LDAP-UX Client Services B.04.00 Administrator's Guide

HP-UX 11i v1, v2 and v3

Edition 5

Manufacturing Part Number : J4269-90071
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Preface: About This Document

The latest version of this document can be found on line at:

http://www.docs.hp.com

This document describes how to install and configure LDAP-UX Client Services product on HP-UX platforms.

The document printing date and part number indicate the document's current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number will change when extensive changes are made.

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Intended Audience

This document is intended for system and network administrators responsible for installing, configuring, and managing the LDAP-UX Client Services. Administrators are expected to have knowledge of the LDAP-UX Client Services Integration product.

New and Changed Documentation in This Edition

This edition documents the following new information for the LDAP-UX Client Services version B.04.00:

- Support the automount service under the AutoFS subsystem. This new feature allows you to store and manage the automount maps in the LDAP directory server.
- Support discovery and and management of publickeys in an LDAP directory.
- Provide the pam_authz login authorization enhancements. This new feature allows you to define access rules in the local policy file, `/etc/opt/ldapux/pam_authz.policy`.

- Support NIS+ migration scripts that can be used to migrate from an NIS+ domain into an LDAP directory server.
- Support Mozilla LDAP C SDK 5.14.1 which contains a set of LDAP Application Programming Interfaces (API) to allow you to build LDAP-enabled clients.

Publishing History

Table 1 **Publishing History Details**

Document Manufacturing Part Number	Operating Systems Supported	Supported Product Versions	Publication Date
J4269-90016	11.0, 11i	B.03.00	September 2002
J4269-90030	11.0, 11i v1 and v2	B.03.20	October 2003
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J4269-90040	11.0, 11i v1 and v2	B.03.30	September 2004
J4269-90048	11i v1 and v2	B.04.00	July 2005
J4269-90051	11i v1 and v2	B.04.00	August 2005
J4269-90053	11i v1 and v2	B.04.00	June 2006
J4269-90071	11i v1, v2 and v3	B.04.00	February 2007

What's in This document

This manual describes how to install, configure and administer the LDAP-UX Client Services software product.

The manual is organized as follows:

Chapter 1 **Introduction** Use this chapter to learn the LDAP-UX Client Services product features, components and client administration tools.

Chapter 2	**Installing And Configuring LDAP-UX Client Services** Use this chapter to learn how to install, configure, and use the LDAP-UX Client Services software.
Chapter 3	**LDAP Printer Configurator Support** Use this chapter to learn how to set up, configure, and use the printer configurator.
Chapter 4	**Administering LDAP-UX Client Services** Use this chapter to understand how to administer your LDAP-UX Clients to keep them running smoothly and expand them as your computing environment expands.
Chapter 5	**Command and Tool Reference** Use this chapter to learn about the commands and tools associated with the LDAP-UX Client Services product.
Chapter 6	**User Tasks** Use this chapter to learn how to change passwords and personal information.
Chapter 7	**Mozilla LDAP C SDK** Use this chapter to learn the Mozilla LDAP SDK software features and its major file components.

Typographical Conventions

This document uses the following conventions.

Book Title	The title of a book. On the web and on the Instant Information CD, it may be a hot link to the book itself.
Emphasis	Text that is emphasized.
Bold	Text that is strongly emphasized.
Bold	The defined use of an important word or phrase.
`ComputerOut`	Text displayed by the computer.
`UserInput`	Commands and other text that you type.
`Command`	A command name or qualified command phrase.
`Variable`	The name of a variable that you may replace in a command or function or information in a display that represents several possible values.
`[ ]`	The contents are optional in formats and command descriptions. If the contents are a list separated by `|`, you must choose one of the items.
`{ }`	The contents are required in formats and command descriptions. If the contents are a list separated by `|`, you must choose one of the items.
`\`	The continuous line symbol.

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Please include document title, manufacturing part number, and any comment, error found, or suggestion for improvement you have concerning this document. Also, please include what we did right so we can incorporate it into other documents.

1 Introduction

LDAP-UX Client Services simplifies HP-UX system administration by consolidating account and configuration information into a central LDAP directory. This LDAP directory could reside on an HP-UX system such as Netscape Directory Server 6.x, or the account information could be integrated in Windows 2000/2003 Active Directory.

Information provided in this manual outlines the installation and administration tasks of LDAP-UX Client Services with HP-UX based LDAP directories such as Netscape Directory Server 6.x.

For information on the integration of LDAP-UX Client Services with Windows 2000/2003 Active Directory, see *LDAP-UX with Microsoft Windows 2000/2003 Active Directory Administrator's Guide (J4269-90041)* at http://docs.hp.com/hpux/internet.

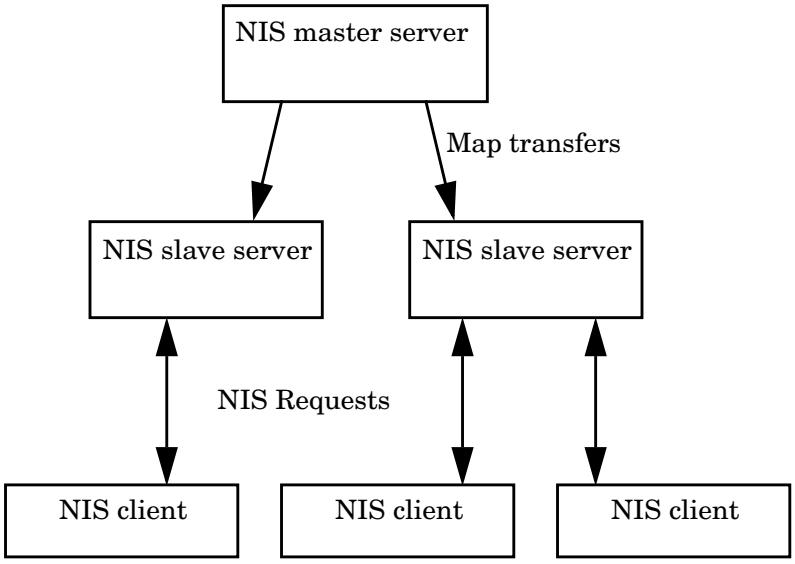
This chapter introduces LDAP-UX Client Services and briefly describes how it works.

Overview of LDAP-UX Client Services

Traditionally, HP-UX account and configuration information is stored in text files, for example, /etc/passwd and /etc/group. NIS was developed to ease system administration by sharing this information across systems

on the network. With NIS, account and configuration information resides on NIS servers. NIS client systems retrieve this shared configuration information across the network from NIS servers, as shown below:

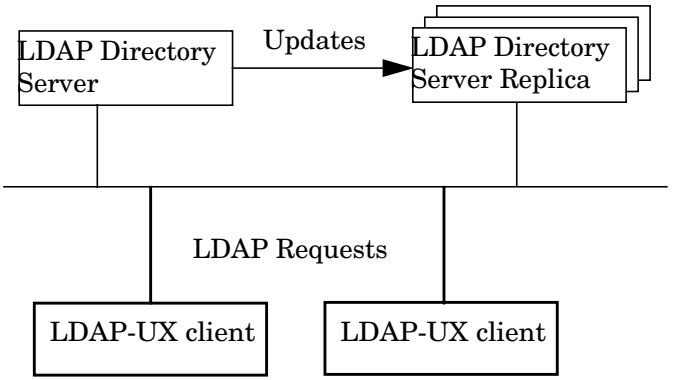
Figure 1-1 A Simplified NIS Environment



LDAP-UX Client Services improves on this configuration information sharing. HP-UX account and configuration information is stored in an LDAP directory, not on the local client system. Client systems retrieve this shared configuration information across the network from the LDAP

directory, as shown below. LDAP adds greater scalability, interoperability with other applications and platforms, and less network traffic from replica updates.

Figure 1-2 A Simplified LDAP-UX Client Services Environment



LDAP-UX Client Services supports the following name service data: passwd, groups, hosts, rpc, services, networks, protocols, publickeys, automount, netgroup. See the *LDAP-UX Integration B.04.00 Release Notes* for any additional supported services.

How LDAP-UX Client Services Works

LDAP-UX Client Services works by leveraging the authentication mechanism provided in the Pluggable Authentication Module, or PAM, and the naming services provided by the Name Service Switch, or NSS. See *pam*(3), *pam.conf*(4), and *Managing Systems and Workgroups* at http://docs.hp.com/hpux/os for information on PAM. For information on NSS, see *switch*(4) and "Configuring the Name Service Switch" in *Installing and Administering NFS Services* at http://docs.hp.com/hpux/communications/#NFS.

These extensible mechanisms allow new authentication methods and new name services to be installed and used without changing the underlying HP-UX commands. And, by supporting the PAM architecture, the HP-UX client becomes truly integrated in the LDAP environment. The PAM_LDAP library allows the HP-UX system to use the LDAP directory as a trusted server for authentication. This means that

passwords may not only be stored in any syntax but also means that passwords may remain hidden from view (preventing a decryption attack on the hashed passwords). Because passwords may be stored in any syntax, HP-UX will be able to share passwords with other LDAP-enabled applications.

With LDAP-UX Client Services B.03.20 or later versions, the client daemon, `ldapclientd`, becomes the center of the product. It supports all NSS backend services for LDAP and data enumeration. It also supports PAM_LDAP for authentication and password change.

With LDAP-UX Client Services, HP-UX commands and subsystems can transparently access name service information from the LDAP directory through `ldapclientd`. The following table shows some examples of commands and subsystems that use PAM and NSS:

Table 1-1 Examples of Commands and Subsystems that use PAM and NSS

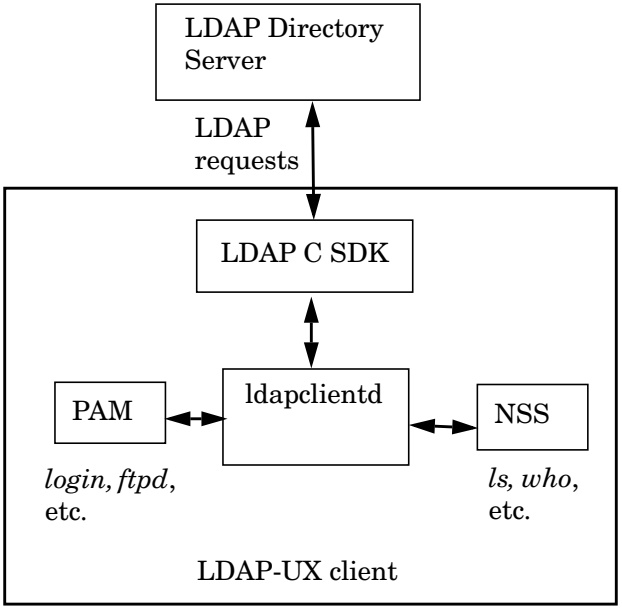
Commands that use NSS	Commands that use PAM and NSS
ls	login
nsquery[a]	passwd
who	ftp
whoami	su
finger[b]	rlogin
id	telnet
logname	dtlogin
groups[b]	remsh
newgrp[b]	
pwget[b]	
grget[b]	
listusers[b]	

Table 1-1 Examples of Commands and Subsystems that use PAM and NSS (Continued)

Commands that use NSS	Commands that use PAM and NSS
logins[b]	
nslookup	

a. *nsquery*(1) is a contributed tool included with the ONC/NFS product.
b. These commands enumerate the entire passwd or group database, which may reduce network and directory server performance for large databases.

Figure 1-3 A Simplified LDAP-UX Client Services Environment



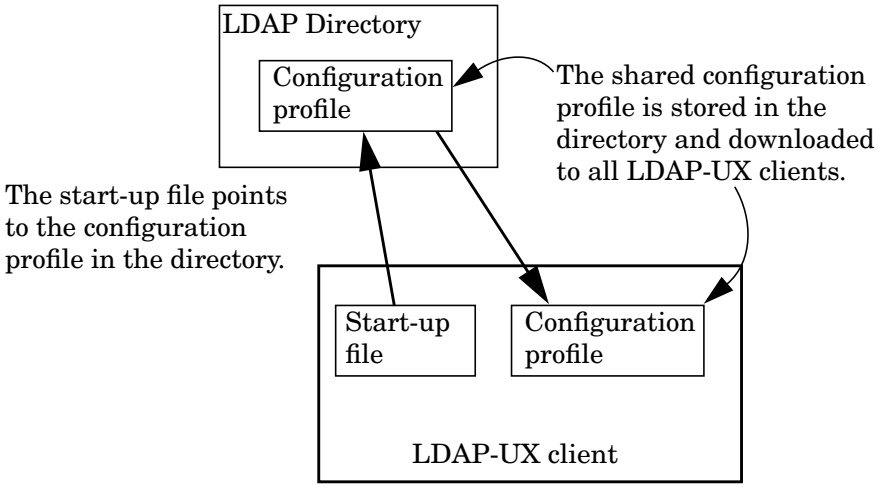
In addition, the *getpwent*(3C) and *getgrent*(3C) family of system calls get user and group information from the directory.

After you install and configure an LDAP directory and migrate your name service data into it, HP-UX client systems locate the directory from a “start-up file.” The start-up file tells the client system how to download a “configuration profile” from the LDAP directory. The configuration profile is a directory entry containing configuration information common to many clients. Storing it in the directory lets you maintain it in one place and share it among many clients rather than storing it redundantly across the clients. Because the configuration information is stored in the directory, all each client needs to know is where its profile is, hence the start-up file. Each client downloads the configuration profile from the directory.

The profile is an entry in the directory containing details on how clients are to access the directory, such as:

- where and how clients should search the directory for user, group and other name service information.
- how clients should bind to the directory: anonymously or as a proxy user. Anonymous access is simplest. Configuring a proxy user adds some security, but at the same time it adds the overhead of managing the proxy user.
- other configuration parameters such as search time limits.

Figure 1-4 The Local Start-up File and the Configuration Profile



The following chapter describes in detail how to install, configure, and verify LDAP-UX Client Services.

2 Installing And Configuring LDAP-UX Client Services

This chapter describes the decisions you need to make and the steps to install Netscape and configure LDAP-UX Client Services. This chapter contains the following sections:

Before You Begin

This section lists some things to keep in mind as you plan your installation.

- Use the configuration worksheet to record your decisions and other information you'll need later for configuration in Appendix A, "Configuration Worksheet," on page 183.
- See the *LDAP-UX Integration B.04.00 Release Notes* (J4269-90042) at http://docs.hp.com/hpux/internet for last-minute information.
- You must have an LDAP directory. You can obtain the Netscape Directory Server for HP-UX version 6.x from your local HP sales office or www.hp.com and view the documentation at http://docs.hp.com/hpux/internet/#Netscape%20Directory%20Server.

- See the white paper *Preparing Your Directory for HP-UX Integration* at http://docs.hp.com/hpux/internet for advice on how to set up and configure your directory to work with HP-UX.
- Most examples here use the Netscape Directory Server for HP-UX version 6.x and assume you have some knowledge of this directory and its tools, such as the Directory Console and ldapsearch. If you have another directory, consult your directory's documentation for specific information.
- For details on how to integrate LDAP-UX Client Services with Windows 2000 Active Directory, please refer to *LDAP-UX Client Services with Microsoft Windows 2000/2003 Active Directory Administrator's Guide (J4269-90041)* at http://docs.hp.com/hpux/internet/#LDAP-UX%20Integration.
- The examples use a base DN of o=hp.com for illustrative purposes.

Summary of Installing and Configuring

The following summarizes the steps you take when installing and configuring an LDAP-UX Client Services environment.

- See "Plan Your Installation" on page 12.
- Install LDAP-UX Client Services on each client system. See "Install LDAP-UX Client Services on a Client" on page 20.
- Install and configure an LDAP directory, if not already done. See "Configure Your Directory" on page 21.
- Configure your LDAP server to support SSL if you attempt to enable SSL support with LDAP-UX.
- Migrate your name service data to the directory. See "Import Name Service Data into Your Directory" on page 25.
- Install and set up the security database files on the LDAP-UX client system if you want to enable SSL support with LDAP-UX. See "Configure the LDAP-UX Client Serivces with SSL Support" on page 41.

- Run the setup program to configure LDAP-UX Client Services on a client system. Setup does the following for you:

  — Extends your Netscape directory schema with the configuration profile schema, if not already done.
  — Imports the LP printer schema into your LDAP directory server if you choose to start the LDAP printer configurator.
  — Imports the publickey schema into your LDAP directory if you choose to store the public keys of users and hosts in the LDAP directory.
  — Imports the automount schema into your LDAP directory server if you choose to store the AutoFS maps in the LDAP directory.
  — Creates a start-up file on the client. This enables each client to download the configuration profile.
  — Creates a configuration profile of directory access information in the directory, to be shared by a group of (or possibly all) clients.
  — Downloads the configuration profile from the directory to the client.
  — Start the product daemon, `ldapclientd`, if you choose to start it. Starting with LDAP-UX Client B.03.20 or later, the client daemon must be started for LDAP-UX functions to work. With LDAP-UX Client B.03.10 or earlier, running the client daemon is optional.

  See “Configure the LDAP-UX Client Services” on page 27.

