◆ Any LDAP search filter: Type a search filter to see any string that contains an equal sign (=) that is considered a search filter.

3 In the Format field, select either On-Screen or Printer.

4 Click Find.

5 In the resulting table, click the name of the entry that you want to edit.

The user edit form is displayed.

6 Change the displayed fields as desired.

7 Click Save Changes.

The Find All Users Whose Field

This field allows you to build a custom search filter. Use this field to narrow down the search results returned by Find User.

Find All Users Whose provides the following search criteria:

1. The left drop-down list allows you to specify the attribute on which the search will be based.

   The options include the following:

   - ◆ Full Name

   - ◆ Last Name

   - ◆ User ID

   - ◆ Phone Number

   - ◆ E-Mail Address

2. The center drop-down list allows you to select the type of search you want to perform.

The options include the following:

- Contains: Entries with attribute values containing the specified search string are returned.

- Is: Use this option when you know the exact value of an user's attribute.

- Isn't: Returns all the entries whose attribute value does not exactly match the search string. For example, if you want to find all the users in the directory whose names are not "Sam Warren," use this option.

    IMPORTANT: Use of this option can cause an extremely large number of entries to be returned to you.

- Sounds Like: Causes an approximate, or phonetic, search to be performed. Use this option if you know an attribute's value, but you are unsure of the spelling. For example, if you are not sure if a user's name is spelled Sarret, Sarette, or Sarett, use this option.

- Starts With: Returns all the entries whose attribute value starts with the specified search string.

- Ends With: Returns all the entries whose attribute value ends with the specified search string.

3. In the right-most text field, type your search string.

Editing User Information

To change a user's entry:

1 Under General Administration, click Users & Groups > Manage Users.

2 Find the user entry you want.

See "Finding User Entries" on page 53 for more information.

3 Edit the field corresponding to the attribute that you wish to change.

4 Click Save Changes.

HINT: You might want to change an attribute value that is not displayed by the edit user form. In this situation, use the ldapmodify command-line utility.

You can change the user's first, last, and full name field from this form, but to fully rename the entry (including the entry's distinguished name), you need to use the Rename User form. For more information on how to rename an entry, see "Renaming Users" on page 56.

Managing a User's Password

The password you set for user entries is used by the various Web Services for user authentication.

To change or create a user's password:

1 Under General Administration, click Users & Groups > Manage Users.

2 Find the user entry you want.

See "Finding User Entries" on page 53 for more information.

3 Click Password at the top of the User Edit form.

4 Type the new password > type the confirmation password.

5 Click Set Password.

6 Click General to return to general user information.

You can also disable the user's password by clicking Disable Password. Doing this prevents the user from logging into a Web Services server without deleting the user's directory entry. You can reinstate the password by using the Password Management form to enter a new password.

Managing User Licenses

To track which Web Services your users are licensed to use:

1 Under General Administration, click Users & Groups > Manage Users.

2 Click Licenses at the top of the User Edit form.

3 Check next to the Web Services that you want the user to be able to use.

4 Click Save Changes.

5 Click General to return to general user information.

HINT: Currently Web Services do not enforce these licenses.

Renaming Users

To rename a user entry:

1 Under General Administration, click Users & Groups > Manage Users.

2 Select the user entry you want.

See Finding User Entries for more information.

3 Click Rename User.

4 Type the new name.

If you are using common name-based DNs, specify the user's full name. If you are using UID-based distinguished names, enter the new UID value that you want to use for the entry.

5 Type the modified given name, surname, full name, or UID in the applicable fields as is appropriate to match the new distinguished name for the entry.

If you are using common name-based distinguished names, and you change the distinguished name to use a new common name, then you should make sure that this new common name is listed as the first choice in the list of full names. This ensures that the appropriate name is displayed when a list showing this entry is generated.

HINT: The rename feature changes only the user's name; all other fields are left intact. In addition, the user's old name is still preserved so searches against the old name will still find the new entry.

When you rename a user entry, you can only change the user's name; you cannot use the rename feature to move the entry from one organizational unit to another. For example, suppose you have

◆ Organizational units for Marketing and Accounting

◆ An entry named James Warren under the Marketing organizational unit

You can rename the entry from James Warren to Jim Warren, but you cannot rename the entry such that James Warren under the Marketing organizational unit becomes James Warren under the Accounting organizational unit.

6 To return to the general information form, click General.

Removing Users

To delete a user entry:

1 Under General Administration, click Users & Groups > Manage Users.

2 Find the user entry you want.

See for more information.

3 Click Delete User > OK.

Creating Groups

To create a group entry within the directory:

1 Under General Administration, click Users & Groups > New Group.

2 In the Group Name field, type the group's name.

You can optionally add a description for the group in the Description field.

3 Click Create Group to add the group and immediately return to the New Group form.

4 Click Create and Edit Group to add the group and then proceed to the Edit Group form for the group you have just added.

For information on editing groups, see "Editing Group Attributes" on page 60.

Managing Groups

You edit groups and manage group memberships from the Group Edit form.

From this form you can

 • Find groups
 • Change group attributes
 • Add and delete owners of the group
 • Add and delete see also information
 • Add and delete members of the group
 • Rename the group
 • Delete the group
 • Change the group's description.

The following sections describe these activities in detail.

Finding Group Entries

To find group entries:

1 Under General Administration, click Users & Groups > Manage Groups.

2 In the Find Group field, type the name of the group that you want to find.

You can enter any of the following in the search field:

- ◆ A name: Type a full name or a partial name.

- ◆ An asterisk (*): Type to see all of the groups currently residing in your directory.

- ◆ Any LDAP search filter: Type to see any string that contains an equal sign (=) that is considered to be a search filter.

3 In the Format field, select either On-Screen or Printer.

4 Click Find.

5 In the resulting table, click the name of the entry you want to edit.

The Find All Groups Whose Field

This field allows you to build a custom search filter. Use this field to narrow down the search results.

Find All Groups Whose provides the following search criteria:

1. The left drop-down list allows you to specify the attribute on which the search is based.

   The options are

   - ◆ Full Name

   - ◆ Description

2. In the middle drop-down list, select the type of search you want to perform.

   The options include the following:

   - ◆ Contains: Entries with attribute values containing the specified search string are returned.

   - ◆ Is: Use this option when you know the exact value of a group's attribute.

   - ◆ Isn't: Returns all the entries whose attribute value does not exactly match the search string. If you want to find all the groups in the

directory whose names do not contain "administrator," use this option.

- ◆ Sounds Like: Causes an approximate, or phonetic, search to be performed. Use this option if you know an attribute's value, but you are unsure of the spelling. For example, if you are not sure if a group's name is spelled Sarret's list, Sarette's list, or Sarett's list, use this option.s

- ◆ Starts with: Returns all the entries whose attribute value start with the specified search string.

- ◆ Ends with: Returns all the entries whose attribute values end with the specified search string.

3. In the right text field, type your search string.

For more information on how to find a group entry, see .

Editing Group Attributes

To change a group entry:

1 Under General Administration, click Users & Groups > Manage Groups.

2 Find the group you want to edit.

See for more information.

3 In the Group Edit form, change the displayed fields as desired.

4 Click Save Changes.

HINT: To change an attribute value that is not displayed by the group edit form, use the ldapmodify command-line utility.

Adding Group Members

To add members to the group

1 Under General Administration, click Users & Groups > Manage Groups.

2 Find the group you want to edit.

See for more information.

3 Click Edit under Group Members.

A new form is displayed that allows you to search for entries. If you want to add user entries to the list, make sure Users is shown in the Find drop-down list. If you want to add group entries to the group, make sure Group is shown.

4 In the right-most text field, type a search string.

Type any of the following:

- A name: Type a full name or a partial name.

- A user ID: Use if you are searching for user entries.

- A telephone number

- An e-mail address: Any search string containing an at (@) symbol is assumed to be an e-mail address.

- An asterisk (*): Type an asterisk to see all of the entries or groups currently residing in your directory.

- Any LDAP search filter: Type a search filter to see any string that contains an equal sign (=) is considered to be a search filter.

5 Click Find and Add to find all the matching entries and add them to the group.

If the search returns any entries that you do not want add to the group, check the box in the Remove from List column. You can also construct a search filter to match the entries you want removed and then click Find and Remove.

6 When the list of group members is complete, click Save Changes.

Adding Groups to the Group Members List

You can add groups (instead of individual members) to the group's members list. Doing so causes any users belonging to the included group to become a member of the receiving group. For example, if Sam Warren is a member of the Marketing Managers group, and you make the Marketing Managers group a member of the Marketing Personnel group, then Sam Warren is also a member of the Marketing Personnel group.

To add a group to the members list of another group, add the group as if it were a user entry. See "Adding Group Members" on page 60 for more information.

Removing Entries from the Group Members List

To delete an entry from the group members list:

1 Under General Administration, click Users & Groups > Manage Groups.

2 Find the group you want to edit.

See "Finding Group Entries" on page 59 for more information.

3 Click Edit under Group Members.

4 For each member that you want to remove from the list, check the corresponding box under the Remove from List column.

5 Click Save Changes.

Managing Owners

You manage a group's owners list the same way as you manage the group members list. The following table shows you which section to read for more information.

If you want to	Use the steps in
Add owners to the group	"Adding Group Members" on page 60
Add groups to the owners list	"Adding Groups to the Group Members List" on page 61
Remove entries from the owners list	"Removing Entries from the Group Members List" on page 62

Managing See Alsos

See Alsos are references to other directory entries that may be relevant to the current group. They allow users to easily find entries for people and other groups that are related to the current group.

You manage see alsos the same way as you manage the group members list. The following table shows you which section to read for more information.

If you want to	Use the steps in
Add users to see alsos	"Adding Group Members" on page 60
Add groups to see alsos	"Adding Groups to the Group Members List" on page 61

If you want to	Use the steps in
Remove entries from see alsos	"Removing Entries from the Group Members List" on page 62

Removing Groups

To delete a group:

1 Under General Administration, click Users & Groups > Manage Groups.

2 Find the group you want to delete.

See "Finding Group Entries" on page 59 for more information.

3 Click Delete Group > OK.

Renaming Groups

To rename a group:

1 Under General Administration, click Users & Groups > Manage Groups.

2 Find the group you want to edit.

See "Finding Group Entries" on page 59 for more information.

3 Click Rename Group.

4 Type the new group name.

When you rename a group entry, you only change the group's name; you cannot use the Rename feature to move the entry from one organizational unit to another. For example, suppose you have

◆ Organizational units for Marketing and Engineering

◆ A group named Research and Development under the Engineering organizational unit.

You can rename the group from Research and Development to Development and Research, but you cannot rename the entry such that Research and Development under the Engineering organizational unit becomes Research and Development under the Marketing organizational unit.

Creating Organizational Units

To create an organizational unit:

1 Under General Administration, click Users & Groups > New Organizational Unit.

2 In the Unit Name field, type the name of the organizational unit.

3 In the optional Description field, you can type a description of the unit.

4 Click Create Organizational Unit.

Additional Information about Organizational Units

The following information may be of interest to the directory administrator:

- New organizational units are created using the organizationalUnit object class.

- The distinguished name for new organizational units is of the form:

```
ou=new organization, ou=parent organization, ...,o=base
    organization, c=country
```

For example, if you create a new organization called Accounting within the organizational unit West Coast, and your Base DN is o=Ace Industry, c=US, then the new organization unit's DN is

```
ou=Accounting, ou=West Coast, o=Ace Industry, c=US
```

Managing Organizational Units

- Find organizational units

- Remove organizational units

- Edit organizational unit attributes

- Rename organizational units

- Delete organizational units

Finding Organizational Units

To find organizational units:

1 Under General Administration, click Users & Groups > Manage Organizational Units.

2 In the Find Organizational Unit field, type the name of the unit you want to find. You can enter any of the following in the search field:

- ◆ A name: Type a full name or a partial name.

- ◆ An asterisk (*): Type to see all of the groups currently residing in your directory.

- ◆ Any LDAP search filter: Type to see any string that contains an equal sign (=) is considered to be a search filter.

3 In the Format field, select either On-Screen or Printer.

4 Click Find.

5 Click the name of the organizational unit that you want to find.

The Find All Units Whose Field

This field allows you to build a custom search filter. Use this field to narrow down the search results that are otherwise returned by Find organizational unit.

Find All Units Whose provides the following search criteria:

1. The left drop-down list allows you to specify the attribute on which the search will be based.

    The options include the following:

    - ◆ Unit name
    - ◆ Description

2. In the center drop-down list, select the type of search you want to perform.

    The options include the following:

    - ◆ Contains: Entries with attribute values containing the specified search string are returned.
    - ◆ Is: Returns the exact value of an organizational unit's attribute.