- Modify the files /etc/pam.conf and /etc/nsswitch.conf on the client to specify LDAP authentication and name service, respectively. See “Configure the LDAP-UX Client Services” on page 27.
- Optionally modify the disable_uid_range flag in the /etc/opt/ldapux/ldapux_client.conf file to disable logins to the local system from specific ldap users.
- Optionally modify the `/etc/opt/ldapux/pam_authz.policy` and `/etc/pam.conf` files to verify the user access rights of a subset of users in a large repository needing access, if appropriate. See the pam_authz(5) man page for the command syntax.
- Verify each client is working properly. See “Verify the LDAP-UX Client Services” on page 68.
- See also “Configure Subsequent Client Systems” on page 72 for some shortcuts.

Plan Your Installation

Before beginning your installation, you should plan how you will set up and verify your LDAP directory and your LDAP-UX Client Services environment before putting them into production. Consider the following questions. Record your decisions and other information you'll need later in Appendix A, "Configuration Worksheet," on page 183.

- How many LDAP directory servers and replicas will you need?

  Each client system binds to an LDAP directory server containing your user, group, and other data. Multiple clients can bind to a single directory server or replica server. The answer depends on your environment, the size and configuration of your directory and how many users and clients you have.Write your directory server host and TCP port number in Appendix A, "Configuration Worksheet," on page 183. See the white paper *Preparing Your Directory for HP-UX Integration* at: http://docs.hp.com/hpux/internet for more information.

  See the *Netscape Directory Server Deployment Guide* for more information. You can add directory replicas to an existing LDAP-UX Client Services environment as described under "Adding a Directory Replica" on page 118. You may also want to review the LDAP-UX performance white paper at http://docs.hp.com/hpux/internet.

- Where will you get your name service data from when migrating it to the directory?

  You can get it from your files in the /etc directory or, if you are using NIS, from the same source files you create your NIS maps from, or you can get it from your NIS maps themselves. Write this information in Appendix A, "Configuration Worksheet," on page 183.

  See "Import Name Service Data into Your Directory" on page 25 for how to import your information into the directory and "Name Service Migration Scripts" on page 160 for details on the migration scripts.

  To add an individual user entry or modify an existing user entry in your directory, you can use the ldapmodify command or other directory administration tools such as the Netscape Console. See also the *LDAP-UX Integration B.03.20 Release Notes* for additional contributed tools.

NOTE You should keep a small subset of users in /etc/passwd, particularly the root login. This allows administrative users to log in during installation and testing. Also, if the directory is unavailable you can still log in to the system.

- Where in your directory will you put your name service data?

  Your directory architect needs to decide where in your directory to place your name service information. LDAP-UX Client Services by default expects user and group data to use the object classes and attributes specified by RFC 2307. The migration scripts by default create and populate a new subtree that conforms to RFC 2307. Figure 2-1 on page 15 shows a base DN of `ou=unix,o=hp.com`. Write the base DN of your name service data in Appendix A, "Configuration Worksheet," on page 183.

  If you prefer to merge your name service data into an existing directory structure, you can map the standard RFC 2307 attributes to alternate attributes. See "LDAP-UX Client Services Object Classes" on page 187 for more information.

- How will you put your user, group, and other data into your directory?

  LDAP supports group membership defined in the X.500 syntax (using the member or uniquemember attribute), while still supporting the RFC 2307 syntax (using the memberuid attribute). This new group membership syntax increases LDAP-UX integration with LDAP and other LDAP-based applications, and may reduce administration overhead eliminating the need to manage the memberuid attribute. In addition, a new performance improvement has been made through the addition of a new caching daemon which caches passwd, group and X.500 group membership information retrieved from an LDAP server. This significantly reduces LDAP-UX's response time to applications. In addition, the daemon re-uses connections for LDAP queries and maintains multiple connections to an LDAP server to improve performance.

  The migration scripts provided with LDAP-UX Client Services can build and populate a new directory subtree for your user and group data.

If you merge your data into an existing directory, for example to share user names and passwords with other applications, the migration scripts can create LDIF files of your user data, but you will have to write your own scripts or use other tools to merge the data into your directory. You can add the posixAccount object class to your users already in the directory to leverage your existing directory data.

See “Import Name Service Data into Your Directory” on page 25 for how to import your information into the directory and “Name Service Migration Scripts” on page 160 for details on the migration scripts.

CAUTION

If you place a root login in the LDAP directory, that user and password will be able to log in as root to any client using LDAP-UX Client Services. Keeping the root user in /etc/passwd on each client system allows the root user to be managed locally. This can be especially useful if the network is down because it allows local access to the system.

It is not recommended that you put the same users both in /etc/passwd and in the directory. This could lead to conflicts and unexpected behavior.

- How many profiles do you need?

  A configuration profile is a directory entry that contains configuration information shared by a group of clients. The profile contains the information clients need to access user and group data in the directory, for example:

  — Your directory server hosts
  — Where user, group, and other information is in the directory
  — The method clients use to bind to the directory
  — Other configuration parameters such as search time limits

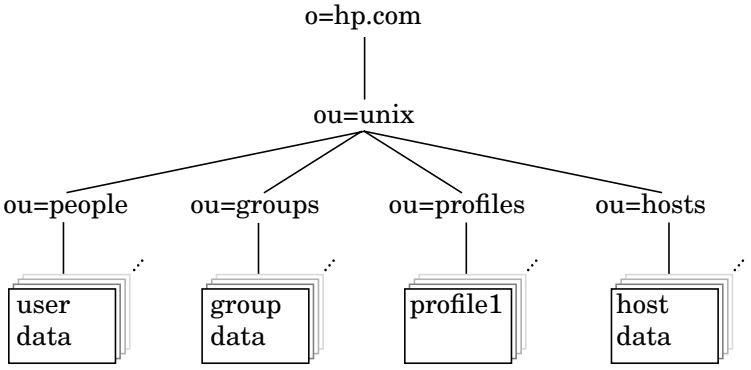
  If these parameters are the same for all your clients, you would need only one profile. You will need at least one profile per directory server or replica. In general, it is a good idea to have as few profiles as necessary to simplify maintenance. Look at the posixNamingProfile object class in Appendix B, “LDAP-UX Client Services Object Classes,” on page 187 to see what is in a profile to decide how many different profiles you need.

If you are familiar with NIS, one example is to create a separate profile for each NIS domain.

- Where in your directory will you put your profile?

  The profile contains directory access information. It specifies how and where clients can find user and group data in the directory. You can put the profile anywhere you want as long as the client systems can read it. For example, you might put it near your user data, or in a separate administrative area. You should put the profile in the same directory as your user and group data to simplify access permissions. Clients must have access to both the profile and the user and group data. The following example shows a configuration profile DN of `cn=profile1,ou=profiles,ou=devices,ou=unix,o=hp.com`.

Figure 2-1 Example Directory Structure



Write your configuration profile DN on the worksheet in Appendix A, “Configuration Worksheet,” on page 183.

- By what method will client systems bind to the directory?

  Clients can bind to the directory anonymously. This is the default and is simplest to administer. If you need to prevent access to your data from anonymous users or your directory does not support anonymous access, you can use a proxy user. If you configure a proxy user, you can also configure anonymous access to be attempted in the event the proxy user fails.

  Write your client access method and proxy user DN, if needed, on the worksheet in Appendix A, “Configuration Worksheet,” on page 183.

- How will you increase the security level of the product to prevent an unwanted user from logging in to the system via LDAP? What is the procedure to set up increased login security?

  The default is to allow all users stored in the LDAP directory to login. To disallow specific users to login to a local system, you will have to configure the disable_uid_range flag in /etc/opt/ldapux/ldapux_client.conf file. There are two sections in this file, the [profile] section and the [NSS] section. HP recommends that you do not edit the [profile] section. The [NSS] section contains the disable_uid_range flag along with two logging flags. For example, the flag might look like this: disable_uid_range=0-100, 300-450, 89.

  Another common example would be to disable root access This flag would look like this: disable_uid_range=0.

  When the disable_uid_range is turned on, the disabled uid will not be displayed when you run commands such as pwget, listusers, logins, etc.

NOTE

The passwd command may still allow you to change a password for a disabled user when alternative authentication methods, such as PAM Kerberos, are used since LDAP does not control these subsystems.

- What PAM authentication will you use? How will you set up /etc/pam.conf? What other authentication do you want to use & in what order?

  PAM is the Pluggable Authentication Module, providing authentication services. You can configure PAM to use ldap, Kerberos, or other traditional UNIX locations (for example files, NIS, NIS+) as controlled by NSS. See *pam*(3), *pam.conf*(4), and *Managing Systems and Workgroups* at http://docs.hp.com/hpux/os for more information on PAM.

  It is recommended you use HP-UX file-based authentication first, followed by LDAP or other authentication. /etc/pam.ldap is an example of this configuration. With this configuration, PAM uses traditional authentication first, searching /etc/passwd when any user logs in, then attempts to authenticate to the directory if the user is

not in /etc/passwd. If you have a few users in /etc/passwd, in particular the root user, and if the directory is unavailable, you can still log in to the client as a user in /etc/passwd.

- Do you want to use SSL for secure communication between LDAP clients and Netscape Directory servers?

  LDAP-UX Client Services B.03.20 or later supports SSL with password as the credential, using either simple or DIGEST-MD5 authentication (DIGEST-MD5 for the Netscape Directory Server only) to ensure confidentiality and data integrity between the clients and servers. By default, SSL is disabled. For detailed information, refer to “Configure the LDAP-UX Client Serivces with SSL Support” on page 41.

- What authentication method will you use when you choose to enable SSL?

  You have a choice between SIMPLE with SSL (the default), or SASL DIGEST-MD5 with SSL.

- What authentication method will you use when you choose to not enable SSL?

  You have a choice between SIMPLE (the default), or SASL DIGEST-MD5. SASL DIGEST-MD5 improves security, preventing snooping over the network during authentication.

  Using the DIGEST-MD5 authentication, the password must be stored in the clear text in the LDAP directory.

- Do you want to import the LDAP printer schema if you choose to start the printer configurator?

  LDAP-UX Client Services B.03.20 or later provides the integration with the LDAP printer configurator to simplify the LP printer management by updating LP printer configuration automatically on your client system. A new printer schema, which is based on *IETF<draft-fleming-ldap-printer-schema-02>*, is required to start the services.

IMPORTANT

If you attempt to use this new feature, in the `ldapclientd.conf` file, the `start` configuration parameter of the printer services section must be set to "`yes`". If the `start` option is enabled, the printer configurator will start when `ldapclientd` is initialized. By default, the `start` parameter is enabled.

- Do you want to import the publickey schema into your LDAP directory if you choose to store and manage publickeys in the LDAP directory.

  LDAP-UX Client Services B.04.00 supports discovery and management of publickeys in an LDAP directory. Both public and private (secret) keys, used by the SecureRPC API can be stored in user and host entries in an LDAP directory server, using the `nisKeyObject` objectclass.

- Do you want to import the automount schema into your LDAP directory server if you choose to store and manage automount maps in the LDAP directory?

  LDAP-UX Client Services B.04.00 supports the automount service under the AutoFS subsystem. This new feature allows you to store or retrieve automount maps in/from an LDAP directory. LDAP-UX Client Services supports the new automount schema based on RFC2307-bis. The `nisObject` automount schema can also be used if configured via attribute mappings.

  The setup program will import the new automount schema into your Netscape Directory Server. An obsolete automount schema is shipped with the Netscape Directory Server version 6.x. You must manually delete the obsolete automount schema before the setup program can successfully import the new automount schema into the LDAP directory.

  For the detailed information about AutoFS with LDAP support, see "AutoFS Support" on page 55.

- What name services will you use? How will you set up /etc/nsswitch.conf? What order do you want NSS to try services?

  NSS is the Name Service Switch, providing naming services for user names, group names, and other information. You can configure NSS to use files, ldap, or NIS in any order and with different parameters.

See /etc/nsswitch.ldap for an example nsswitch.conf file using files and ldap. See *switch*(4) and "Configuring the Name Service Switch" in *Installing and Administering NFS Services* at http://docs.hp.com for more information.

It is recommended you use files first, followed by LDAP for passwd, group and other supported name services. With this configuration, NSS will first check files, then check the directory if the name service data is not in the respective files. /etc/nsswitch.ldap is an example of this configuration.

- Do you need to configure login authorization for a subset of users from a large repository such as an LDAP directory? How will you set up the `/etc/opt/ldapux/pam_authz.policy` and `/etc/pam.conf` files to implement this feature?

  The pam_authz service module for PAM provides functionality that allows the administrator to control who can login to the system. These modules are located at /usr/lib/security/libpam_authz.1 on the HP 9000 machine and at `libpam_authz.so.1` on the Integrity (ia64) machine. pam_authz has been created to provide access control similar to the netgroup filtering feature that is performed by NIS. These modules are located at /usr/lib/security/libpam_authz.1 on the HP 9000 machine (libpam_authz.so.1 on the Integrity (ia64) machine). Starting with LDAP-UX Client Services B.04.00, pam_authz has been enhanced to allow system administrators to configure and customize their local access rules in a local policy file, `/etc/opt/ldapux/pam_authz.policy`. pam_authz uses these access control rules defined in the `/etc/opt/ldapux/pam_authz.policy` file to control the login authorization. pam_authz is intended to be used when NIS is not used, such as when the pam_ldap or pam_kerberos authentication modules are used. Because pam_authz doesn't provide authentication, it doesn't verify if a user account exists.

  Starting with LDAP-UX Client Services B.04.00, if the `/etc/opt/ldapux/pam_authz.policy` file does not exist in the system, pam_authz provides access control based on the netgroup information found in the `/etc/passwd` and `/etc/netgroup` files. If the `/etc/opt/ldapux/pam_authz.policy` file exists in the system, pam_authz uses the access rules defined in the policy file to determine who can login to the system.

For detailed information on this feature and how to configure the `/etc/opt/ldapux/pam_authz`.policy file, see “PAM_AUTHZ Login Authorization Enhancement” on page 109 or the `pam_authz(5)` man page.

- How will you communicate with your user community about the change to LDAP?

  For the most part, your user community should be unaffected by the directory. Most HP-UX commands will work as always. However, for some LDAP directories (such as Netscape Directory Server 6.x), data in replica servers cannot be modified. The *passwd*(1) command will not work on clients configured to use such a directory replica. See “To Change Passwords” on page 169 for how you can use *ldappasswd*(8) in this situation.

  Check the *Release Notes* for any other limitations and tell your users how they can work around them.

Install LDAP-UX Client Services on a Client

Use *swinstall*(1M) to install the LDAP-UX Client Services software, the NativeLdapClient subproduct, on a client system. See the *LDAP-UX Integration B.04.00 Release Notes* for any last-minute changes to this procedure. You don’t need to reboot your system after installing the product.

NOTE Starting with LDAP-UX Client Services B.03.20 or later, system reboot is not required after installing the product.

NOTE For the HP 9000 and Integrity (ia64) client systems, you need to install the required patches. For the detailed information about the required patches, refer to “*LDAP-UX Client Services B.04.00 Release Notes* at: *http://www.docs.hp.com.*

Configure Your Directory

This section describes how to configure your directory to work with LDAP-UX Client Services. Examples are given for Netscape Directory Server for HP-UX version 6.x. See the *LDAP-UX Integration B.04.00 Release Notes* for information on supported directories. If you have a different directory, see the documentation for your directory for details on how to configure it.

See *Preparing Your LDAP Directory for HP-UX Integration* at http://docs.hp.com/hpux/internet for more details on directory configuration.

Step 1. Install the posix schema (RFC 2307) into your directory.

If you have Netscape Directory Server for HP-UX version 4.0, or later, the posix schema is already installed.

The schema is in the file /opt/ldapux/ypldapd/etc/slapd-v3.nis.conf. For information on the posix schema (RFC 2307), see http://www.ietf.org/rfc.html. RFC 2307 consists of object classes such as: posixAccount, posixGroup, shadowAccount, etc. posixAccount represents a user entry from /etc/passwd. posixGroup represents a group entry from /etc/group. And shadowAccount provides additional user information for added security.

Step 2. Restrict write access to certain passwd (posixAccount) attributes of the posix schema.

CAUTION Make sure you restrict access to the attributes listed below. Allowing users to change them could be a security risk

Grant write access of the uidnumber, gidnumber, homedirectory, and uid attributes only to directory administrators; disallow write access by all other users. You may want to restrict write access to other attributes in the passwd (posixAccount) entry as well.

With Netscape Directory Server for HP-UX, you can use the Netscape Console or ldapmodify to set up access control instructions (ACI) so ordinary users cannot change these attributes in their passwd entry in the directory.

The following access control instruction is by default at the top of the directory tree for a 6.x Netscape directory. This ACI allows a user to change any attribute in their passwd entry:

```
aci: (targetattr = "*") (version 3.0; acl "Allow self entry modification";
 allow (write)userdn = "ldap:///self";)
```

You could modify this example ACI to the following, which prevents ordinary users from changing their uidnumber, gidnumber, homedirectory, and uid attributes:

```
aci: (targetattr != "uidnumber || gidnumber || homedirectory || uid") (version
 3.0; acl "Allow self entry modification, except for important posix attributes";
 allow (write)userdn = "ldap:///self";)
```

You may have other attributes you need to protect as well.