- ◆ Isn't: Returns all the entries whose attribute value does not exactly match the search string. If you want to find all the organizational units in the directory whose name does not contain "Marketing," use this option.

- ◆ Sounds Like: Causes an approximate, or phonetic, search to be performed. Use this option if you know an attribute's value, but you are unsure of the spelling.

- ◆ Starts With: Returns all the entries whose attribute value starts with the specified search string.

- ◆ Ends With: Returns all the entries whose attribute value ends with the specified search string.

3. In the right text field, type your search string.

For more information on how to find an organizational unit entry, see "Finding Organizational Units" on page 65.

Editing Organizational Unit Attributes

To change an organizational unit entry:

1 Under General Administration, click Users & Groups > Manage Organizational Units.

2 Find the organizational unit you want to edit.

See "Finding Organizational Units" on page 65 for more information.

3 In the organizational unit edit form, change the displayed fields as desired.

4 Click Save Changes.

HINT: It is possible that you will want to change an attribute value that is not displayed by the organizational unit edit form. In this situation, use the ldapmodify command-line utility.

Renaming Organizational Units

To rename an organizational unit entry:

1 Make sure no other entries exist in the directory under the organizational unit that you want to rename.

2 Under General Administration, click Users & Groups > Manage Organizational Units.

3 Find the organizational unit you want to edit.

See for more information.

4 Click Rename.

5 Type the new organizational unit name.

When you rename an organizational unit entry, you can only change the organizational unit's name; you cannot use the Rename feature to move the entry from one organizational unit to another. For example, suppose you have

- Organizational units for Marketing and Engineering
- An organizational unit called User Research under the Marketing organizational unit

You can rename the entry from User Research to User Validation, but you cannot rename the entry such that User Research under the Marketing organizational unit becomes User Research under the Engineering organizational unit.

Deleting Organizational Units

To delete an organizational unit entry:

1 Make sure no other entries exist in the directory under the organizational unit that you want to rename.

2 Under General Administration, click Users & Groups > Manage Organizational Units.

3 Find the organizational unit you want to delete.

See for more information.

4 Click Delete > OK.

Importing a Directory from LDIF

If you do not currently have a directory or if you want to add a new sub-tree to an existing directory, you can use the Users and Groups import function. This function accepts a file containing LDAP Data Interchange Format (LDIF) and attempts to build a directory or a new sub-tree from the LDIF entries.

If you are using the local directory, the import function will optionally overwrite any existing directories. If you are using a directory server and you attempt to import an entry that already exists, then that operation will fail.

To merge LDIF formatted entries into an existing directory (either for a local directory or for directory server), it is best to convert the LDIF to LDIF update statements and use ldapmodify to perform the merge.

To create an new directory or sub-tree:

1 Under General Administration, click Users & Groups > Import.

2 In the Import from LDIF File field, type the full pathname to the LDIF file containing the entries you want to add to your directory.

3 Check Stop On Errors if you want the import to fail completely if any single add operation fails.

4 If you are using the local directory, check Erase Existing Database if you want your existing database to be erased when a new directory is imported from LDIF.

If Erase Existing Database is not checked, then the import function will attempt to add the contents of the LDIF file to the existing directory. However, if the import function attempts to add an entry to the directory that already exists, an error is returned. Whether the import function continues or stops immediately is dependent on whether Stop On Errors is checked.

5 Click Begin Import.

Exporting a Directory to LDIF

You can export your current directory to LDIF using the Users and Groups export function. This function creates an LDIF-formatted file that represents your directory.

To export your directory to an LDIF file:

1 Under General Administration, click Users & Groups > Export.

2 In the Export to LDIF File field, type the full pathname to the file in which you want the LDIF to be placed.

Note that if you do not enter a full pathname, the file is placed in NSHOME\DB\LDAP\TOOLS, where NSHOME is NetWare Web Manager's installation root directory.

3 If you are exporting a local directory to the directory server, specify a suffix in the Suffix to Add field.

The suffix you specify must match at least one of the suffixes configured for your directory server.

4 Click OK.

6 Modifying the Directory

You can modify directory entries using either the Users & Groups area of NetWare® Web Manager, which provides you with only essential modification capabilities, or you can use the ldapmodify command-line tool for more complex modifications that involve a wider range of attributes and attribute values.

ldapmodify

You use ldapmodify to add, delete, or modify entries in your directory. It can be used either with the directory server or with a local directory that is bundled with NetWare Web Manager.

You direct ldapmodify's actions through LDAP Data Interchange Format (LDIF) update statements.

You can find ldapmodify at the following location under NetWare Web Manager:

NOVONYX\SUITESPOT\USERDB\LDAP\TOOLS\

LDIF Update Statements

You use LDIF update statements to define how ldapmodify should change your directory. In general, LDIF update statements are a series of statements that

- Specify the distinguished name of the entry to be modified.

- Specify a change type that defines how a specific entry is to be modified (add, delete, modify, or modrdn). Note that a change type is required unless you specify the -a option. If you specify the -a option, then an add

operation (CHANGETYPE: ADD) is assumed. However, any other change type will override the -a option.

If you specify a modify operation (**changetype: modify**), a change operation is required that indicates how the entry should be changed.

If you specify CHANGETYPE: MODRDN, change operations are required that specify how the relative distinguished name (RDN) is to be modified. A distinguished name's RDN is the left-most value in the DN. For example, the distinguished name

```
uid=ssarette, o=Ace Industry, c=US
```

has a RDN of uid=ssarette.

 Specify a series of attributes and their changed values.

The general format of LDIF update statements is as follows:

```
dn: distinguished name
  changetype identifier
  change operation identifier
  list of attributes

...

-

change operation identifier
  list of attributes
  ...

-

...
```

IMPORTANT: A hyphen (-) must be used to denote the end of a change operation if subsequent change operations are specified. For example, the following statement adds the telephone number and manager attributes to the entry:

```
dn: cn=Brad Cummings, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  add: telephonenumber
  telephonenumber: (408) 555-2468
  -
  add: manager
  manager: cn=Brooke Warren, ou=Manufacturing, o=Ace
  Industry, c=US
```

In addition, the line continuation operator is a single space. Therefore, the following two statements are identical:

```
dn: cn=Brad Cummings, ou=Sales, o=Ace Industry, c=US
```

```
dn: cn=Brad Cummings,
  ou=Sales,
  o=Ace Industry,
  c=US
```

The following sections describe the change types in detail.