To change an ACI with the Netscape Directory Console, select the Directory tab, select your directory suffix in the left-hand panel, then select the Object: Set Access Permissions menu item. In the dialog box, select the "Allow self entry modification" ACI and click OK. Use the Set Access Permissions dialog box to modify the ACI. See "Managing Access Control" in the *Netscape Directory Server Administrator's Guide* for complete details.

Step 3. Restrict write access to certain group (posixGroup) attributes of the posix schema.

Grant write access of the cn, memberuid, gidnumber, and userPassword attributes only to directory administrators; disallow write access by all other users.

With Netscape Directory Server for HP-UX, you can use the Netscape Console or ldapmodify to set up access control lists (ACL) so ordinary users cannot change these attributes in the posixGroup entry in the directory. For example, the following ACI, placed in the directory at `ou=groups,ou=unix,o=hp.com`, allows only the directory administrator to modify entries below `ou=groups,ou=unix,o=hp.com`:

```
aci: (targetattr = "*")(version 3.0;acl "Disallow modification of group
 entries"; deny (write) (groupdn != "ldap:///ou=Directory Administrators,
 o=hp.com");)
```

Step 4. Grant read access of all attributes of the posix schema.

Ensure all users have read access to the posix attributes.

When using PAM_LDAP as your authentication method, users do not need read access to the userPassword attribute since the authentication is handled by the directory itself. Therefore, for better security, you can remove read access to userPassword from ordinary users.

Step 5. Configure anonymous access, if needed. If you do not configure a proxy user, then the attributes of your name service data must be readable anonymously.

Step 6. Create a proxy user in the directory, if needed.

To create a proxy user with Netscape Directory Server for HP-UX, use the Netscape Console, Users and Groups tab, Create button. For example, you might create a user `uid=proxyuser,ou=Special Users,o=hp.com`.

Step 7. Set access permissions for the proxy user, if configured.

Give the proxy user created above read permission for the posix account attributes.

With Netscape Directory Server, for example, the following ACI gives a proxy user permission to compare, read, and search all posix account attributes except the userPassword attribute:

```
aci: (target="ldap:///o=hp.com")(targetattr!="userpassword")
 (version 3.0; acl "Proxy userpassword read rights";
 allow (compare,read,search)
 userdn = "ldap:///uid=proxyuser,ou=Special Users,o=hp.com";)
```

Step 8. The default ACI of Netscape Directory Server 6.11 allows a user to change his own common attributes. But, for Netscape Directory Server 6.21 or later, you need to set ACI that gives a user permission to change his own common attributes. By default, the Netscape Directory Server 6.21 or later provides the following ACI named `Enable self write for common attributes` that gives a user permission to change his own common attributes:

```
aci: (targetattr = "carLicense ||description ||displayName
 ||facsimileTelephoneNumber ||homePhone ||homePostalAddress ||initials
 ||jpegPhoto ||labeledURL ||mail ||mobile ||pager ||photo ||postOfficeBox
 ||postalAddress ||postalCode ||preferredDeliveryMethod ||preferredLanguage
 ||registeredAddress ||roomNumber ||secretary ||seeAlso ||st ||street
```

```
||telephoneNumber ||telexNumber ||title ||userCertificate ||userPassword
||userSMIMECertificate ||x500UniqueIdentifier")
(version 3.0; acl "Enable self  write for common attributes"; allow (write)
(userdn = "ldap:///self"))
```

You can modify the default ACI and give appropriate access rights to change your own common attributes.

Step 9. Index important attributes for better performance of Netscape Directory Server.

Since many of your directory requests will be for the attributes listed below, you should index these to improve performance. If you don't index, your directory may search sequentially causing a performance bottleneck. As a rule of thumb, databases containing more than 100 entries should be indexed by their key attributes.

The following attributes are recommended for indexing:

- cn
- objectclass
- memberuid
- uidnumber
- gidnumber
- uid
- ipserviceport
- iphostnumber

To index these entries with Netscape Directory Server, use the Console, Configuration tab, Indexes tab, Add Attributes button.

Step 10. Determine if you need to support enumeration requests. If you do, increase the Look-Through limit, the Size limit, and the All-IDs-Threshold in the Netscape Directory Server.

Enumeration requests are directory queries that request all of a database, for example all users or all groups. Enumeration requests of large databases could reduce network and server performance. With large Netscape Directories and default configurations, enumerations may fail or provide incomplete data, but the default configuration also may prevent performance problems from enumerations.

If you need to support enumerations with large Netscape Directories, increase the listed parameters as described in *Preparing Your LDAP Directory for LDAP-UX Integration* available at http://docs.hp.com/hpux/internet/#LDAP-UX%20Integration.

The Look-through limit specifies the maximum number of directory entries to examine before aborting the search operation. The Size limit determines the maximum number of entries to return to any query before aborting. The All-IDs-Threshold specifies the number of entries that can be maintained for an index key. In general, it is bad practice to have an extremely large All-ID's threashold, as it can dramatically increase the size of your directory server's database. However, if you have a large number of posixAccounts, posixGroups or other form of RFC 2307 data that needs to be enumerated and you also have other large sets of data in your directory server, increasing the All-UID's threashold to above the maximum number of posixAccounts, posixGroups, or others, can dramatically increase enumeration performance.

For information on these parameters and how to change them, see the *Netscape Directory Server Administrator's Guide*. See also "Minimizing Enumeration Requests" on page 125.

Step 11. If you want to enable SSL support with LDAP-UX, you need to turn on SSL in your directory server. For detailed information on how to set up and configure your Netscape Directory Server to enable SSL communication over LDAP, see *"Managing SSL Chapter"* in the *Administrator's Guide for Netscape Directory Server* at *http://enterprise.netscape.com/docs/directory/61/pdf/ds61admin.pdf*

Import Name Service Data into Your Directory

The next step is to import your name service data into your LDAP Directory. Here are some considerations when planning this:

- If you have already imported data into your directory with the NIS/LDAP Gateway product, LDAP-UX Client Services can use that data and you can skip to "Configure the LDAP-UX Client Services" on page 27.

- If you are using NIS, the migration scripts take your NIS maps and generate LDIF files. These scripts can then import the LDIF files into your directory, creating new entries in the directory. This only works if you are starting with an empty directory or creating an entirely new subtree in your directory for your data.

  If you are not using NIS, the migration scripts can take your user, group, and other data from files, generate LDIF, and import the LDIF into your directory.

- If you integrate the name service data into your directory, the migration scripts may be helpful depending on where you put the data in your directory. You could use them just to generate LDIF, edit the LDIF, then import the LDIF into your directory. For example, you could manually add the posixAccount object class to your existing entries under `ou=People` and add their HP-UX information there.

Steps to Importing Name Service Data into Your Directory

Here are the steps for importing your user and group data into your LDAP directory. Modify them as needed.

Step 1. Decide which migration method and scripts you will use.

Migration scripts are provided to ease the task of importing your existing name service data into your LDAP directory.

See “Name Service Migration Scripts” on page 160 for a complete description of the scripts, what they do, and how to use them. Modify the migration scripts, if needed.

Step 2. Back up your directory.

Step 3. Run the migration scripts, using the worksheet in Appendix A, “Configuration Worksheet,” on page 183.

Step 4. If the method you used above did not already do so, import the LDIF file into your directory.

Configure the LDAP-UX Client Services

Below is a summary of how to configure LDAP-UX Client Services with Netscape Directory Server 6.x. For a default configuration, see “Quick Configuration” on page 29. For a custom configuration, see “Custom Configuration” on page 34 for more information.

NOTE The setup program has only been certified with Netscape Directory Server 6.x, and Windows 2000/2003 Active Directory. See the *LDAP-UX Client Services B.04.00 Release Notes* (P/N J4269-90042).

NOTE The LDAP-UX Client Services B.04.00 supports storage of automount maps and publickeys on Netscape Directory Server 6.11 or 6.21. See the *LDAP-UX Client Services B.04.00 Release Notes* (P/N J4269-90045).

- Run the Setup program. The setup program provides the following assistance:
  - — Extends your Netscape directory schema with the configuration profile schema, if not already done
  - — Imports the LDAP printer schema into your Netscape Directory Server if you choose to start the LDAP printer configurator
  - — Imports the publickey schema into your Netscape Directory Server if you choose to store the public keys of users and hosts in an LDAP directory
  - — Imports the new automount schema into your Netscape Directory Server if you choose to store the AutoFS maps in an LDAP directory
  - — Provides the option to enable SSL for secure communication between LDAP clients and Netscape Directory servers
  - — Optionally configures SASL Digest-MD5 authentication (for Netscape Directory only)
  - — Creates a configuration profile entry in your Netscape directory from information you provide

— Updates the local client's start-up file (/etc/opt/ldapux/ldapux_client.conf) with your directory and configuration profile location
— Downloads the configuration profile from the directory to your local client system
— Configures a proxy user for the client, if needed
— Starts the Client Daemon if you choose to start it

IMPORTANT

Starting with LDAP-UX Client Services B.03.20, the client daemon, `/opt/ldapux/bin/ldapclientd`, must be running for LDAP-UX functions to work. With LDAP-UX Client Services B.03.10 or earlier, running the client daemon, `ldapclientd`, is optional.

NOTE

The LDAP printer configurator can support any Directory Servers that support the LDAP printer schema based on *IETF<draft-fleming-ldap-printer-schema-02.txt>*.

However, the LDAP-UX Client Services only supports automatically importing the LDAP printer schema into the Netscape Directory Server by running the setup program.

If your directory server does not support the LDAP printer schema, you may experience problems when importing the printer schema.

- Configure the Pluggable Authentication Module (PAM) by modifying the file /etc/pam.conf. See /etc/pam.ldap for a sample.
- Configure the Name Service Switch (NSS) by modifying the file /etc/nsswitch.conf. See /etc/nsswitch.ldap for a sample.
- Optionally modify the disable_uid_range flag in the /etc/opt/ldapux/ldapux_client.conf file to disable logins to the local system from specific users.
- Optionally configure the authorization of one or more subgroups from a large repository such as an LDAP directory server. For the detailed information on how to set up the policy file, `/etc/opt/ldapux/pam_authz.policy`, see "Policy File" on page 111.

After you configure your directory and the first client system, configuring additional client systems is simpler. Refer to “Configure Subsequent Client Systems” on page 72 for more information.

Quick Configuration

You can quickly configure a Netscape directory and the first client by letting most of the configuration parameters take default values as follows. For a custom configuration, see “Custom Configuration” on page 34.

The steps described below assume that you don’t use SSL support with LDAP-UX. If you want to enable SSL support, see “Custom Configuration” on page 34.

Step 1. Log in as root and run the Setup program:

```
cd /opt/ldapux/config
./setup
```

The Setup program asks you a series of questions and usually provides default answers. Press the Enter key to accept the default, or change the value and press Enter. At any point during setup, enter Control-b to back up or Control-c to exit setup.

Step 2. Choose Netscape Directory as your LDAP directory server (option 1).

Step 3. Enter either the host name or IP address of the directory server where your profile exists, or where you want to create a new profile from Appendix A, “Configuration Worksheet,” on page 183.

Step 4. Enter the port number of the previously specified directory server that you want to store the profile from Appendix A, “Configuration Worksheet,” on page 183. The default port number is 389.

Step 5. If the profile schema has already been imported, setup skips this step. Otherwise, enter “yes” to extend the profile schema if the schema has not been imported with LDAP-UX Client Services object class `DUAConfigProfile`. See Appendix B, “LDAP-UX Client Services Object Classes,” on page 187 for a detailed description of this object class.

Step 6. If the LDAP printer schema has already been extended, setup skips this steps. Otherwise, enter “yes” to extend the LP printer schema if you choose to start the printer configurator. The LDAP printer configurator is a feature that simplifies the LP printer management by refreshing LP

printer configurations on your client system. A new printer schema, which is based on *IETF<draft-fleming-ldap-printer-schema-02.txt>,* is required to start the services.

Step 7. If the publickey schema has already extended, setup skips this step. Otherwise, enter “yes” to extend the publickey schema if you choose to store the public keys of users and hosts in the LDAP directory. A publickey schema, which is based on RFC 2307-bis is required to migrate the publickeys in the NIS+ credential table entries on the NIS+ server to the LDAP directory.

Step 8. If the new automount schema has already been imported, setup skips to step 9.

Otherwise, you will be asked whether or not you want to install the new automount schema which is based on RFC 2307-bis. Enter “yes” if you want to import the new automount schema into the LDAP directory server. Enter “no” if you do not want to import new automount schema into the LDAP directory server. Setup skips to step 9 if you enter “no”.

Step 9. Next, if the setup program detects the obsolete automount schema exists in the LDAP directory, it will prompt you for the information shown as follows:

```
The obsolete automount schema exists in the directory.
If you still want to use the new automount schema, you must
perform the following steps:
 1. Exit this program
 2. Stop directory server
 3. Remove the obsolete automount schema:
    a. objectclass- automount
    b. attribute-automountInformation

    Note: for Netscape Directory Server, they are in
    10rfc2307.ldif.
 4. Start directory and re-run setup program to install the new
    automount schema.
Do you still want to use the new automount schema? Press Yes
will exit this program. {YES]:
```

Reply “`yes` ” when asked do you still want to use the new automount schema. If you reply `yes`, it will take you to exit this program. You must re-run the setup program again to install the new automount schema after you exit this program and manually delete the obsolete automount

schema. For detailed information on how to remove the obsolete automount schema, see “Removing The Obsolete Automount Schema” on page 59.

If you reply `no`, setup skips to step 9 and the new automount schema will not be imported.

Otherwise, you will be asked to enter the DN (Distinguished Name) and password of the directory user who can import the schema into the LDAP directory.

Step 10. If you are creating a new profile, add all parent entries of the profile DN to the directory (if any). If you attempt to create a new profile and any parent entries of the profile do not already exist in the directory, setup will fail. For example, if your profile will be **`cn=profile1,ou=profiles,o=hp,com`**, then **`ou=profiles,o=hp.com`** must exist in the directory or setup will fail.

Step 11. Next enter either the DN of a new profile, or the DN of an existing profile you want to use, from Appendix A, “Configuration Worksheet,” on page 183.

To display all the profiles in the directory, use a command like the following:

```
ldapsearch -b o=hp.com objectclass=DUAConfigProfile dn
```

If you are using an existing profile, setup configures your client, downloads the profile, and exits. In this case, continue with step 12 below.

Step 12. If you are creating a new profile, enter the DN and password of the directory user who can create a new profile from Appendix A, “Configuration Worksheet,” on page 183.

Step 13. Next, it will prompt you for the following information:

```
Select authentication method for users to bind/authenticate to
the server
1. SIMPLE
2. SASL DIGEST-MD5
To accept the default shown in brackets, press the Return key.

Authentication method: [1]:
```

Press the return key if you choose to accept SIMPLE authentication method, type 2 if you choose SASL DIGEST-MD5 authentication method for the following prompt:

```
Authentication method: [1]:
```

Step 14. Next enter the host name and port number of the directory where your name service data is, from Appendix A, “Configuration Worksheet,” on page 183. For high availability, each LDAP-UX client can look for name service data in up to three different directory hosts. You can enter up to three hosts, to be searched in order.

Step 15. Enter the base DN where clients should search for name service data from Appendix A, “Configuration Worksheet,” on page 183.

Step 16. You can quickly configure a Netscape directory and the first client by accepting the remaining default configuration parameters when prompted.

Table 2-1 shows the configuration parameters and the default values they will be configured with.

Table 2-1 Configuration Parameter Default Values

Parameter	Default Value
Type of client binding	Anonymous
Bind time limit	5 seconds
Search time limit	no limit
Use of referrals	Yes
Profile TTL (Time To Live)	0 - infinite
Use standard RFC-2307 object class attributes for supported services	Yes
Use default search descriptions for supported services	Yes
Authentication method	Simple

To change any of these default values, refer to “Custom Configuration” on page 34.

Step 17. After entering all the configuration information, setup extends the schema, creates a new profile, and configures the client to use the directory.

Step 18. Configure the Pluggable Authentication Module (PAM).

Save a copy of the file /etc/pam.conf and edit the original to specify LDAP authentication and other authentication methods you want to use. See /etc/pam.ldap for a sample. You may be able to just copy /etc/pam.ldap to /etc/pam.conf. See *pam*(3), *pam.conf*(4), and *Managing Systems and Workgroups* at http://docs.hp.com/hpux for more information on PAM.

Step 19. Configure the Name Service Switch (NSS).

Save a copy of the file /etc/nsswitch.conf and edit the original to specify the ldap name service and other name services you want to use. See /etc/nsswitch.ldap for a sample. You may be able to just copy /etc/nsswitch.ldap to /etc/nsswitch.conf. See *nsswitch.conf*(4) for more information.

Step 20. Optionally, configure the Pam Authorization Service module (pam_authz).