Change Types

There are four change types that you can use: add, delete, modify, and modrdn. Note that you can use the modify change type to add, replace, or remove attribute values.

Adding New Entries with CHANGETYPE:ADD

Use CHANGETYPE:ADD to add entire new entries. The format of this type of change is essentially the same as an LDIF-formatted entry (LDIF is described in). The format is

```
dn: distinguished name
  changetype: add
  objectClass: objectClass
  objectClass: objectClass
  ...
  attribute type: attribute value
  attribute type: attribute value
  ...
```

Deleting Entries with CHANGETYPE:DELETE

Deleting Entries with CHANGETYPE:DELETEUse CHANGETYPE:DELETE to delete the entire entry. The format is

```
dn: distinguished name
  changetype: delete
```

Renaming Entries with CHANGETYPE:MODRDN

Use CHANGETYPE:MODRDN to change the RDN of an entry. In essence, this renames the entry. An entry's RDN is the left-most element in its distinguished name.

The format is

```
dn: distinguished name changetype: modrdnnewrdn: new rdn
  deleteoldrdn: 0|1
```

where DELETEOLDRDN indicates whether the old RDN is to be deleted. If 0 is specified, then the attribute values of the old RDN are included in the entry corresponding to the new RDN.

Modifying Entries with CHANGETYPE:MODIFY

Use CHANGETYPE:MODIFY to add, replace, or remove attributes and attribute values to the entry. When you specify changetype: modify, you must also provide a change operation to indicate how the entry is to be modified. Change operations include the following:

* ADD:ATTRIBUTE: Adds the specified attribute or attribute value. If the attribute does not currently exist for the entry, then the attribute and its corresponding value are created. If the attribute already exists for the entry, then the specified attribute value is added to the existing value.

* REPLACE:ATTRIBUTE: The specified values are used to entirely replace the attribute's value. If the attribute does not already exist, it is created. If no replacement value is specified for the attribute, the attribute is deleted.

* DELETE:ATTRIBUTE: The specified attribute is deleted. If more than one instance of an attribute exists for the entry, then all instances of the attribute are deleted in the entry. To delete just one of many attribute instances, specify the attribute and associated value on the line following the DELETE:ATTRIBUTE change operation.

The format is

```
dn: distinguished name
  changetype: modify
  add: attribute type
  attribute type: attribute value
  attribute type: attribute value
  -
  ...
  replace: attribute type
  attribute type: attribute value
  attribute type: attribute value
  -
  ...
  delete: attribute typeattribute type: attribute value
  attribute type: attribute value-...
```

Adding an Entry

Use CHANGETYPE:ADD to add an entry to your directory. When you add an entry, make sure to create an entry representing a branch point before you try to create new entries under that branch. If you want to place an entry in a Marketing and an Accounting sub-tree, then create the branch point for those sub-trees before creating entries within the sub-trees. For example,

```
dn: o=Ace Industry, c=US

dn: ou=Marketing, o=Ace Industry, c=US

...

Marketing subtree entries.

...

dn: ou=Accounting, o=Ace Industry, c=US

...

Accounting subtree entries.

...
```

The following LDIF update statements can be used to create the Marketing and the Accounting subtrees and then create entries within those trees:

```
dn: o=Ace Industry, c=US
  changetype: add
  objectclass: organization
  organizationName:Ace Industry

dn: ou=Maketing, o=Ace Industry, c=US
  changetype: add
  objectclass: organizationalUnit
  ou: Marketing

dn: cn=Pete Minsky, ou=Marketing, o=Ace Industry, c=US
  changetype: add
  objectclass: person
  objectclass: organizationalPerson
  objectclass: inetOrgPerson
  cn: Pete Minsky
  cn: Pete
  sn: Minsky
  ou: Marketing
  uid: pminsky

dn: cn=Sue Jacobs, ou=Marketing, o=Ace Industry, c=US
  changetype: add
  objectclass: person
```

```
objectclass: organizationalPerson
objectclass: inetOrgPerson
cn: Sue Jacobs
cn: Sue
sn: Jacobs
ou: Marketing
uid: sjacobs

dn: ou=Accounting, o=Ace Industry, c=US
changetype: add
objectclass: organizationalUnit
ou: Accounting

dn: cn=Lisa Nielson, ou=Accounting, o=Ace Industry, c=US
changetype: add
objectclass: person
objectclass: organizationalPerson
objectclass: inetOrgPerson
cn: Lisa Nielson
cn: Lisa
sn: Nielson
ou: Accounting
uid: lnielson

dn: cn=Byron Zuraski, ou=Accounting, o=Ace Industry, c=US
changetype: add
objectclass: person
objectclass: organizationalPerson
objectclass: inetOrgPerson
cn: Byron Zuraski
cn: Byron
sn: Zuraski
ou: Accounting
uid: bzuraski
```

If you are simply adding entries to your directory, you can avoid the
CHANGETYPE:ADD statement by specifying the -a option on the call to
ldapmodify. In this case, simply provide LDIF (as opposed to LDIF update
statements) to ldapmodify. For example,

```
dn: o=Ace Industry, c=US
objectclass: organization
organizationName:Ace Industry

dn: ou=Maketing, o=Ace Industry, c=US
objectclass: organizationalUnit
ou: Marketing

dn: cn=Pete Minsky, ou=Marketing, o=Ace Industry, c=US
objectclass: person
```

```
objectclass: organizationalPerson
objectclass: inetOrgPerson
cn: Pete Minsky
cn: Pete
sn: Minsky
ou: Marketing
```

...

Deleting an Entry

You use CHANGETYPE:DELETE to delete an entry from your directory. When you delete an entry, make sure that no other entries exist under that entry in the directory tree. You can not delete an organizational unit entry unless you have first deleted all the entries that belong to the organizational unit.