LDAP-UX Client Services provides a sample configuration file, `/etc/opt/ldapux/pam_authz.conf.template`. This sample file shows you how to configure the policy file to work with pam_authz. You can copy this sample file and edit it using the correct syntax to specify the access rules you wish to authorize or exclude from authorization. For more detailed information on how to configure the policy file. see “PAM_AUTHZ Login Authorization Enhancement” on page 109.

The sample /etc/pam.conf file in the man page will show you how to configure the /etc/pam.conf file to work with pam_authz.For more detailed information about pam_authz, refer to the pam_authz(5) man page.

Step 21. Optionally configure the disable_uid_range flag.

Save a copy of the file /etc/opt/ldapux/ldapux_client.conf and edit the original to activate the disable_uid_range flag. Uncomment the flag in the [NSS] portion of the file and fill in the UID range. The format is disable_uid_range=uid#,[uid#-uid#], ... where uid# stands for uid number.

For example: disable_uid_range=0-100,300-450,89

Note:

- White spaces between numbers are ignored.
- Only one line of the list is accepted, however, the line can be wrapped.
- The maximum number of ranges is 20.

Step 22. “Verify the LDAP-UX Client Services” on page 68.

Step 23. Configure subsequent clients by running setup on those clients and specifying an existing configuration profile. Or for a simpler process see “Configure Subsequent Client Systems” on page 72.

Custom Configuration

Running the Setup program for a quick configuration, as described above, configures your client using default values where possible. If you would like to customize these parameters, proceed as follows.

If you want to use SSL, you must have the certificate database files, *cert7.db or cert8.db and key3.db,* on your client system before you run the custom configuration. See “Configure the LDAP-UX Client Serivces with SSL Support” on page 41 for details.

Step 1. Perform the steps described in “Quick Configuration” on page 29. However, after step 11, You will be asked whether you want to use SSL or not. Enter “yes” to use SSL for the secure communication between LDAP clients and the Netscape Directory Server. Enter “no” if you don’t want to use SSL.

Step 2. Next, it will prompt you for selecting the authentication method for users to bind/authenticate to the server.

You have a choice between SIMPLE (the default), or SASL DIGEST-MD5 if you choose to not enable SSL. However, you have a choice between SIMPLE with SSL (the default), or SASL DIGEST-MD5 with SSL if you choose to enable SSL.

If you select SASL DIGEST-MD5, two additional prompts will appear. The first will prompt you for a user mapping (UID, DN, or Other). The second will prompt you for a single realm to use when retrieving user authentication information. If no realm is specified, user information will be retrieved from the first realm the directory server offers.

Step 3. Specify the host name and optional port number where your directory is running. If you choose to not use SSL, the default directory port number is 389. If you choose to use SSL, the default directory port number is 636.

For high availability, each LDAP-UX client can look for user and group information in up to three different directory servers. You are able to specify up to three directory hosts, to be searched in order.

Step 4. Reply "no" when asked if you want to accept the remaining default configuration parameters.

Step 5. Select the client binding you want from Appendix A, "Configuration Worksheet," on page 183. This determines the identity that client systems use when binding to the directory to search for user and group information.

Step 6. If you configured a proxy user, enter the DN and password of your proxy user, from Appendix A, "Configuration Worksheet," on page 183.

Step 7. Enter the maximum time in seconds the client should wait for directory searches before aborting. Enter 0 for no time limit.

Step 8. Enter whether or not you want directory searches to follow referrals. Referrals are a redirection mechanism supported by the LDAP protocol. Please see your directory manuals for more information on referrals.

NOTE If you want your directory searches to follow referrals, you must allow anonymous access into your directories.

Step 9. Enter the Profile TTL (Time To Live) value. This value defines the time interval between automatic downloads (refreshes) of new configuration profiles from the directory. Automatic refreshing ensures that the client is always configured using the newest configuration profile.
If you want to disable automatic refresh or manually control when the refresh occurs, enter a value of 0. See "Download the Profile Periodically" on page 74.

Step 10. Next, the setup program will prompt you for the following information:

```
LDAP-UX Client Services supports the following services:
```

```
1.Password                                   6.Protocols
2.Shadow passwd                              7.Networks
3.Group                                      8.Hosts
4.PAM (Pluggable Authentication Module)      9.Services
5.RPC                                       10.Netgroup
                                            11.Automount

Each services uses a standard object class (defined by RFC
2307)

You can remap any of these attributes to alternate attributes

Do you want to remap any of the standard RFC 2307 attributes?
```

Enter whether or not you want to remap the standard object class attributes to alternate attributes. You need to do this if your user and group data do not conform to the object classes defined in RFC 2307, posixAccount, posixGroup, shadowAccount, and so forth.

You can remap the attributes for any of the supported services: passwd, shadow passwd, group, PAM, netgroup, rpc, protocols, networks, hosts, automount and services. Select the service you want to remap. Then select the attribute you want to remap and enter the new attribute name. For example, you might map the standard UNIX user id number attribute `uidnumber` to an `employeeID` attribute.

By default, LDAP-UX Client Services uses the RFC2307-bis automount schema. The `nisObject` automount schema can also be used if configured via attribute mappings.

Use the following steps if you want to remap the automount attributes to the `nisObject` automount attributes:

1. Enter yes for the following question:

   ```
   Do you want to remap any of the standard RFC 2307
   attributes?  [yes]: yes
   ```

2. If you want to select the `automount` service, then enter 11 for the following question and press the return key:

   ```
   Specify the service you want to map? [0]:11
   ```

3. Next, it will take you to the screen which shows you the following information:

   ```
   Current Automount attribute names:
   ```

```
1.automountMapName ->[automountMapname]
2.automountKey -> [automountKey]
3.automountInformation -> [automountInformation]

Specify the attribute you want to map. [0]:
```

You type 1 for the following question and press the return key:

```
Specify the attribute you want to map. [0]:1
```

4. Next, type the attribute `nisMapName` that you want to map to the `automountMapName` attribute for the following question and press the return key:

   `automountMapName` -> nisMapName

5. Next, it will take you to the screen which shows you the following information:

```
Current Automount attribute names:

1.automountMapName ->[nisMapname]
2.automountKey -> [automountKey]
3.automountInformation -> [automountInformation]

Specify the attribute you want to map. [0]:
```

   If you want to specify the attribute to map to the `automountKey` attribute , then type 2 for the following question and press the return key:

```
Specify the attribute you want to map. [0]:2
```

6. Next, type the attribute `cn` you want to map to the `automountKey` attribute and press the return key:

   `automountKey` -> cn

7. Next, it will take you to the screen which shows you the following information:

```
Current Automount attribute names:

1.automountMapName ->[nisMapname]
2.automountKey -> [cn]
3.automountInformation -> [automountInformation]

Specify the attribute you want to map. [0]:
```

If you want to specify the attribute to map to the `automountInformation` attribute , then type 3 for the following question and press the return key:

```
Specify the attribute you want to map. [0]:3
```

8. Next, type the attribute `nisMapEntry` you want to map to the automountInformation attribute and press the return key:

   `automountInformation` -> nisMapEntry

9. Next, it will take you to the screen which shows you the following information:

```
Current Automount attribute names:

1.automountMapName ->[nisMapname]
2.automountKey -> [cn]
3.automountInformation -> [nisMapEntry]

Specify the attribute you want to map. [0]:
```

You type 0 to exit this menu for the following question:

```
Specify the attribute you want to map. [0]:0
```

If you will be configuring X.500 group membership support, you should remap the group member attribute (to `member` or `uniquemember`) instead of using the default.

NOTE Make sure that the attribute name is typed in correctly to avoid unpredictable results later on.

See RFC 2307 at http://www.ietf.org/rfc/rfc2307.txt for a description of the standard object classes and attributes.

Optionally, you may set up X.500 by executing the following steps:

1. `#cd /opt/ldapux/config/`
2. Execute the setup program:
   `#./setup`
   For the question:
   `Accept remaining defaults? (y/n) [y]: N`
   Answer “N” instead of the default “Y”

3. For the question:
   `Do you want to remap any of the standard RFC 2307 attributes? [No]: Y`
   Answer “Y” instead of the default “N”

4. For the question:
   `Specify the service you want to map? [0]: 3`
   Answer “3”

5. For the question:
   `Specify the attribute you want to map? [0]: 3`
   Answer “3”

6. Type the attributes you want to map to the member attribute:
   `[memberuid]: member`

NOTE

LDAP-UX supports DN-based (X.500 style) membership syntax. This means that you do not need to use the memberUid attribute to define the members of a POSIX group. Instead, you can use either the member or uniqueMember attribute. LDAP-UX can convert from the DN syntax to the POSIX syntax (an account name).

For Netscape Directory Server, the typical member attribute would be either memberUid, member or uniqueMember.

7. Follow the prompts to finish the setup.

Step 11. Next, the setup program will prompt you the following information:

```
LDAP-UX Client Services supports the following services:

1.Password                                  7.Networks
2.Shadow passwd                             8.Hosts
3.Group                                     9.Services
4.PAM (Pluggable Authentication Module)     10.Netgroup
5.RPC                                       11.PrinterConfigurator
6.Protocols                                 12.Automount

You can create up to three custom search descriptors for each
name service to search different locations in the directory for
user and group information.

Do you want to create custom search descriptors? [No]:
```

Enter whether or not you want to create custom search descriptors for any of the supported services: passwd, shadow passwd, group, PAM, netgroup, rpc, protocols, network, hosts and services. Select the service you want to create a custom search descriptor for.

A custom search descriptor consists of three parts: a search base DN, scope, and filter. Use custom search descriptors if you want clients to search different locations in the directory or to apply different search filters, for example some clients might search for employees only in a particular department. Each service can have up to three different search descriptors. The client uses the search descriptors in order until it finds what it is looking for.

NOTE

If your search filters overlap, enumeration requests will result in duplicate entries being returned. For example, if one search filter searched a subset of your organization and a second search filter searched your entire organization, an enumeration request would return duplicate entries.

See “Minimizing Enumeration Requests” on page 125 for more information.

LDAP-UX Client Services uses the automount search filter for the automount service as default. If you want to create the `nisObject` search filter for the automount service to search a different location in the directory, use the following steps:

1. Type yes for the following question and press the return key:

   ```
   Do you want to create custom search descriptors? [No]: yes
   ```

2. Next, it will take you to the screen which shows you the following information:

   ```
   To accept the default shown in brackets, press the Return
   key.
   search base [dc=cup,dc=hp,dc=com]:
   search scope (base, one, sub) [sub]
   Search filter [(objectclass=automount)]
   ```

If you want to create the `nisObject` search filter for the automount service, then type `(objectclass=nisObject)` for the following prompt and press the Return key; otherwise press the return key to accept the default search filter, `objectclass=automount`:

```
Search filter [(objectclass=automount)]:
(objectclass=nisObject)
```

Step 12. You will be asked whether or not you want to start the client daemon. For LDAP-UX Client B.03.20 or later versions, the client daemon must be started for LDAP-UX functions to work. With LDAP-UX Client B.30.10 or earlier, the client daemon is optional, and should be turned on in order to provide better prformance (response time) and for the X.500 group membership to work.

Configure the LDAP-UX Client Serivces with SSL Support

The LDAP-UX Client Services provides SSL (Secure Socket Layer) support to secure communication between the LDAP client and the Directory Server. The LDAP-UX Client Services supports SSL with password as the credential, using either simple bind or DIGEST-MD5 authentication (DIGEST-MD5 for Netscape Directory Server only) to ensure confidentiality and data integrity between clients and servers. With SSL support, the LDAP-UX Clients provides a secure way to protect the password over the network, This allows the directory administrator has the choice in selecting authentication mechanism, such as using simple password stored in the directory server as a hash syntax.

The LDAP-UX Client Services supports Microsoft Windows 2000/2003 Active Directory Server (ADS) and Netscape Directory Server (NDS) over SSL. For detailed information on how to set up and configure your Netscape Directory Server to enable SSL communication over LDAP, see *"Managing SSL Chapter"* in the *Administrator's Guide for Netscape Directory Server* at *http://www.redhat.com/docs/manuals/dir-server/*

Configuring the LDAP-UX Client to Use SSL

You can choose to enable SSL with LDAP-UX when you run the setup program. If you attempt to use SSL, you must install Certificate Authority (CA) certificate on your LDAP-UX Client and configure your LDAP directory server to support SSL before you run the setup program.

NOTE If you already have the certificate database files, *cet7 or cert8.db* and *key3.db*, on your client for your HP-UX applications, you can simply create a symbolic link */etc/opt/ldapux/cert7.db* that points to *cert7.db* or */etc/opt/ldapux/cert8.db* that points to *cer8.db* and */etc/opt/ldapux/key3.db* that points to *key3.db*.

You can Download the certificate database from the Netscape Communicator or Mozilla browser to set up the certificate database into your LDAP-UX Client.

Steps to Download the CA Certificate from Mozilla Browser

The following steps show you an example on how to download the Certificate Authority (CA) certificate on your client system using Mozilla browser 1.4 for HP-UX:

Step 1. Log in to your system as root.

Step 2. Use Mozilla browser to connect to your Certificate Authority Server.

The following shows an example of using a link to connect to your Certificate Authority Server:

https://CA servername:port number/ca/

Step 3. Click the `retrieval` tab in the *Netscape certificate management* window screen.

Step 4. Click the "*import CA certificate chain*" link to take you to the "*import CA* certificate chain" window screen.

Step 5. Check the "*import the CA certificate chain into your browser*" check box in the "*import CA certificate chain*" window screen. Then, click the `submit` button.

Step 6. Check the "*Trust the CA to identify web sites*", "*Trust the CA to identify e-mail users*", and "*Trust the CA to identify software developers*" checkboxes in the *Downloading Certificate* window screen. Then click OK button.

Step 7. The Netscape Directory CA certificate will be downloaded to the following two files on your LDAP-UX Client:

/.mozilla/default/.slt/cert8.db*

/.morilla/default/.slt/key3.db*

Step 8. You can simply copy the */.mozilla/default/*slt/cert8.db* file to */etc/opt/ldapux/cert8.db* and */.mozilla/default/*slt/key3.db* file to */etc/opt/ldapux/key3.db.*

Step 9. Set the file access permissions for */etc/opt/ldapux/cert7..db* and */etc/opt/ldapux/key3.db* to be read only by root as follows:

```
-r-------- 1 root sys 65536 Jun 14 16:27 \
/etc/opt/ldapux/cert8.db

-r-------- 1 root sys 32768 Jun 14 16:27 \
/etc/opt/ldapux/key3.db
```

NOTE You may use the unsupported `/opt/ldapux/contrib/bin/certutil` command line tool to create the certificate database files, *cert8.db* and *key3.db*. For detailed command options and their arguments, see *Using the Certificate Database Tool* available at *http://www.mozilla.org/projects/security/pki/nss/tools/certutil.html*.

NOTE If your browser does not generate `cert7.db` or `cert8.db` and `key3.db` security database files, you must export the certificate (preferably the root certificate of the Certificate Authority that signed the LDAP server's certificate) from your certificate server as a Base64-Encoded certificate and use the `certutil` utility to create the `cert8.db` and `key3.db` security database files.

Steps to create database files using the certutil utility

The following steps show you an example on how to create the security database files, `cert8.db` and `key3.db` on your client system using the `certutil` utility:

Step 1. Retrieve the Base64-Encoded certificate from the certificate server and save it.

For example, get the Base64-Encoded certificate from the certificate server and save it as the `/tmp/mynew.cert` file. This file should look like:

```
--------------- BEGIN CERTIFICATE ---------------------------------
-MIICJjCCAY+gAwIBAgIBJDANBgkghkiG9w0BAQQFADBxMQswCQYDVQQGEwJVUzEL
MAkga1UECBMCQ2ExEjAQBgNVBAcTCWN1cGVvsG1ubzEPMA0GA1UEChmgAhaUy29T
MRIwEAYDVQQLEw1RR1NMLUxkYXAxHDAaBgNVBAMTE0N1cnRpzmljYXR1IE1hbmFn
4I2vvzz2i1Ubq+Ajcf1y8sdafuCmqTgsGUYjy+J1weM061kaWOt0HxmXmrUdmenF
skyfHyvEGj8b5w6ppgIIA8JOT7z+F0w+/mig=
--------------- END CERTIFICATE -----------------------------------
```

Step 2. Use the `rm` command to remove the old database files, `/etc/opt/ldapux/cert8.db` and `/etc/opt/ldapux/key3.db`:

```
rm -f /etc/opt/ldapux/cert8.db /etc/opt/ldapux/key3.db
```

Step 3. Use the `certutil` utility with the `-N` option to initialize the new database:

```
/opt/ldapux/contrib/bin/certutil -N -d /etc/opt/ldapux
```

Step 4. Add the Certificate Authority (CA) certificate or the LDAP server's certificate to the security database:

- To use the `certutil` command to add a CA certificate to the database:

  For example, the following command adds the CA certificate, `my-ca-cert`, to the security database directory, `/etc/opt/ldapux`, with the Base64-Encoded certificate request file, `/tmp/mynew.cert`:

  ```
  /opt/ldapux/contrib/bin/certutil -A -n my-ca-cert -t \
  "C,," -d /etc/opt/ldapux -a -i /tmp/mynew.cert
  ```

NOTE

The `-t "C,,"` represents the minimum trust attributes that may be assigned to the CA certificate for LDAP-UX to successfully use SSL to connect to the LDAP directory server. If you have other applications that use the CA certificate for other functions, then you may wish to assign additional trust flags. See *http://www.mozilla.org/projects/security/pki/nss/tools/certutil.html* for additional information.