The following LDIF update statements can be used to delete the person entries:

```
dn: cn=Pete Minsky, ou=Marketing, o=Ace Industry, c=US
  changetype: delete
```

```
dn: cn=Sue Jacobs, ou=Marketing, o=Ace Industry, c=US
  changetype: delete
```

Renaming an Entry

You use CHANGETYPE:MODRDN to rename an entry. This rename operation allows you to change the left-most value in an entry's distinguished name. For example, the entry

```
cn=Sue Jacobs, ou=Marketing, o=Ace Industry, c=US
```

can be modified to be

```
cn=Susan Jacobs, ou=Marketing, o=Ace Industry, c=US
```

but it can not be modified to be

```
cn=Sue Jacobs, ou=Accounting, o=Ace Industry, c=US
```

The following example can be used to rename Sue Jacobs to Susan Jacobs:

```
dn: cn=Sue Jacobs, ou=Marketing, o=Ace Industry, c=US
  changetype: modrdn
  newrdn: cn=Susan Jacobs
  deleteoldrdn: 0
```

Because DELETEOLDRDN is 0, this example retains the existing RDN in the new entry. The resulting entry would therefore have a common name (CN) attribute set to both Sue Jacobs and Susan Jacobs in addition to all the other attributes included in the original entry.

Modifying an Entry

In addition to adding, deleting, and renaming entire entries in your directory, you can use ldapmodify to modify attributes and their values.

Deleting an Attribute

You use CHANGETYPE:MODIFY with the delete operation to delete an attribute from an entry. If the entry has more than one instance of the attribute, you must indicate which of the attributes you want to delete.

For example, the following LDIF update statement deletes all instances of the telephonenumber attribute from the entry, regardless of how many times it appears in the entry:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  delete: telephonenumber
```

If you want to delete just a specific instance of the telephonenumber attribute, then you simply delete that specific attribute value.

Deleting an Attribute Value

You use CHANGETYPE:MODIFY with the delete operation to delete an attribute value from an entry. You must then indicate which of the actual attributes you want to delete.

For example, consider the following entry:

```
cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  objectClass: inetOrgPerson
  cn: Sam Warren
  sn: Warren
  telephonenumber: 555-1212
  telephonenumber: 555-5678
```

To delete the 555-1212 telephone number from this entry, use the following LDIF update statement:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  delete: telephonenumber
  telephonenumber: 555-1212
```

Sam's entry then becomes:

```
cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  objectClass: inetOrgPerson
  cn: Sam Warren
  sn: Warren
  telephonenumber: 555-5678
```

Adding Attributes

You use CHANGETYPE:MODIFY with the add operation to add an attribute and an attribute value to an entry.

For example, the following LDIF update statement adds a telephone number to the entry:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  add: telephonenumber
  telephonenumber: 555-1212
```

The following example adds two telephone numbers to the entry:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  add: telephonenumber
  telephonenumber: 555-1212
  telephonenumber: 555-6789
```

The following example adds two telephone numbers and a manager attribute to the entry:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  add: telephonenumber
  telephonenumber: 555-1212
  telephonenumber: 555-6789
  -
  add: manager
  manager: cn=Sally Nixon, ou=Sales, o=Ace Industry, c=US
```

Changing an Attribute Value

Changing an Attribute ValueYou use CHANGETYPE:MODIFY with the replace operation to change an attribute value when there is only a single instance of that attribute in the entry.

For example, the following LDIF update statement changes Sam's manager from Mike Nelson to Denise Olsen:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  replace: manager
  manager: cn=Denise Olsen, ou=Sales, o=Ace Industry, c=US
```

If the entry has multiple instances of the attribute, then to change one of the attribute values, you must delete the attribute value that you want to change and then add the replacement value. For example, consider the following entry:

```
cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  objectClass: inetOrgPerson
  cn: Sam Warren
  sn: Warren
  telephonenumber: 555-1212
  telephonenumber: 555-5678
```

To change 555-1212 to 555-4321, use the following LDIF update statement:

```
dn: cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  changetype: modify
  delete: telephonenumber
  telephonenumber: 555-1212
  -
  add: telephonenumber
  telephonenumber: 555-4321
```

Sam's entry is now as follows:

```
cn=Sam Warren, ou=Sales, o=Ace Industry, c=US
  objectClass: inetOrgPerson
  cn: Sam Warren
  sn: Warren
  telephonenumber: 555-5678
  telephonenumber: 555-4321
```

Using ldapmodify

You can perform minimal modifications to directory entries using the Users & Groups area of NetWare Web Manager. To perform more complex modifications, use ldapmodify with LDIF update statements.

This section describes how to use ldapmodify.

NOTE: In order for users to successfully authenticate to NetWare Web Manager, a unique uid attribute must be placed on their directory entries. The Users & Groups area of NetWare Web Manager automatically creates a uid when it creates an entry, and NetWare Web Manager ensures that the uid is unique. However, Ldapmodify does none of these things. Make sure that when you are creating entries using ldapmodify that you place a unique uid on each new user entry.

Using Quotation Marks

When using the ldapmodify command line utility, you may need to specify values that contain characters that have special meaning to the command-line interpreter (such as space [ ], asterisk [*], backslash [\], and so forth). When this situation occurs, enclose the value in quotation marks (""). For example,

```
-D "cn=Barbara Jensen, ou=Product Development, o=Ace
   Industry, c=US"
```

NOTE: Depending on which command-line interpreter you are using, you should use either single or double quotation marks for this purpose. Refer to your operating system documentation for more information.

Providing Input from the Command Line

Using ldapmodify, you can provide LDIF update statements both from an input file (using the -f option), and from the command line. If you want to provide input from the command line, do not specify the -f option.

You can also use ldapmodify to collect statements that you enter in the command line just as if it were reading the statements from a file. When you are done providing statements to the utility, type the character that your command-line processor recognizes as the end-of-file (EOF) marker. This causes the utility to begin operations based on the input you have supplied.

Although configurable, the EOF escape sequence is almost always control-D (^D) under UNIX* and usually CTRL-z followed by RETURN (^zRETURN) under Windows* NT.

For example, suppose you wanted to specify some LDIF update statements to ldapmodify. Then you would do the following:

```
prompt> ldapmodify -D bindn -w password -h hostname
  > dn: "cn=Barry Nixon, ou=Manufacturing, o=Ace Industry,
  c=US"
  > changetype: modify
  > delete: telephonenumber
  > -
  > add: manager
  > manager: cn=Harry Cruise, ou=Manufacturing, o=Ace
  Industry, c=US
  > ^D
  prompt>
```

Commonly Used ldapmodify Parameters

To modify an entry or entries in an existing directory, use the ldapmodify command-line utility with the following parameters:

Parameter	Function
-D	Specifies the distinguished name with which to authenticate to the server. The value must be a DN recognized by the directory server or the local directory, and it must also have the authority to modify the entries.
-w	Specifies the password associated with the distinguished name specified in the-D option.
-h	Specifies the name of the host on which the server is running.
-p	Specifies the port number that the server uses. The default number is 389.
-C	Specifies the location of the configuration file for the local directory in which to perform the search. By default, the location of this file is NSHOME\USERDB\LDAP\CONFIG\LCACHE.CONF NSHOME is the directory where NetWare Web Manager is installed. This parameter is required if you are using this tool with a Netscape local directory.
-f	Specifies the file containing the LDIF update statements used to define the directory modifications. This is an optional parameter. For information on supplying LDIF update statements from the command line, refer to "Providing Input from the Command Line" on page 81.