- To use the `certutil` command to add the LDAP server's certificate to the security database:

  For example, the following command adds the LDAP server's certificate, `my-server-cert`, to the security database directory, `/etc/opt/ldapux`, with the Base64-Encoded certificate request file, `/tmp/mynew.cert`:

```
/opt/ldapux/contrib/bin/certutil -A -n my-server-cert -t \
"P,," -d /etc/opt/ldapux -a -i /tmp/mynew.cert
```

NOTE

The `-t "p,,"` represents the minimum trust attributes that may be assigned to the LDAP server's certificat for LDAP-UX to successfully use SSL to connect to the LDAP directory server. See *http://www.mozilla.org/projects/security/pki/nss/tools/certutil.html* for additional information.

Configure LDAP-UX Client Services with Publickey Support

LDAP-UX Client Services B.04.00 or later version supports discovery and management of publickeys in an LDAP directory. Both public and secret keys, used by the Secure RPC API can be stored in user and host entries in an LDAP directory server, using the `nisKeyObject` objectclass. Support for discovery of keys in an LDAP directory server is provided through the `getpublickey()` and `getsecretkey()` APIs. You can use `chkey` and `newkey` commands to manage user and host keys in an LDAP server. The `chkey -s ldap` command is used to change user's secure RPC public key and secret key in an LDAP directory. The `newkey -u <username> -s ldap` command is used to add new keys for users to an LDAP directory while the `newkey -h <hostname> -s ldap` command is used to create new keys for machines to an LDAP directory.

For detailed information on the `newkey` and `chkey` commands, refer to `newkey(1M)`, `chkey(1)`, `getpublickey(3N)`, `getsecretkey()` and `publickey(4)` man pages.

HP-UX Enhanced Publickey-LDAP Software Requirement on HP-UX 11i v1 or v2

Support for publickey through LDAP requires functionality enhancement in LDAP-UX Client Services and an enhancement in the ONC product. ONC with publickey LDAP support is available through the HP-UX Enhanced Publickey-LDAP Software Pack (SPK) web release.

To enable the publickey LDAP support, you must install the Enhanced Publickey-LDAP software bundle shown on Table 2-2 and LDAP-UX Client Services B.04.00 or later on your client systems. The software bundle contains all the required patches plus the enablement product for this new feature. On HP-UX 11i v3, the software bundle is not required. For detailed information, refer to the *ONC with Publickey LDAP Support Software Pack Release Notes* at the following web site:

http://docs.hp.com/en/netcom.html

Navigate to `NFS Services`.

Table 2-2 Enhanced Publickey-LDAP Software for HP-UX 11i v1 or v2

Operating System Supported	Software Bundle Version	Planned Release Date
`HP-UX 11i v1`	`Enhkey B.11.11.01`	June, 2006
`HP-UX 11i v2`	`Enhkey B.11.23.01`	October, 2006

You can download the Enhanced Publickey-LDAP software bundle from the following Software Depot web site:

- Go to http://www.hp.com/go/softwaredepot
- Click on the `Enhancement releases and patch bundles` link.
- Select one of the following links:
  - `HP-UX Software Pack (Optional HP-UX 11i v1 Core Enhancements)` for HP-UX 11i v1

    and then select

    `HP-UX Public Key LDAP` link for HP-UX 11i v1

    Select and download the following software bundle, place it to your client system, `/tmp` is assumed:

    `Enhkey B.11.11.01 HP-UX B.11.11 64+32 depot` for HP-UX 11i v1
  - `HP-UX Software Pack (Optional HP-UX 11i v2 Core Enhancements)` for HP-UX 11i v2

    and then select

    `PublicKey-LDAP` link for HP-UX 11i v2

    Select and download the following software bundle, place it to your client system, `/tmp` is assumed:

    `Enhkey B.11.23.01 HP-UX B.11.23 IA+PA depot` for HP-UX 11i v2
- Use swinstall to install the software bundle:

— `swinstall -x autoreboot=true -s /tmp/ENHKEY_B.11.11.01_HP-UX_B.11.11_64_32.depot` for HP-UX 11i v1

— `swinstall -x autoreboot=true -x reinstall=false -s /tmp/ENHKEY_B.11.23.01_HP-UX_B.11.23_IA_PA.depot` for HP-UX 11i v2

Extending the Publickey Schema into Your Directory

The publickey schema is not loaded in the Netscape Directory Server. If you are installing LDAP-UX B.04.00 or later version on your client system, the `setup` program will extend the publickey schema into your Netscape Directory Server. If you previously configured LDAP-UX B.03.30 or earlier version, and now update the product to version B.04.00 or later, you must re-run the setup program to extend the publickey schema into your LDAP directory. You do not need to re-run the setup program for the subsequent client systems. For detailed information on how to run the setup program to extend the publickey schema into an LDAP directory, see “Quick Configuration” on page 29.

Admin Proxy User

A special type of proxy user, known as an Admin Proxy has been added to LDAP-UX to support management of publickey information in an LDAP directory server. The Admin Proxy represents the HP-UX administrator’s rights in the directory server and typically is used to represent root’s privileges extended to the directory server. Only an Admin Proxy user is allowed to use the `newkey` tool to add host and user keys into the LDAP directory server, or to use the `chkey` tool to modify host keys in the LDAP directory server.

Configuring an Admin Proxy User Using ldap_proxy_config

You need to use a new `ldap_proxy_config` tool option `-A` to configure an Admin Proxy user. You must specify the `-A` option along with other options to perform operations applying to an Admin Proxy user. For example, you can use the `ldap_proxy_config -A -i` command to create an Admin Proxy user. See “The ldap_proxy_config Tool” on page 146 for details.

Password for an Admin Proxy User

In order to protect user's secret keys in the LDAP directory, the secret keys are encrypted using the user's password. This process is used in NIS as well as NIS+ environments. The host's secret key must also be encrypted. Since the host itself does not have its own password, root's password is used to encrypt the host's secret key. The `chkey` or `newkey` command prompts for root's password when changing or adding a key for a host. For this reason, you may wish to configure the Admin Proxy user in the LDAP directory to have the same password as the root user on the master host. Although it is not required that the Admin Proxy user and root user share the same password, it allows you to avoid storing the Admin Proxy user's password in the `/etc/opt/ldapux/acred` file. In such case, when you run the `ldap_proxy_config -A -i` command to configure the Admin Proxy user, you enter only Admin Proxy user's DN without the password. LDAP-UX will use the root's password given to the `chkey` and `newkey` commands as the Admin Proxy user's password to perform public key operations. However, the `ldap_proxy_config -A -v` command will not be able to validate the Admin Proxy user because no password is available to `ldap_proxy_config`. As a result, the message "`No password is provided. Validation is not performed`" will be displayed.

Setting ACI for Key Management

Before storing public keys in an LDAP server, LDAP administrators may wish to update their LDAP access controls such that users can manage their own keys, and the Admin Proxy user can manage host keys. This section describes how you set up access control instructions (ACI) for an Admin Proxy user or a user.

Setting ACI for an Admin Proxy User

With Netscape Directory Server 6.11 and 6.21, you can use the Netscape Console or `ldapmodify` to set up ACI, which gives an Admin Proxy user permissions to manage host and user keys in the LDAP directory.

An Example

The following ACI gives the permissions for the Admin Proxy user `uid=keyadmin` to read, write, and compare `nissecretkey` and `nispublickey` attributes for hosts and users:

```
dn:dc=org,dc=hp,dc=com
```

```
aci:(targetattr =”objectlass||nispublickey||nissecretkey”)
 (version 3.0;acl “Allow keyadmin to change key pairs”;
 allow (read,write,compare)
 userdn=“ldap:///uid=keyadmin,ou=people,dc=org,dc=hp,dc=com”;)
```

Setting ACI for a User

The default ACI of Netscape Directory Server 6.11 allows a user to change his own `nispublickey` and `nissecretkey` attributes. For Netscape Directory Server 6.21, you need to set up ACI which gives a user permission to change his own `nissecretkey` and `nispublickey` attributes. Use the Netscape Console or `ldapmodify` to set up ACI for a user.

An Example

The following ACI gives a user permission to change his own `nissecretkey` and `nispublickey` attributes for user keys:

```
dn:ou=People,dc=org,dc=hp,dc=com
```

```
aci:(targetattr =”nissecretkey||nispublickey”)(version 3.0;
 acl “Allow key self modification”;allow (write)
 (userdn = “ldap:///self”);)
```

Configuring serviceAuthenticationMethod

`serviceAuthenticationMethod` is a newly supported attribute of the configuration profile, `/opt/ldapux/ldapux_profile.ldif`. It’s function is the same as `authenticationMethod`, but it allows authentication configuration for specific name services. The `serviceAuthenticationMethod` attribute is created to resolve issues that may arise when the default authentication method is not considered secure enough for specific name services. For example, if the default `authenticationMethod` is configured as `NONE` then the `newkey` and `chkey` commands would not know how to properly bind to the directory server when changing or adding key pairs. LDAP-UX only supports the `serviceAuthenticationMethod` attribute for the `keyserv` service, since the `keyserv` service is the only one that currently needs modification of privileges in the directory server.

To perform `newkey` and `chkey` operations, LDAP-UX binds the Admin Proxy user to the LDAP directory using the authentication method specified in `serviceAuthenticationMethod`. LDAP-UX only supports `serviceAuthenticationMethod` for `keyserv`. Any other services configured in `serviceAuthenticationMethod` will be ignored.

Configuring `serviceAuthenticationMethod` is optional. If you do not configure `serviceAuthenticationMethod`, LDAP-UX binds the Admin Proxy user to the LDAP directory using the authentication method specified for the proxy user.

Authentication Methods

LDAP-UX Client Services supports the following authentication methods for the `keyserv` service:

- simple with SSL enabled
- SASL DIGEST-MD5 with SSL enabled
- simple with SSL disabled
- SASL DIGEST-MD5 with SSL disabled

NOTE SSL settings for both `authenticationMethod` and `serviceAuthenticationMethod` must be set the same. It is not supported to have SSL enabled for `authenticationMethod` and SSL disabled for `serviceAuthenticationMethod`, or vice versa.

Procedures Used to Configure serviceAuthenticationMethod

Use the following steps on one of LDAP-UX client sytems to configure the `serviceAuthenticationMethod` attribute in the `/etc/opt/ldapux/ldapux_profile.ldif` file:

Step 1. Login as `root`.

Step 2. Use the `ldapentry` tool to modify the profile entry in the LDAP directory server to include `serviceAuthenticationMethod`. To do this, `ldapentry` requires the profile DN. You can find the profile DN from `PROFILE_ENTRY_DN in /etc/opt/ldapux/ldapux_client.conf` after you finish running the `setup` program. The following example edits the profile entry "`cn=ldapuxprofile,dc=org,dc=hp,dc=com`":

For example:

```
cd /opt/ldapux/bin

./ldapentry -m "cn=ldapuxprofile,dc=org,dc=hp,dc=com"
```

After you enter the prompts for "Directory login:" and "password:", `ldapentry` will bring up an editor window with the profile entry. You can add the `serviceAuthenticationMethod` attribute.

The value of the `serviceAuthenticatioMethod` entry depends on the authentication method you configure. The following shows the possible values of the `serviceAuthenticationMethod` attribute:

- For SASL DIGEST-MD5 using the Distinguish Name (DN) to generate the DIGEST-MD5 hash, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:sasl/digest-md5:\
  username=dn
  ```

- For SASL DIGEST-MD5 using the UID attribute to generate the DIGEST-MD5 hash, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:sasl/digest-md5
  ```

- For SASL DIGEST-MD5 with SSL enabled using the DN to generate the DIGEST-MD5 hash, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:tls:sasl/digest-md5:
  username=dn
  ```

- For SASL DIGEST-MD with SSL enabled using the UID attribute to generate the DIGEST-MD5 hash, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:tls:sasl/digest-md5
  ```

- For simple authentication, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:simple
  ```

- For simple with SSL enabled, the data in the entry is:

  ```
  serviceAuthenticationMethod:keyserv:tls:simple
  ```

For more information on `ldapentry`, refer to Chapter 5, “Command and Tool Reference,” on page 137.

Step 3. Go to `/opt/ldapux/config`:

```
cd /opt/ldapux/config
```

Step 4. Use `/opt/ldapux/config/get_profile_entry` to download the modified LDIF profile:

```
./get_profile_entry -s nss
```

Step 5. Run the `/opt/ldapux/config/display_profile_cache` tool to check the configuration of the `serviceAuthenticationMethod` attribute:

```
./display_profile_cache
```

For example:

If the `serviceAuthenticationMethod:keyserv:sasl/digest-md5` entry is added to the profile entry in the LDAP directory, you can see the following information when you run the `display_profile_cache` tool:

```
serv-auth: keyserv:sasl/digest-md5
auth opts: username: uid
realm:
```

For subsequent LDAP-UX client systems that share the same profile configuration, use the following steps to download and activate the profile:

Step 1. Login as `root`.

Step 2. Go to `/opt/ldapux/config`:

```
cd /opt/ldapux/config
```

Step 3. Use `/opt/ldapux/config/get_profile_entry` to download the modified LDIF profile:

```
./get_profile_entry -s nss
```

Step 4. Run the `/opt/ldapux/config/display_profile_cache` tool to check the configuration of the `serviceAuthenticationMethod` attribute:

```
./display_profile_cache
```

Configuring Name Service Switch

Configure the Name Service Switch (NSS) to enable the LDAP support for publickey.

You can save a copy of `/etc/nsswitch.conf` file and modify the original to add ldap support to the publickey service. See `/etc/nsswitch.ldap` for a sample.

The following shows the sample file, `/etc/nsswitch.ldap`:

```
passwd:       files ldap
group:        files ldap
hosts:        dns files ldap
networks:     files ldap
protocols:    files ldap
rpc:          files ldap
publickey:    ldap [NOTFOUND=return] files
netgroup:     files ldap
automount:    files ldap
aliases:      files
services:     files ldap
```

AutoFS Support

AutoFS is a client-side service that automatically mounts appropriate file systems when users request access to them. If an automounted file system has been idle for a period of time, AutoFS unmounts it. AutoFS uses name services such as files, NIS or NIS+ to store and manage AutoFS maps.

LDAP-UX Client Services B.04.00 supports the automount service under the AutoFS subsystem. This new feature allows users to store AutoFS maps in an LDAP directory server. .

AutoFS Patch Requirement

In order to enable the LDAP support for AutoFS, you must install the AutoFS patch or Enhanced AutoFS version on your client system shown in Table 2-3:

Table 2-3 Patch Requirement

Operating System Supported	Patch ID/Version	Planned Release Date
`HP-UX 11i v1`	Enhanced AutoFS version B.11.11.0509.1	September, 2005
`HP-UX 11i v2`	PHNE_33100	August, 2005

Automount Schemas

This section describes the following three automount schemas:

- new automount schema

  An automount schema is based on RFC 2307-bis. This schema defines new `automountMap` and `automount` structures to represent the AutoFS maps and their entries in the LDAP directory.

- nisObject automount schema

The nisObject automount schema defines nisMap and nisObject structures to represent the AutoFS maps and their entries in the LDAP directory. There are some limitations that you need to be aware of when using the nisObject automount schema.

- obsolete automount schema

  This is the schema that is shipped with Netscape Directory Server version 6.x.

The LDAP-UX Client Services supports the new automount schema. The nisObject automount schema can also be used if configured via attribute mappings. LDAP-UX does not support the obsolete automount schema. You must manually delete it before the setup program can successfully import the new automount schema into the LDAP directory server.

Read subsequent sections of this chapter for the detailed information about the automount schemas.

New Automount Schema

This schema is a new schema defined in RFC2307-bis. This schema defines new automountMap and automount structures to represent AutoFS maps and their entries in the LDAP directory. AutoFS maps are stored in the LDAP directory server using structures defined by this schema.

The RFC2307-bis automount schema is not loaded in the Netscape Directory Server. If you are installing LDAP-UX B.04.00 on your client system, the setup program will import the new automount schema into your Netscape Directory Server. If you previously configured LDAP-UX B.03.30 or an earlier version, and are now updating the product to version B.04.00, you must re-run the setup program to import the new automount schema into the LDAP directory. The subsequent client systems do not need to re-run the setup.

Schema

The following shows the RFC 2307-bis automount schema in the LDIF format:

```
objectClasses: ( 1.3.6.1.1.1.2.16
NAME 'automountMap'
DESC 'Automount Map information'
SUP top STRUCTURAL
MUST automountMapName
```