Additional ldapmodify Parameters

The following parameters offer additional functionality:

Parameter	Function
-b	Causes the utility to check each attribute value to determine whether the value is a valid file reference. If the value is a valid file reference, then the contents of the referenced file is used as the attribute value. This is often used for specifying a path to a file containing binary data, such as JPEG. For example, if you wanted to add a jpegPhoto attribute, then specify the -b option on the ldapmodify call. In the LDIF you provide to ldapmodify, include something like the following: jpegPhoto: /TMP/PHOTO.JPEG Ldapmodify will read the contents of into the jpegPhoto attribute that you are placing on the entry.
-c	Specifies that the utility runs in continuous operation mode. Errors are reported, but the utility will continue with modifications. The default is to quit after reporting an error.
-n	Specifies that the entries are not to be actually modified, but that ldapmodify is to show what it would do with the specified input.
-R	Specifies that referrals are not to be followed automatically.
-v	Specifies that the utility is to run in verbose mode.

Example of ldapmodify Used with a Local Directory

Consider the following scenario using ldapmodify to work with a local directory. As the administrator,

- You want to modify entries as specified in the file modify_statements.

- You have configured a special entry for the database administrator that has the authority to modify the entries, and that entry has the distinguished name of cn=Directory Manager, o=Ace Industry, c=US.

- The database administrator's password is Top~Secret.

- The server is located on hostname JazzArts.

- The server uses port number 845.

Then to modify the entries, first specify the appropriate LDIF update statements in the modify_statements file, and then enter the following command:

```
ldapmodify -D "cn=Directory Manager, o=Ace Industry, c=US" -
  w Top~Secret -h JazzArts -p 845 -C NSHOME/userdb/ldap/
  config/lcache.conf -f modify_statements
```

The previous example references the ldapmodify utility that is bundled with NetWare Web Manager.

You can find the ldapmodify command-line utility at the location where NetWare Web Manager was installed. Go to the NSHOME/USERDB/LDAP/TOOLS directory.

7 Finding Directory Entries

You can find entries in your directory using either the Users & Groups area of NetWare® Web Manager or the ldapsearch command-line utility. In either case, you can use search filters to locate entries.

Using ldapsearch

You can use ldapsearch to locate entries in your directory. You can use ldapsearch either with the directory server or with a Netscape local directory that is bundled with NetWare Web Manager. You direct ldapsearch's actions through search filters. Ldapsearch can be located under NetWare Web Manager at

NSHOME\USERDB\LDAP\TOOLS\LDAPSEARCH

NSHOME is the directory where you installed NetWare Web Manager.

Search Filters

Search filters select the entries to be returned after the search is completed. Search filters are most commonly used with the ldapsearch command-line utility. When you are using ldapsearch, you can place multiple search filters in a file, with each filter on a separate line, or you can specify a search filter directly on the command-line call to ldapsearch.

For example, the following filter specifies a search for a common name equal to Brooke Davis:

```
cn=brooke davis
```

Search Filter Syntax

The basic syntax of a search filter is

```
attribute operator value
```

for example,

```
employeenumber >= 100
```

In this example, employeenumber is the attribute, >= is the operator, and 100 is the value. You can also define filters that combine attributes using boolean operators.

The following topics describe search filters in detail.

Using Attributes in Search Filters

When searching for an entry, you can specify attributes associated with that type of entry. For example, when you search for entries about people, you can use the CN attribute to search for people with a specific common name.

Examples of attributes for entries about users or clients might include

- cn—the person's common name
- sn—the person's surname, last name, or family name
- telephonenumber—the person's telephone number
- employeenumber—the person's employee number
- l—the person's location

Using Operators in Search Filters

The following table (Table 3) lists the available search filter operators.

Table 3   **Search Operators**

Search Type	Symbol	Description
Equality	=	Returns entries containing attributes set to the specified value, for example, cn=Bob Johnson.

Search Type	Symbol	Description
Substring	=*string*string*	Returns entries containing attributes containing the specified substring, for example, cn=Bob*cn=*Johnsoncn=*John*cn=B*John.
Greater than or equal to	>=	Returns entries containing attributes that are greater than or equal to the specified value, for example, employeenumber >= 100.
Less than or equal to	<=	Returns entries containing attributes that are less than or equal to the specified value, for example, employeenumber <= 100.
Presence	=*	Returns entries containing the specified attribute, for example, cn=*telephonenumber=*manager=*.
Approximate	~=	Returns entries containing the specified attribute that is approximately equal to the specified value, for example, cn~=surettel~=san fransico.

Using Multiple Search Filters

Multiple search operations can be combined using boolean operators expressed in prefix notation as follows:

```
(boolean_operator((search operation)(search
  operation)(search operation)...))
```

where operator is any one of the boolean operators. In addition, multiple boolean search operators can be nested together to form complex expressions, such as

```
(boolean_operator(search operation)((operator(search
  operation)(search operation)))
```

Boolean Operators

The boolean operators available for use with search filters are explained in the following table:

Operator	Symbol	Description
And	&	All specified filters must be true for the statement to be true. For example,(&(filter)(filter)(filter)...)
Or	|	At least one specified filter must be true for the statement to be true. For example,(|(filter)(filter)(filter)...)
Not	!	The specified statement must not be true for the statement to be true. Note that only one filter is affected by the not operator. For example,(!(filter))

Search Filter Examples

The following filter searches for entries containing the manager attribute. This is also known as a presence search.

```
manager=*
```

The following filter searches for entries containing the common name of Ethan Warren. This is also known as an equality search.

```
cn=Ethan Warnick
```

The following filter returns any entries that do not contain the common name of Ethan Warnick.

```
(!(cn=Ethan Warnick))
```

The following filter returns any entries that contain a description attribute with a substring of X.500.

```
description=*X.500*
```

The following filter returns any entries whose organizational unit is Marketing and whose description field does not contain the substring X.500.

```
(&(ou=Marketing)(!(description=*X.500*)))
```

The following filter returns any entries whose organizational unit is Marketing and that list Julie Fulmer or Cindy Zwaska as a manager.

```
(&(ou=Marketing)(|(manager="cn=Julie
  Fulmer,ou=Marketing,o=Ace
  Industry,c=US")(manager="cn=Cindy
  Zwaska,ou=Marketing,o=Ace
  Industry,c=US")))
```

The following filter returns any entries that do not represent a person.

```
(!(objectClass=person))
```

The following filter returns any entries that do not represent a person and whose common name is similar to printer3b.

```
(&(!(objectClass=person))(cn~=printer3b))
```

Using ldapsearch

You can use the ldapsearch command-line utility to locate and retrieve directory entries. This utility opens a connection to the specified server using the specified distinguished name and password and locates entries based on a specified search filter. Alternatively, this utility can access a Netscape local directory and search it for entries. Search scopes can include a single entry, an entry's immediate subentries, or an entire tree or sub-tree.

Search results are returned in LDIF format.

Using Quotation Marks

When using the ldapsearch command-line utility, you may need to specify values that contain characters that have special meaning to the command-line interpreter (such as space [ ], asterisk [*], backslash [\], and so forth). When this situation occurs, enclose the value in quotation marks (""). For example,

```
-D "cn=Barbara Jensen, ou=Product Development, o=Ace
  Industry, c=US"
```

IMPORTANT: Depending on which command-line interpreter you are using, you should use either single or double quotation marks for this purpose. Refer to your operating system documentation for more information.

Commonly Used ldapsearch Parameters

To locate an entry in an existing database, use the ldapsearch command-line utility with the following parameters:

Parameter	Function
-D	Specifies the distinguished name (DN) a user uses to authenticate to the server. This parameter is optional if anonymous access is supported by your server. If specified, this value must be a DN recognized by the directory server or the local directory, and it must also have the authority to search for the entries.
-w	Specifies the password associated with the DN that is specified in the -D option. This parameter is required if the -D option is specified.
-h	Specifies the name of the host on which the directory server is running.
-p	Specifies the port number that the directory server uses. The default number is 389.

Parameter	Function
-C	Specifies the location of the configuration file for the local directory in which to perform the search. By default, the location of this file is NSHOME\USERDB\LDAP\CONFIG\LCACHE.CONF NSHOME is the directory where NetWare Web Manager is installed. This parameter is required if you are using this tool with a Netscape local directory. This parameter is supported only if you are using a Netscape local directory bundled with NetWare Web Manager.
-b	Specifies the starting point for the search. The value specified here must be a distinguished name that currently exists in the database. This parameter is optional if the LDAP_BASEDN environment variable has been set to a base DN. The value specified in this parameter should be provided in double quotation marks. For example, -b "cn=Barbara Jensen, ou=Product Development, o=Ace Industry, c=US".
-s	Specifies the scope of the search. The scope can be one of the following: ◆ Base: Searches only the entry specified in the -b option. ◆ One: Searches only the most immediate children of the entry specified in the -b parameter. Note that only the children are searched; the actual entry specified in the -b parameter is not searched. ◆ Sub: Searches the entry specified in the -b parameter and all of its descendants. That is, performs a sub-tree search starting at the point identified in the -b parameter. This is the default.
-l	Specifies the maximum number of seconds to wait for a search request to complete. Regardless of the value specified here, ldapsearch will never wait longer than is allowed by the server's Time Limit parameter.
-z	Specifies the maximum number of entries to return in response to a search request. Regardless of the value specified here, ldapsearch will never return more entries than is allowed by the server's Size Limit parameter.

Additional ldapsearch Parameters

To further customize a search, use the following optional parameters:

Parameter	Function
-f	Specifies the file containing the search filter to be used in the search. Search filters are described in Search Filters. Omit this parameter if you want to supply a search filter directly to the command line.
-A	Specifies that the search retrieve the attributes only, not the attribute values. This parameter is useful if you just want to determine if an attribute is present for an entry and you are not interested in the attribute value.
-a	Specifies how alias de-referencing is completed. The value can be Never, Always, Search, or Find. The default value is Never.
-n	Specifies that the search is not to be actually performed, but that ldapsearch is to show what it would do with the specified input.
-R	Specifies that referrals are not to be followed automatically.
-S	Specifies the attribute to use as the sort criteria. The default is not to sort the returned entries. If the attribute is the zero-length string (""), the entries will be sorted by their DN.
-t	Specifies that the results be written to a set of temporary files.
-u	Specifies that the user-friendly form of the DN be used in the output.
-v	Specifies that the utility is to run in Verbose mode.

Example of ldapsearch Used with a Local Directory

Consider the following scenario using ldapsearch to work with a local directory. As the administrator,

- ◆ You want to perform searches based on filters contained in the file SEARCHDB.

- ◆ You want to perform a search for all entries below the marketing sub-tree.

- ◆ The database administrator's password is Top~Secret.

To perform the search, first specify the appropriate search filter in the SEARCHDB file and then enter the following command. Note that the local directory's configuration file is a referenced -C option rather than an actual database location:

Example ldapsearch Used with the Directory Server

Consider the following scenario using ldapsearch to work with the Directory Server. As the administrator,

- You want to perform searches based on filters contained in the file SEARCHDB.

- You want to perform a search for all entries below the marketing sub-tree.

- You have configured a special entry for the database administrator who has the authority to modify the entries, and that entry has the DN of cn=Directory Manager, o=Ace Industry, c=US.

- The database administrator's password is Top~Secret.

- The server is located on hostname JazzArts.

- The server uses port number 845.

To perform the search, first specify the appropriate search filter in the SEARCHDB file, and then type the following command:

```
-C NSHOME/userdb/ldap/config/lcache.conf
```

HINT: The previous command references the ldapsearch tool that is bundled with NetWare Web Manager.

You can find the ldapsearch command-line utility with NetWare Web Manager installation in the NSHOME/USERDB/LDAP/TOOLS directory.

For information on using Secure Sockets Layer (SSL) with this utility, see Managing Server Content and Configuring Server Preferences in the NetWare Enterprise Web Server Administration Guide.