```
MAY description
X-ORIGIN 'user defined' )

objectClasses: ( 1.3.6.1.1.1.2.17
NAME 'automount'
DESC 'Automount information'
SUP top STRUCTURAL
MUST ( automountKey $ automountInformation )
MAY description
X-ORIGIN 'user defined' )

attributeTypes: ( 1.3.6.1.1.1.1.31
NAME 'automountMapName'
DESC 'automount Map Name'
EQUALITY caseExactIA5Match
SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 SINGLE-VALUE
X-ORIGIN 'user defined' )

attributeTypes: ( 1.3.6.1.1.1.1.32
NAME 'automountKey'
DESC 'Automount Key value'
EQUALITY caseExactIA5Match
SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 SINGLE-VALUE
X-ORIGIN 'user defined' )

attributeTypes: ( 1.3.6.1.1.1.1.33
NAME 'automountInformation'
DESC 'Automount information'
EQUALITY caseExactIA5Match
SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 SINGLE-VALUE
X-ORIGIN 'user defined' )
```

For Netscape Directory Server, each entry started by "`attributetypes`:" or "`objectclasses`:" must be one continuous line.

An Example

The following shows an example of a direct AutoFS map, `auto_direct`, stored in the LDAP directory server using new automount schema:

```
dn:automountMapName=auto_direct,dc=nishpind
objectClass: top
objectClass: automountMap
automountMapName: auto_direct
```

```
dn:automountKey=/mnt_direct/test1,\
automountMapname=auto_direct, dc=nishpind
objectClass: top
objectClass: automount
automountInformation:hostA:/tmp
automountKey: /mnt_direct/test1

dn:automountKey=/mnt_direct/test2,\
automountMapname=auto_direct, dc=nishpind
objectClass: top
objectClass: automount
automountInformation:hostB:/tmp
automountKey:/mnt_direct/test2
```

The nisObject Automount Schema

The `nisObject` automount schema defines `nisMap` and `nisObject` structures to represent the AutoFS maps and their entries. The AutoFS maps are stored in the LDAP directory server using the `nisMap` and `nisObject` structures.

An Example

The following shows an example of a direct AutoFS map, `auto_direct`, stored in the LDAP directory server using the `nisObject` automount schema:

```
dn:nisMapName=auto_direct,dc=nishpind
objectClass: top
objectClass: nisMap
nisMapName: auto_direct

dn:cn=/mnt_direct/test1, nisMapName=auto_direct, dc=nishpind
objectClass: top
objectClass: nisObject
nisMapName: auto_direct
cn: /mnt_direct/test1
nisMapEntry:hostA:/tmp

dn:cn=/mnt_direct/test2, nisMapname=auto_direct, dc=nishpind
objectClass: top
objectClass: nisObject
nisMapName: auto_direct
cn: /mnt_direct/test2
nisMapEntry:hostB:/tmp
```

Limitations

The `nisObject` automount schema contains three attributes, `cn`, `nisMapEntry` and `nisMapName`. `cn` is an attribute that ignores case-matching. Consider the following example:

```
# an indirect map named auto_test
test1     server1:/source
TEST1     server2:/source
```

In the above example, because the `cn` attribute is case-insensitive, the LDAP considers "`cn=TEST1, nisMapName=auto_test`" to be a redefinition of "`cn=test1, nisMapName=auto_test`".

Using the `nisObject` automount map schema, capital letters are not significant. In other words, if two keys have names that are only different by the use of capital letters, then one of those entries will be rendered inoperable because the other one is the only one that can be retrieved.

NOTE If you use the `nisObject` automount map schema, do not use any keys that have capital letters and only differ from other keys by those capital letters.

Obsolete Automount Schema

The obsolete automount schema is shipped with the Netscape Directory Server version 6.x. You must manually delete it before the setup program can successfully import the new automount schema into the LDAP directory server.

Removing The Obsolete Automount Schema

Perform the following steps to delete the obsolete automount schema:

Step 1. Login to your Netscape Directory Server as `root`.

Step 2. Stop your Netscape Directory Server daemon, `slapd`.

`/var/opt/netscape/servers/slapd-<server-instance>/stop-slapd`

For example:

`/var/opt/netscape/servers/slapd-ldapA.cup.hp.com/stop-slapd`

Step 3. Delete the following two entries in the `/var/opt/netscape/servers/slapd-<server-instance>/ \ config/schema/10rfc2307.ldif` file. These two entries contain the 'automountInformation' attributetype and the 'automount' objectclass. The data in these two entries define the obsolete automount schema. The complete two entries are:

- `attributeTypes:( 1.3.6.1.1.1.1.25 NAME 'automountInformation' DESC 'Standard LDAP attribute type' SYNTAX 1.3.6.1.4.1.1466.115.121.1.26 X-ORIGIN 'RFC 2307')`
- `objectClasses:( 1.3.6.1.1.1.2.9 NAME 'automount' DESC 'Standard LDAP objectclass' SUP top MUST (cn $automountInformation)MAY (description) X-ORIGIN 'RFC2307')`

Step 4. Restart the daemon, `slapd`. This is to ensure that the updated schema file is recognized by the Netscape Directory Server.

`/var/opt/netscape/servers/slapd-<server-instance>/restart-slapd`

For example:

`/var/opt/netscape/servers/slapd-ldapA.cup.hp.com/restart-slapd`

After you delete the obsolete automount schema, you must re-run the setup program to import the new automount schema into the LDAP directory server.

Attribute Mappings

LDAP-UX Client Services B.04.00 supports attribute mappings between the new RFC 2307-bis automount schema and the `nisObject` automount schema. This feature allows the directory administrators to use the `nisObject` schema if they have already deployed it.

When both new automount schema and `nisObject` schema exist in the LDAP directory server, if you choose to use the `nisObject` automount schema, you must run the setup program using the custom configuration to perform the attribute mappings and search filter changes for the automount service. The attribute mappings include the following:

- Remap the new automount attributes to the `nisObject` automount attributes. The attribute mappings are done in step 10 of the Custom Configuration. For detailed information on how to remap the automunt attributes, see "Custom Configuration" on page 34.

Table 2-3 shows the attribute mappings:

Table 2-4 Attribute Mappings

New Automount Attribute	nisObject Automount Attribute
automountMapname	nisMapname
automountKey	cn
automountInformation	nisMapEntry

- Change the automount search filter for the automount service to the nisObject search filter. LDAP-UX Client Services uses the automount search filter for the automount service as a default. The search filter change can be done in step 11 of the Custom Configuration. If you want to create the nisObject search filter for the automount service to search a different location in the LDAP directory server, see “Custom Configuration” on page 34 for details.

If you want to perform attribute mappings or search filter changes by using the Custom Configuration, ensure that you do not accept the remaining default configuration parameters in step 4 of the Custom Configuration.

NOTE You can use the nisObject automount schema without attribute mappings and search filter changes if only the nisObject automount schema exists in the LDAP directory.

Configuring Name Service Switch

Configure the Name Service Switch (NSS) to enable the LDAP support for AutoFS.

You can save a copy of /etc/nsswitch.conf file and modify the original to add LDAP support to the automount service. See /etc/nsswitch.ldap for a sample.

The following shows the sample file, /etc/nsswitch.ldap:

```
passwd:       files ldap
group:        files ldap
hosts:        dns files ldap
networks:     files ldap
protocols:    files ldap
rpc:          files ldap
publickey:    ldap [NOTFOUND=return] files
netgroup:     files ldap
automount:    files ldap
aliases:      files
services:     files ldap
```

AutoFS Migration Scripts

This section describes the migration scripts which can be used to migrate your AutoFS maps from files, NIS servers or NIS+ servers to LDIF files. After LDIF files are created, you can use the `ldapmodify` tool to import LDIF files to your LDAP directory server. These migration scripts use the new automount schema defined in RFC 2307-bis to migrate the AutoFS maps to LDIF. You need to import the new automount schema into your LDAP directory server before you use these migration scripts to migrate AutoFS maps.

Table 2-4 describes the migration scripts:

Table 2-5 Migration Scripts

Migration Script	Description
`migrate_automount.pl`	Migrates AutoFS maps from files to LDIF.
`migrate_nis_automount.pl`	Migrates AutoFS maps from the NIS server to LDIF.
`migrate_nisp_autofs.pl`	Migrates AutoFS maps from NIS+ server to the `nisp_automap.ldif` file.

Environment Variables

When you use the AutoFS migration scripts to migrate AutoFS maps, set the following environment variables:

`LDAP_BASEDN` The base distinguished name of the LDAP directory that the AutoFS maps are to be placed in.

`DOM_ENV` This only applies to the `migrate_nisp_autofs.pl` script. This variable defines the fully qualified name of the NIS+ domain where you want to migrate your data from.

`NIS_DOMAINNAME` This only applies to the `migrate_nis_automount.pl` script. This variable specifies the fully qualified name of the NIS domain where you want to migrate your data from. This variable is optional. If the NIS domain name is not specified, LDAP-UX uses the value of the `NIS_DOMAIN` parameter configured in the `/etc/rc.conf.d/namesvrs` file.

Examples:

The following command sets the fully qualified name of the NIS+ domain to "`cup.hp.com`":

```
export DOM_ENV="cup.hp.com"
```

The following command sets the fully qualified name of the NIS domain to "`india.hp.com`":

```
export NIS_DOMAINNAME="india.hp.com"
```

The following command sets the base DN to "`dc=cup, dc=hp, dc=com`":

```
export LDAP_BASEDN="dc=cup, dc=hp, dc=com"
```

General Syntax For Migration Scripts

The migration scripts use the following general syntax:

```
scriptname inputfile outfile
```

where

scriptname Is the name of the particular script you are using.

inputfile Is the fully qualified file name of the appropriate AutoFS map that you want to migrate. For example, `/etc/auto_master`.

outputfile This only applies to the `migrate_nis_automount.pl` and `migrate_automount.pl` scripts. This is optional and is the name of the file where the LDIF is written. stdout is the default output.

The migrate_automount.pl Script

This script, found in `/opt/ldapux/migrate`, migrates the AutoFS maps from files to LDIF.

Syntax

scriptname inputfile outputfile

Examples

The following commands migrate the AutoFS map `/etc/auto_direct` to LDIF and place the results in the `/tmp/auto_direct.ldif` file:

```
export LDAP_BASEDN="dc=nishpind"
migrate_automount.pl /etc/auto_direct /tmp/auto_direct.ldif
```

The following shows the `/etc/auto_direct` file:

```
#local mount point          remote server:directory
/mnt/direct/lab1                   hostA:/tmp
/mnt/direct/lab2                   hostB:/tmp
```

The following shows the `/tmp/auto_direct.ldif` file:

```
dn:automountMapName=auto_direct,dc=nishpind
objectClass: top
objectClass: automountMap
automountMapName: auto_direct

dn:automountKey=/mnt_direct/lab1,\
automountMapname=auto_direct, dc=nishpind
objectClass: top
objectClass: automount
automountInformation:hostA:/tmp
automountKey: /mnt_direct/lab1

dn:automountKey=/mnt_direct/lab2,\
automountMapname=auto_direct, dc=nishpind
objectClass: top
objectClass: automount
automountInformation:hostB:/tmp
automountKey:/mnt_direct/lab2
```

You can use the `/opt/ldapux/bin/ldapmodify` tool to import the LDIF file `/tmp/auto_direct.ldif` that you just created above into the LDAP directory. For example, the following command imports the `/tmp/auto_direct.ldif` file to the LDAP base DN "`dc=nishpind`" in the LDAP directory server `LDAPSERV1`:

```
/opt/ldapux/bin/ldapmodify -a -h LDAPSERV1 -D "cn=Directory
Manager" -w <passwd> -f /tmp/auto_direct.ldif
```

Where options are:

-a Add a new entry into the LDAP directory

-h The LDAP directory host name

-D The Distinguish Name (DN) of the directory manager

-w The password of the directory manager

-f The LDIF file to be imported into the LDAP directory

The migrate_nis_automount.pl Script

This script, found in `/opt/ldapux/migrate`, migrates the AutoFS maps from the NIS server to LDIF.

Syntax

scriptname inputfile outputfile

Examples

The following commands migrate the AutoFS map `/etc/auto_indirect` to LDIF and place the results in the `/tmp/auto_indirect.ldif` file:

```
export LDAP_BASEDN="dc=nisserv1"
export NIS_DOMAINNAME="cup.hp.com"
migrate_nis_automount.pl /etc/auto_indirect
/tmp/auto_indirect.ldif
```

The following shows the `/etc/auto_indirect` file:

```
#local mount point          remote server:directory
lab1                            hostA:/tmp
lab2                            hostB:/tmp
```

The following shows the `/tmp/auto_indirect.ldif` file:

```
dn:automountMapName=auto_indirect,dc=nisserv1
objectClass: top
objectClass: automountMap
automountMapName: auto_indirect

dn:automountKey=lab1,\
automountMapname=auto_indirect, dc=nisserv1
objectClass: top
objectClass: automount
automountInformation:hostA:/tmp
automountKey: lab1

dn:automountKey=lab2, \
automountMapname=auto_indirect, dc=nisserv1
objectClass: top
objectClass: automount
automountInformation:hostB:/tmp
automountKey:lab2
```

You can use the `/opt/ldapux/bin/ldapmodify` tool to import the LDIF file `/tmp/auto_indirect.ldif` that you just created above into the LDAP directory. For example, the following command imports the `/tmp/auto_indirect.ldif` file to the LDAP base DN "`dc=nisserv1`" in the LDAP directory server `LDAPSERV1`:

```
/opt/ldapux/bin/ldapmodify -a -h LDAPSERV1 -D "cn=Directory
Manager" -w <passwd> -f /tmp/auto_indirect.ldif
```

The migrate_nisp_autofs.pl Script

This script, found in `/opt/ldapux/migrate/nisplusmigration`, migrates the AutoFS maps from the NIS+ server to the `nisp_automap.ldif` file.

Syntax

scriptname inputfile

Examples

The following commands migrate the AutoFS map `/etc/auto_indirect` to LDIF and place the results in the `nisp_automap.ldif` file:

```
export LDAP_BASEDN="dc=nishpbnd"
export DOM_ENV ="cup.hp.com"
migrate_nisp_autofs.pl /etc/auto_indirect
```

The following shows the `/etc/auto_indirect` file:

```
#local mount point          remote server:directory
lab1                            hostA:/tmp
lab2                            hostB:/tmp
```

The following shows the `nisp_automap.ldif` file:

```
dn:automountMapName=auto_indirect,dc=nishpbnd
objectClass: top
objectClass: automountMap
automountMapName: auto_indirect

dn:automountKey=lab1, \
automountMapname=auto_indirect, dc=nishpbnd
objectClass: top
objectClass: automount
automountInformation:hostA:/tmp
automountKey: lab1
```

```
dn:automountKey=lab2, \
automountMapname=auto_indirect, dc=nishpbnd
objectClass: top
objectClass: automount
automountInformation:hostB:/tmp
automountKey:lab2
```

You can use the `/opt/ldapux/bin/ldapmodify` tool to import the LDIF file `nisp_automap.ldif` that you just created above into the LDAP directory. For example, the following command imports the `nisp_automap.ldif` file to the LDAP base DN "`dc=nishpbnd`" in the LDAP directory server `LDAPSERV1`:

```
/opt/ldapux/bin/ldapmodify -a -h LDAPSERV1 -D "cn=Directory
Manager" -w <passwd> -f nisp_automap.ldif
```

Verify the LDAP-UX Client Services

This section describes some simple ways you can verify the installation and configuration of your LDAP-UX Client Services. You may need to do more elaborate and detailed testing, especially if you have a large environment.

If any of the following tests fail, see "Troubleshooting" on page 131.

Step 1. Use the *nsquery(1)*[1] command to test the name service:

```
nsquery lookup_type lookup_query [lookup_policy]
```

For example, to test the name service switch to resolve a username lookup, enter:

```
nsquery passwd username ldap
```

where ***username*** is the login name of a valid user whose posix account information is in the directory. You should see output something like the following depending on how you have configured /etc/nsswitch.conf:

1. *nsquery*(1) is a contributed tool included with the ONC/NFS product.

```
Using "ldap" for the passwd policy.
Searching ldap for jbloggs
User name: jbloggs
user Id: 10000
Group Id: 2000
Gecos:
Home Directory: /home/jbloggs
Shell: /bin/sh
Switch configuration: Terminates Search
```

This tests the Name Service Switch configuration in /etc/nsswitch.conf. If you do not see output like that above, check /etc/nsswitch.conf for proper configuration.

Step 2. Use other commands to display information about users in the directory, making sure the output is as expected:

```
pwget -n username
nsquery hosts host_to_find
grget -n groupname
ls -l
```

NOTE

While you can use the following commands to verify your configuration, these commands enumerate the entire passwd or group database, which may reduce network and directory server performance for large databases:

```
pwget (with no options)
grget (with no options)
listusers
logins
```

Step 3. Use the beq search utility to search for the following services: pwd (password), grp (group), shd (shadow password), srv (service), prt (protocol), rpc (RPC), hst (host), net (network), ngp (netgroup), and grm (group membership). An example beq command using name as the search key, grp as the service, and ldap as the library is shown below.