You can also specify a search filter directly on the call to the command line. If you do this, be sure to enclose your filter in quotation marks ("filter"). Also do not specify the -f option. For example,

```
ldapsearch -b "cn=marketing, o=Ace Industry, c=US" -D
  "cn=Directory Manager, o=Ace Industry, c=US" -w Top~Secret
  -C NSHOME/userdb/ldap/config/lcache.conf "cn=Ethan Warren"
```

8 Using LDIF

You can use the LDAP Data Interchange Format (LDIF) to import and export entries into and out of your local directory. For example, when you perform a search of your directory using the ldapsearch command-line utility, the resulting output is in LDIF format. When you create entries using ldapmodify, you use a form of LDIF called LDIF update statements.

The LDIF Format

The LDAP Data Interchange Format (LDIF) is used to represent directory entries in text form. The basic form of an LDIF entry is

```
[id]
  dn: distinguished nameobjectClass: object class
  objectClass: object class...
  attribute type:attribute valueattribute type:attribute
  value...
```

HINT: Only the DN and at least one object class definition are required. Also required are any attributes required by the object classes that you define for the entry. All other attributes and object classes are optional. You can specify object classes and attributes in any order. The object classes and attributes that you can use with your directory server are defined by the directory server's schema.

The following table describes the LDIF fields shown in the previous definition:

Field	Definition
[id]	Optional positive decimal number representing the entry ID. The database creation tools generate this ID for you. Never add or edit this value yourself.
dn: distinguished name	Specifies the distinguished name for the entry. For a complete description of distinguished names, refer to "User and Group Management" on page 35
objectClass: object class	Specifies an object class to use with this entry. The object class identifies the types of attributes allowed and required for the entry.
attribute type	Specifies a descriptive attribute to use with the entry. The attribute should be defined either in SLAPD.AT.CONF or with the attribute parameter in SLAPD.CONF. A list of standard attributes can be found in the online documentation that comes with the server.
attribute value	Specifies the attribute value to be used with the attribute type.

Continued Lines

When you specify LDIF, you can break and continue a line by indenting the continued portion of the line by a single space. For example, the following two statements are identical:

```
dn: cn=Jake Lupinski, ou=Accounting, o=Ace Industry, c=US

dn: cn=Jake Lup
   inski, ou=Accoun
   ting, o=Ace Industr
   y, c=US
```

Creating Databases Using LDIF

You can create a directory database using LDIF. This is useful when you are creating an entire directory database or when you are importing entries from another directory service application.

To create a database using LDIF:

1 Create an ASCII file containing the entries you want to add in LDIF format. See Creating LDIF Entries for more information.

   Separate each entry from the next with an empty line.

2 Begin each directory in the database with the top-most, or the root, entry. The root point of the directory must represent a suffix you have set for your server. For example, if your server has the suffix

   ```
   o=Ace Industry, c=US
   ```

   the very first entry in your directory must be

   ```
   dn: o=Ace Industry, c=US
   ```

3 As you proceed with your directory creation, make sure that you create an entry representing a branch point before you create new entries under that branch. If you want to place an entry in a Marketing and an Accounting sub-tree, create the branch point for those sub-trees before creating entries within those sub-trees. For example

   ```
   dn: o=Ace Industry, c=US
      list of attributes and object classes

   dn: ou=Marketing, o=Ace Industry, c=US
      list of attributes and object classes

   ...

   Marketing subtree entries.

   ...

   dn: ou=Accounting, o=Ace Industry, c=US
      list of attributes and object classes

   ...

   Accounting subtree entries.

   ...
   ```

4 Create the database from the LDIF file using the procedure described in "Configuring Users and Groups" on page 51.

Creating LDIF Entries

This section explains how to create a series of entries using LDIF to describe the people in your organization. For general formatting of an LDIF entry, see

Note that you can, and will, create more types of entries than are discussed here. However, organizational person entries are the most common type of entry that you will store in your directory, so this is the kind of entry used for these examples.

Specifying Entries for an Organizational Person

Specifying Entries for an Organizational PersonThe most common type of entry that you will include in your directory will describe a person within your organization. The LDIF you specify to define an organizational person should appear as follows:

```
dn: distinguished namecn: common namesn: surnamelist of
  optional attributes...
  objectClass: top
  objectClass: person
  objectClass: organizationalPerson
  objectClass: inetOrgPerson
```

The following defines each aspect of the LDIF-formatted entry:

Distinguished Name (dn): Specifies the DN for the entry. A DN is required.

Common Name (cn): Specifies the common name for the person, the full name commonly used by the person. For example, cn: Bill Anderson. A common name is required.

Surname (sn): Specifies the person's surname, or last name. For example, sn: Anderson. A surname is required.

List of Attributes: Specifies the list of optional attributes that you want to maintain for the entry.

Object Class (top): Specifies the top object class. This object class specification is optional. Some older LDAP clients will require the existence of the TOP object class during search operations.

Object Class (person): Specifies the person object class. This object class specification should be included because many LDAP clients will require the

existence of object class person during search operations for a person or an organizational person.

Object Class (organizationalPerson): Specifies the organizationalPerson object class. This object class specification should be included because some LDAP clients will require the existence of object class organizationalPerson during search operations for an organizational person.

Object Class (inetOrgPerson): Specifies the inetOrgPerson object class. The inetOrgPerson object class is recommended for the creation of an organizational person entry because this object class includes the widest range of attributes.

Example of the Syntax in an LDIF File

The following example shows an LDIF file that contains three organizational person entries:

```
dn: cn=June Rossi, ou=accounting, o=Ace Industry, c=US
  cn: June Rossi
  sn: Rossi
  givenName: June
  mail: rossi@aceindustry.com
  userPassword: {sha}KDIE3AL9DK
  telephoneNumber: 2616
  roomNumber: 220
  objectClass: top
  objectClass: person
  objectClass: organizationalPerson
  objectClass: inetOrgPerson

dn: cn=Marc Chambers, ou=manufacturing, o=Ace Industry, c=US
  cn: Marc Chambers
  sn: Chambers
  givenName: Marc
  mail: chambers@aceindustry.com
  userPassword: {sha}jdl2alem87dlacz1
  telephoneNumber: 2652
  roomNumber: 167
  objectClass: top
  objectClass: person
  objectClass: organizationalPerson
  objectClass: inetOrgPerson

dn: cn=Robert Wong, ou=manufacturing, o=Ace Industry, c=US
  cn: Robert Wong
  cn: Bob Wong
```

```
sn: Wong
givenName: Robert
givenName: Bob
mail: bwong@aceindustry.com
userPassword: {sha}nn2msx761
telephoneNumber: 2881
roomNumber: 211
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: inetOrgPerson
```

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