```
./beq -k n -s grp -l /usr/lib/libnss_ldap.1 nss_status........
NSS_SUCCESS
pw_name...........(iuser1)
pw_passwd.........(*)
pw_uid............(101)
pw_gid............(21)
pw_age............()
```

```
pw_comment........()
pw_gecos..........(gecos data in files)
pw_dir............(/home/iuser1)
pw_shell..........(/usr/bin/sh)
pw_audid..........(0)
pw_audflg.........(0)
```

Refer to “beq Search Tool” in Chapter 4 for command syntax and examples.

Step 4. Log in to the client system from another system using rlogin or telnet. Log in as a user in the directory and as a user in /etc/passwd to make sure both work.

Step 5. Optionally, test your pam_authz authorization configuration:

If the pam_authz is configured without the `pam_authz.policy` file, verify the followings:

- logging into the client system from another system using rlogin or telnet with a user name that is a member of a +@netgroup in the directory to make sure the user will be allowed to log in.
- logging in as a user that is a member of a -@netgroup to be sure that the user will not be allowed to login.

If the pam_authz is configured with the `pam_authz.policy` file, verify the followings:

- logging into the client system with a user name that is covered by an `allow` access rule in the policy file. Make sure the user will be allowed to log in.
- logging in as a user that is covered by a `deny` access rule in the policy file. Make sure the user can not login to the client system.

Step 6. Open a new *hpterm*(1X) window and log in to the client system as a user whose account information is in the directory. It is important you open a new hpterm window or log in from another system because if login doesn’t work, you could be locked out of the system and would have to reboot to single-user mode.

This tests the Pluggable Authentication Module (PAM) configuration in /etc/pam.conf. If you cannot log in, check /etc/pam.conf for proper configuration. Also check your directory to make sure the user’s account information is accessible by the proxy user or anonymously, as appropriate. Check your profile to make sure it looks correct. See also Troubleshooting in this chapter for more information.

Step 7. Use the *ls*(1) or *ll*(1) command to examine files belonging to a user whose account information is in the directory. Make sure the owner and group of each file are accurate:

```
ll /tmp
ls -l
```

If any owner or group shows up as a number instead of a user or group name, the name service switch is not functioning properly. Check the file /etc/nsswitch.conf, your directory, and your profile.

If you want to verify that you set up X.500 group membership correctly, follow these steps:

1. Create a valid posix user and group. Add this user as a member of this group using the attribute “member” instead of “memberuid”. Here is an example ldif file specifying `xuser2` as a member of the group `xgrpup1`:

```
#cat example_ids.ldif
dn: cn=xgroup1,ou=Groups,o=hp.com
objectClass: posixGroup
objectClass: groupofnames
objectClass: top
cn: xgroup1
userPassword: {crypt}*
gidNumber: 999
member: uid=xuser2,ou=People,o=hp.com
dn: uid=xuser2,ou=People,o=hp.com
uid: xuser2
cn: xuser2
objectClass: top
objectClass: account
objectClass: posixAccount
userPassword: {crypt}xxxxxxxxxxxxx
loginShell: /bin/ksh
uidNumber: 9998
gidNumber: 999
homeDirectory: /home/xuser2
```

2. Make sure that the file `/etc/nsswitch.conf` specifies ldap for group service:

```
#cat /etc/nsswitch.conf
:
```

```
:
group: files ldap
:
:
```

3. Verify:

```
#grget -n xgroup1
xgroup1:*:999: xuser2
```

If xuser2 shows up as a member of xgroup1, then your setup is correct.

Configure Subsequent Client Systems

Once you have configured your directory and one client system, you can configure subsequent client systems using the following steps. Modify any of these files as needed.

Step 1. Use swinstall to install LDAP-UX Client Services on the client system. This does not require rebooting the client system.

Step 2. Copy the following files from a configured client to the client being configured:

- /etc/opt/ldapux/ldapux_client.conf
- /etc/opt/ldapux/pcred only if you have configured a proxy user, not if you are using only anonymous access
- /etc/pam.conf
- /etc/nsswitch.conf
- /etc/opt/ldapux/acred if the /etc/opt/ldapux/acred file exists
- cert7.db or cert8.bd and key3.db flles if SSL is enabled

Set all file access mode permission to be the same as those of the first client being configured.

Step 3. Download the profile by running get_profile_entry as follows:

```
cd /opt/ldapux/config
./get_profile_entry -s nss
```

Alternatively you could interactively run the setup program to download the profile from the directory and respond “no” when asked if you want to change the current configuration:

```
cd /opt/ldapux/config
./setup
```

Step 4. If you are using a proxy user, configure the proxy user by calling ldap_proxy_config as follows:

```
cd /opt/ldapux/config
./ldap_proxy_config
```

Step 5. “Verify the LDAP-UX Client Services” on page 68.

Download the Profile Periodically

Setup allows you to define a time interval after which the current profile is being automatically refreshed. The start time for this periodic refresh is defined by the time the setup program was run and the value defined for ProfileTTL. Therefore, it does not allow you to define a specific time of day when the profile should be downloaded (refreshed). For more detailed information, refer to the ldapclientd(1) man page.

If you would like to manually control when you want to download the profile, you can use the following steps:

Step 1. When creating your profile entry using setup, set the ProfileTTL value to 0.

Step 2. Using the command `get_profile_entry -s nss`, write a shell script that downloads the profile. Below is an example that downloads the profile from the directory. Modify this example for your environment. It also compares the new and old profiles and emails a status message:

```
#!/bin/ksh
cp /etc/opt/ldapux/ldapux_profile.ldif /etc/opt/ldapux/ldapux_profile.sav
/opt/ldapux/config/get_profile_entry -s nss 2>&1>/tmp/profile.upd$$
diff /etc/opt/ldapux/ldapux_profile.ldif /etc/opt/ldapux/ldapux_profile.sav\
>> /tmp/profile.upd$$
if [ -s /tmp/profile.upd$$ ]; then
   cat /tmp/profile.upd$$ | mailx -s "Profile cache refreshed." root@sys01
else
   echo "No changes." | mailx -s "Profile cache refreshed." root@sys01
fi
rm -f /etc/opt/ldapux/ldapux_profile.sav
rm -f /tmp/profile.upd$$
```

Step 3. Create a *crontab*(1) file (or edit your existing crontab file) and specify how frequently you want the profile to be downloaded. For example, assuming the script above is in the file /ldapux/download_ldap_profile, the following crontab specification specifies that /ldapux/download_ldap_profile be executed nightly at midnight:

```
0 0 * * * /ldapux/download_ldap_profile
```

Step 4. Log in as root and schedule the job with the *crontab*(1) command. For example, assuming the crontab entry above is in the file crontab.profile, the following schedules the profile downloading:

```
crontab crontab.profile
```

Use r-command for PAM_LDAP

An enhancement has been implemented to the LDAP-UX Client Services B.03.20, so that `r-commands` can work with LDAP account users whose password is hidden, or not in clear text or crypt syntax.

If you want to use this new fearture, use the following steps:

1. Uncomment out the following line in the `/etc/opt/ldapux/ldapux_client.conf` file:

   #password_as = "x"

2. On the HP-UX 11.0 or 11i v1 client system, modify account management session in `/etc/pam.conf` file for pam_ldap to add "`rcommand`" option as shown below:

```
# Account management
#
login     account sufficient  /usr/lib/security/libpam_unix.1
login     account required    /usr/lib/security/libpam_ldap.1 rcommand
su        account sufficient  /usr/lib/security/libpam_unix.1
su        account required    /usr/lib/security/libpam_ldap.1
dtlogin   account sufficient  /usr/lib/security/libpam_unix.1
dtlogin   account required    /usr/lib/security/libpam_ldap.1
dtaction  account sufficient  /usr/lib/security/libpam_unix.1
dtaction  account required    /usr/lib/security/libpam_ldap.1
ftp       account sufficient  /usr/lib/security/libpam_unix.1
ftp       account required    /usr/lib/security/libpam_ldap.1
OTHER     account sufficient  /usr/lib/security/libpam_unix.1
OTHER     account required    /usr/lib/security/libpam_ldap.1 rcommand
```

On the HP-UX 11i v2 client system, you will modify account management session in `/etc/pam.conf` file for pam_ldap to add "`rcommand`" option as follows:

```
# Account management
#
login     account required    libpam_hpsec.so.1
login     account sufficient  libpam_unix.so.1
login     account required    libpam_ldap.so.1 rcommand
su        account required    libpam_hpsec.so.1
su        account sufficient  libpam_unix.so.1
su        account required    libpam_ldap.so.1
```

```
dtlogin    account required    libpam_hpsec.so.1
dtlogin    account sufficient  libpam_unix.so.1
dtlogin    account required    libpam_ldap.so.1
dtaction   account required    libpam_hpsec.so.1
dtaction   account sufficient  libpam_unix.so.1
dtaction   account required    libpam_ldap.so.1
ftp        account required    libpam_hpsec.so.1
ftp        account sufficient  libpam_unix.so.1
ftp        account required    libpam_ldap.so.1
rcomds     account required    libpam_hpsec.so.1
rcomds     account sufficient  libpam_unix.so.1
rcomds     account required    libpam_ldap.so.1 rcommand
sshd       account required    libpam_hpsec.so.1
sshd       account sufficient  libpam_unix.so.1
sshd       account required    libpam_ldap.so.1
OTHER      account sufficient  libpam_unix.so.1
OTHER      account required    libpam_ldap.so.1
```

CAUTION Setting user password to be returned as any string for the hidden password, and turning on the “rcommand” option for pam_ldap account management could allow users with active accounts on a remote host to rlogin to the local host on to a disabled account.

3 LDAP Printer Configurator Support

This chapter contains information describing how LDAP-UX supports the printer configurator, how to set up the printer schema, and how to configure the printer configurator to control its behaviors.

This chapter contains the following sections:

Overview

Management of network printing is complex, and printers themselves are more complicated. Instead of having printer configuration and information scattered over client systems and printer servers, they can be stored and managed from a single repository. LDAP is suited to build a backend printer configuration database. LDAP-UX enables the centralized management of printers, and the printer entries can easily be distributed to clients to reduce concerns about synchronization of configuration information. LDAP-UX comes with a printer configurator to consolidate printer configuration and control of printer devices into the LDAP Directory Server for a central location of printer management.

Definitions

Printer Services

HP-UX provides LP spooler system with the LP subsystem to manage printers and print services requests. The LP subsystem is a collection of 18 programs that operate on the resources (files and subdirectories) in LP spool directory to perform their functions, such as `lpadmin`, `rlpdaemon` programs, and `lp` command.

Printing Protocol

The LP spooler system has built-in support for sending jobs to other hosts that running `rlpdaemon`. `rlpdaemon` is a line printer daemon (LPD) for handling remote spool requests. This feaure enables the user to install a printer on one host and make it accessible from other hosts. It also works with printers/printservers that have network interfaces that support the LDP protocol. The LPD network printing protocol is the widely used network printing protocol in the UNIX world.

LP Printer types

The LP spooler supports the following three types of printers:

- A network printer which is a printer connected to a network interface or printserver.
- A remote printer is a printer configured on a system other than the one you are logged into when you submit a print request.

- A local printer which is a printer that is directly connected to your system.

NOTE The LDAP printer configurator only supports the HP LP spooler system, remote printers, network printers and printerservers that support Line Printer Daemon (LPD) protocol. It does not support local printers.

How the LDAP Printer Configurator works

The Printer Configurator is a service daemon which provides the following functions:

- Periodically searches the existing printer entries stored in LDAP Directory Server
- Compares the search result with the master printer record file on each scheduled ldapsearch
- Adds the print configuration to client system for each new printer
- Deletes the printer from the client system for each removed printer
- Updates master printer record file

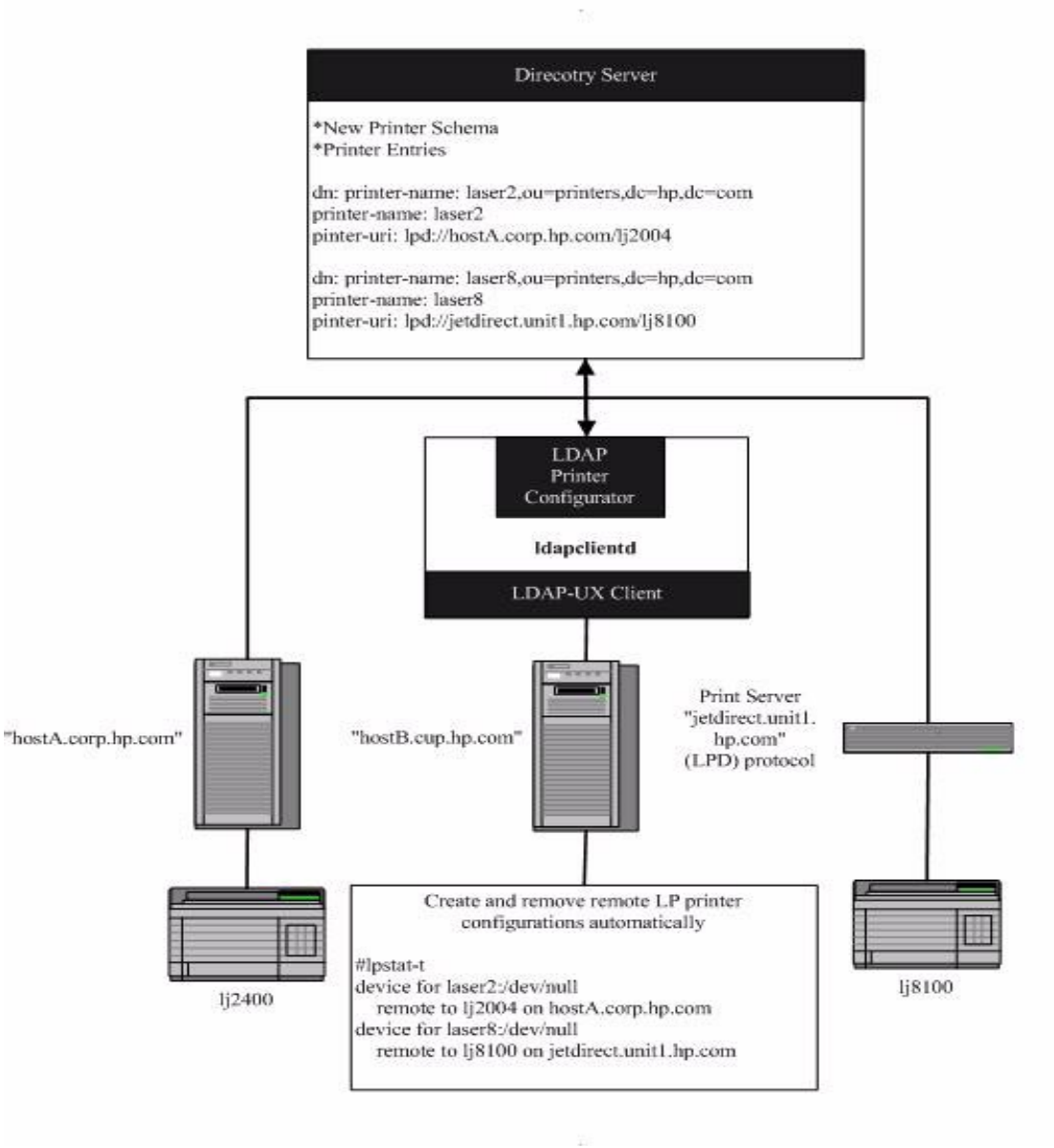
When `ldapclientd` is initialized, it will enable the printer configurator sevices at the same time. Once the printer configurator is up, it periodically searches for any existing printer entries in the LDAP Direcotry Server based on a predefined search filters. If there are any printer entries in the LDAP Directory Server, the printer configurator will extract the LP printer configuration from each printer entry.

Then, the printer configurator compares the printer configuration with the current LP printer configuration in the client system. The result of comparison will generate a list of new or removed printers. For a new printer, the printer configurator adds this printer to the LP printer spool of the client which is running the printer configurator. For a removed printer, the printer configurator deletes this printer from the LP printer spool of the client.

With the printer configurator, if a printer administrator attempts to remove or add a printer, all the administrator has to do is to add or delete the printer entry in the LDAP Directory Server. The printer configuration will be updated automatically without manually setting the printers on each client system.

NOTE The system administrator manually adds or removes printers to the HP-UX system. The LDAP Printer Configurator will only add or remove printers that it has discovered in the LDAP directory according to the search filter defined for the printer.

Figure 3-1 Printer Configurator Architecture



Printer Configuration Parameters

The LDAP-UX Client Services provides four printer configuration parameters, `start`, `search_interval`, `max_printers` and `lpadmin_option` available for you to customize and control the behaviors of the printer configurator. These parameters are defined in the `ldapclientd.conf` file. For detailed information on these new parameters, refer to Chapter 4, “Administering LDAP-UX Client Services,” on page 93.

Printer Schema

The new printer schema, *IETF<draft-fleming-ldap-printer-schema-02.txt>*, is used to create the printer objects that are relevant to the printer configurator services. The draft printer schema can be obtained from IETF web site at *http://www.ietf.org*. For the detailed structure information of the new printer schema, see Appendix C. You must import the new printer schema into the LDAP Directory Server to create new printer objects.

NOTE The LDAP printer configurator supports any Directory Servers that support the LDAP printer schema based on *IETF<draft-fleming-ldap-printer-schema-02.txt>*.

An Example

The following shows a typical printer object entry:

```
dn: printer-name=printer1,ou=printers,dc=cup,dc=hp,dc=com
objectclass: top
objectclass: printerabstract
objectclass: printerservice
objectclass: printerlpd
printer-name: lj81003
printer-uri: lpd://hostA.hp.com/lj81003
printer-location: 47L
printer-make-model: hp laser jet 81003
printer-service-person: John Louie
```

With the new printer schema, you are able to create printer objects for the LP printer configuration.The minimum information for a printer object entry is the local printer name, remote hostname, and the remote printer name. The remote hostname is the system or device that the remote printer is connected to. The remote hostname must be the fully qualified name.

The `printer-name` attribute provides information of local printer name, the `printer-uri` attribute identifies the remote hostname and the remote printer name information. URI stands for uniform resources identifier. The syntax of URI is based on RFC 2396. The following shows an example of the `printer-uri` attribute:

```
printer-uri: lpd://hostA.hp.com/lj2004
```

Managing the LP printer configuration

The LDAP-UX Client Services provide the printer configurator integration; the product daemon automatically updates the remote LP printer configuration of a client system based on the available printer objects in the Directory Server. The printer configurator provides the printer configuration management; it verifies if the printer configuration has any conflict with the LP printer configurations in the client system before it actually adds or deletes a printer.

Following are five examples to show how the LDAP printer configurator provides central management of printer services based on the printer objects stored in the Directory Server:

Example 1:

An administrator sets up a new printer located in the Engineering Lab and wants this printer to be shared. This printer is physically connected to a system `hostA` and is set up as a local printer `lj2004`. The administrator creates a new printer entry in the directory server as follow:

```
dn: printer-name=laser2,ou=printers,dc=hp,dc=com
printer-name: laser2
printer-uri: lpd://hostA.hp.com/lj2004
```

A new printer configuration for `laser2` is created automatically in every client system if the LDAP printer configurator is running. The print queue for `laser2` is enabled and ready to accept print jobs. Users can sent their print jobs to `laser2` by typing `lp -dlaser2` filename.

Example 2:

IT department would like to store additional service information in the printer object. The administrator modifies the printer object by adding more printer attributes. The modified content of the printer object is shown as below:

```
dn: printer-name=laser2,ou=printers,dc=hp,dc=com
printer-name: laser2
printer-uri: lpd://hostA.cup.hp.com/lj2004
printer-location: Engineering Lab
printer-model: Hewlett Packard laserjet Model 2004N
printer-service-person: David Lott
```

Since the local printer name, remote hostname, remote printer name, and the printing protocol information are still the same, the LDAP Printer Configurator will not change the current remote LP printer configuration for `laser2`.

Example 3:

The system `hostA.hp.com` is retired. The Laserjet 2004 printer is now connected to system `hostC` and set up as a local LP printer `lj2004`. The administrator should update the printer object by changing the value in `printer-uri` attribute. The following shows the updated information of print objects:

```
dn: printer-name=laser2,ou=printers,dc=hp,dc=com

printer-name: laser2
printer-model: Hewlett Packard laserjet Model 2004N
printer-service-person: David Lott
```

The current remote LP `laser2` printer configuration is removed from the client system, and the new `laser2` printer configuration with new remote hostname information is added to the client system. In fact, if either remote hostname or remote printer name of `printer-uri` attribute is modified, the printer configurator will remove the current remote LP printer configuration and create the new printer configuration with the updated resource information.

Example 4:

The remote LP printer, `laser2`, no longer supports LPD printing protocol. IPP printing protocol is implemented instead. The administrator updated the printer object by changing the printing protocol to IPP. The following shows the updated printer objects in the directory server:

```
dn: printer-name=laser2,ou=printers,dc=hp,dc=com
printer-name: laser2
printer-uri: ipp://hostC.hp.com/lj2004
printer-location: Engineering Lab
printer-model: Hewlett Packard laserjet Model 2004N
printer-service-person: David Lott
```

IPP printing protocol is not supported by the LP spool printing system. The only action that the LDAP printer configurator will take is to remove the current `laser2` printer configuration on the client system.

Example 5:

The administrator created a new printer object in the directory server as below:

```
dn: printer-name=laser8,ou=printers,dc=hp,dc=com
printer-name: laser8
printer-uri: lpd://hostD.hp.com/lj81003
```

In this example, the printer configurator adds a new remote LP `laser8` printer configuration to the client system.

However, if the user attempts to remove the `laser8` printer configuration manually, the printer configuration will no longer be managed by the printer configurator. The user has to recreate the printer configuration manually in case the `laser8` printer is needed. The printer configurator does not try to create the printer configuration even though the printer object of `laser8` still exists in the directory server.

If the user manually adds a remote LP printer configuration to the client system, the new printer configuration will not be managed by the printer configurator. The user has to remove the printer configuration manually if the remote LP printer is no longer needed.

Limitations of Printer Configurator

- The new LDAP printer schema based on *IETF<draft-fleming-ldap-printer-schema-02>* is imported into the LDAP Directory Server to create the printer objects.
- LDAP-UX Client Services only suports the HP-UX LP spooler system, network printers, and printerservers that support Line Printer Daemon (LPD) protocol. The printer configurator does not support local printers.
- In a global management envoriment, it is hard to determine a default printer for the individual client system. The LDAP printer configurator treats every printer entry as the regular printer. The administrator or user requires to manually select a printer as a default printer for the client system.

4 Administering LDAP-UX Client Services

This chapter describes how to keep your clients running smoothly and expand your computing environment. It describes the following topics:

Using The LDAP-UX Client Daemon

This section describes the following:

- the steps required to activate the client daemon
- an explanation of the administration tool `ldapclientd`, along with the configuration file `ldapclientd.conf`

Overview

The LDAP-UX client daemon enables LDAP-UX clients t o work with LDAP directory servers. It caches entries, supports multiple domains in the Windows 2000/2003 Active Directory Server (ADS), supports X.500 group membership, automatically downloads the configuration profiles, reuses connections to the LDAP Directory Server, and manages the remote LP printer configuration.

The client daemon enables LDAP-UX to use multiple domains for directory servers like Active Directory Server (ADS). The daemon also allows PAM Kerberos to authenticate posix users stored in multiple domains.

Automatic Profile Downloading updates the LDAP client configuration profile by downloading a newer copy from the directory server as the profileTTL (Time To Live) expires.

By default, the LDAP printer configurator is enabled, the client daemon, *ldapclientd*, automatically searches printer objects configured in the LDAP server and executes `lpshut`, `lpadmin` and `lpsched` commands to add, modify, and remove printers accordingly for the local system.

By default, `ldapclientd` starts at system boot time. The `ldapclientd` command can also be used to launch the client daemon manually, or control it when the daemon is already running. Please refer to the following section and the `ldapclientd` man page(s) for information about the `ldapclientd` command and its parameters.

IMPORTANT Starting with LDAP-UX Client Services B.03.20 or later, the client daemon, `/opt/ldapux/bin/ldapclientd`, must be running for LDAP-UX functions to work. With LDAP-UX Client Services B.03.10 or earlier, running the client daemon, `ldapclientd`, is optional.

ldapclientd

Starting the client

Use the following syntax to start the client daemon. Note the use of upper and lower-case characters:

```
/opt/ldapux/bin/ldapclientd <[-d <level>] [-o<stdout|syslog|file[=size]>]\
[-z]
```

Controlling the client

Use the following syntax to control the client daemon:

```
/opt/ldapux/bin/ldapclientd <[-d <level>] [-o<stdout|syslog|file[=size]>]>

/opt/ldapux/bin/ldapclientd <[-D <cache>]|-E <cache>|-S [cache]>

/opt/ldapux/bin/ldapclientd <-f| -k| -L| -h| -r>
```

Client Daemon performance

Performance (client response time) is improved by the use of two techniques:

1. Caching entries to reduce the LDAP-UX client response time while retrieving the following:

   passwd
   group
   netgroup
   X.500 group membership
   automount

2. Reusing and maintaining connections to the directory server. The reduction in bindings and disconnections significantly reduces the load on server and network traffic.

For more information on the client daemon performance, see “Client Daemon Performance” on page 126.

Command options

Please refer to the `ldapclientd` man page(s) for option information.

Diagnostics

By default, errors are logged into syslog if the system log is enabled in the LDAP-UX client startup configuration file */etc/opt/ldapux/ldapux_client.conf*. Errors occuring before `ldapclientd` forks into a daemon process leaves an error message directly on the screen.

The following diagnostic messages may be issued:

Message: Already running.

Meaning: An attempt was made to start an LDAP Client Daemon when one was already running.

Message: Cache daemon is not running (or running but not ready).

Meaning: This message can mean several things:

1. Attempted to use the control option features of `ldapclientd` when no `ldapclientd` daemon process was running, to control.
2. Attempted to start, or control, `ldapclientd` without superuser’s privilege.
3. The `ldapclientd` daemon process is too busy with other requests to respond at this time. Try again later.

Message: Problem reading configuration file.

Meaning: The */etc/opt/ldapux/ldapclientd.conf* file is missing or has a syntax error. If the problem is with its syntax, the error message will be accompanied by a line showing exactly where it could not recognize the syntax, or where it found a setting which is out of range.

Warnings

Whenever the system is rebooted, `ldapclientd` launches if `[StartOnBoot]` has the parameter `enabled=yes` in the file */etc/opt/ldapux/ldapclientd.conf* (the `ldapclientd` configuation file).

Downloading profiles takes time, depending on the server's response time and the number of profiles listed in the LDAP-UX startup file */etc/opt/ldapux/ldapux_client.conf*.

ldapclientd.conf

The file *ldapclientd.conf* is the configuration file for */opt/ldapux/bin/ldapclientd*, the LDAP Client Daemon. Refer to the previous section for more information about the Client Daemon.

Missing settings

`ldapclientd` uses the *default values* for any settings which may be missing from the configuration file.

Configuration file syntax

```
# comment
[section]
setting=value
setting=value
. . .
[section]
setting=value
setting=value
. . .
```

Where:

comment	ldapclientd ignores any line beginning with a # delimiter.
section	Each section is configured by setting=value information underneath. The section name must be enclosed by brackets ("[ ]") as delimiters. Valid section names are: - StartOnBoot - general - passwd - group - netgroup - uiddn - domain_pwd - domain_grp

- automount
- automountMap
- printers

setting — This will be different for each section.

value — Depending on the setting, this can be <yes | no | number>.

Section details Within a section, the following syntax applies:

[StartOnBoot] — Determines if `ldapclientd` starts automatically when the system boots.

setting=value:

enable=<yes | no>
By default, this is enabled after LDAP-UX has been configured by the LDAP-UX setup program */opt/ldapux/config/setup*.

[general] — Any cache setting defined here will be used as the default setting for all caches (passwd, group, netgroup, uiddn, domain_pwd and domain_grp).

setting=value:

max_conn=<2-500>
The maximum number of connections `ldapclientd` can establish to the directory server (or multiple servers when in a multi-domain environment.
The default value is 100.

connection_ttl=<1-2147483647>
The number of seconds before an inactive connection to the directory server is brought down and cleaned up.
The default value is 300.

num_threads=<1-100>
The number of client request handling threads in `ldapclientd`.
The default value is 10.

socket_cleanup_time=<10-2147483647>
The interval, in seconds, before the next attempt to clean up the socket files created by any LDAP-UX client applications that were terminated abnormally.
The default value is 300.

cache_cleanup_time=<1-300>
The interval, in seconds, between the times when `ldapclientd` identifies and cleans up stale cache entries.
The default value is 10.

update_ldapux_conf_time=<10-2147483647>
This determines how often, in seconds, `ldapclientd` re-reads the */etc/opt/ldapux/ldapux_client.conf* client configuration file to download new domain profiles.
The default value is 600 (10 minutes).

cache_size=<102400-1073741823>
The maximum number of bytes that should be cached by `ldapclientd`. This value is the maximum, upper limit, of memory that can be used by `ldapclientd`. If this limit is reached, new entries are not cached until enough expired entries are freed to allow it.
The default value is 10000000.

state_dump_time=<0-2147483647>
As state, functions like a virtual between the client and LDAP server, is created for `setXXent()` request, and stays for the subsequent `getXXent()` requests. If no `get` requests are received in the specified time interval (in seconds), the state will be removed. The default value is 300 (in seconds).

max_enumeration_states=<0-95>[%]
The maximum number of states that `ldapclientd` allows. It means the number of enumeration `ldapclientd` will handle simultaneously. This number must be less than max_conn and it is configured as a percentage of max_conn. The minimum value is 0% and maximum value is 95%. The default value is 80%. A value of 0% disables enumeration.

poscache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. There is no `[general]` default value for this setting. Each cache section has its own default values (listed below). Specifying a value under `[general]` will override `poscache_ttl` defaults in other sections (where there is no specific `poscache_ttl` definitions for that section).

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache. There is no `[general]` default value for this setting. Each cache section has its own default value.

[passwd] Cache settings for the `passwd` cache (which caches name, uid and shadow information).

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. If the cache is not enabled, `ldapclientd` will query the directory server for any entry request from this section. Since this impacts LDAP-UX client performance and response time, by default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Since personal data can change frequently, this value is typically smaller than some others.
The default value is 120 (2 minutes)

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 240 (4 minutes).

[group] Cache settings for the group cache (which caches name, gid and membership information).

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Since people are added and removed from groups occasionally, this value is not typically large.
The default value is 240 (4 minutes)

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 240 (4 minutes).

[netgroup] Cache settings for the netgroup cache.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Since people are added and removed from groups occasionally, this value is not typically large.
The default value is 240 (4 minutes)

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 240 (4 minutes).

[uiddn] This cache maps a user's UID to their DN from the directory.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Typically, once added into a directory, the user's DN rarely changes.
The default value is 86400 (24 hours).

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 84400 (24 hours).

[domain_pwd] This cache maps user names and UIDs to the domain holding its entry.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Since new domains are rarely added to or removed from the forest, the cache is typically valid for a long time.
The default value is 86400 (24 hours)

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 86400 (24 hours).

[domain_grp] This cache maps group names and GUIDs to the domain holding its entry.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. Since new domains are rarely added to or removed from the forest, the cache is typically valid for a long time.
The default value is 86400 (24 hours).

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 86400 (24 hours).

[automount] Cache settings for the automount entry cache (which caches automount entries in automount maps).

A positive cache means that the automount entry data has been recently retrieved from the LDAP directory server and is stored in the positive cache locally.

A negative cache is used to store the automount entry data about non-existent information. For example, if a user requests information about an automount entry that does not exist, the LDAP directory server will not return an entry, all the negative result will be stored in the negative cache.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. The default value is 1800 (30 minutes).

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 1800 (30 minutes).

[automountMap] Cache settings for the automount map cache.

setting=value

enable=<yes | no>
`ldapclientd` only caches entries for this section, when it is enabled. By default, caching is enabled.

poscache_ttl=<0-2147483647>
The time, in seconds, before a cache entry expires from the positive cache. The default value is 1800 (30 minutes).

negcache_ttl=<1-2147483647>
The time, in seconds, before a cache entry expires from the negative cache.
The default value is 7200 (2 hours).

[printers] Any printer setting defined here will be used by the LDAP printer configurator.

start=<yes | no>
Determines if the printer configurator service will start when `ldapclientd` is initialized. If it is enabled, the

printer configurator will start when `ldapclientd` is initialized. By default, the `start` parameter is enabled.

search_interval=<1800-1209600>
Defines the interval, in seconds, before the printer configurator performs a printer search in the directory server. The default value is 86400 (in seconds). The minimum value is 1800 (30 minutes) and the maximum value is 1209600 (2 weeks).

max_printers=<10-500>
Defines the maximum printer objects that printer configurator services will handle. For example, a number of 100 printer entries is returned to the printer configurator after a scheduled printer search. If the `max_printers` value is set to 50, only the first 50 printer entries received by the printer configurator will be processed. For this configuration parameter, the minimum value is 10 and the maximum value is 500. The default value is 50.

lpadmin_option
Defines the `lpadmin` options. Do not include the `-p`, `-orm` and `-orp` options in the option fields. The LDAP printer configurator provides the required information of printer name (`-p`), remote machine name (`-orm`) and remote printer name (`-orp`) during the run time. Do not include any other parameters, such as stderr or stdout redirection options. If the option fields of the `lpadmin_option` parameter are empty or the `lpadmin_option` parameter does not exist, the default `lpadmin` options are used. By default, `lpadmin_option = -mrmodel -v/dev/null -ocmrcmodel -osmrsmodel`.

Configuration File

The LDAP client configuration file is automatically loaded when the product is installed. Refer to the man page for additional information.

If you update LDAP-UX Client Services from an older version, such as B.03.00 or B.03.10, the new configuration file will be */opt/ldapux/newconfig/etc/opt/ldapux/ldapclientd.conf*.

Integrating with Trusted Mode

This section describes features and limitations, PAM configuration changes and configuration parameter for integrating LDAP-UX with Trusted Mode.

Overview

LDAP-UX Client Services B.03.30 or later supports coexistence with Trusted Mode. This means that local-based accounts can benefit from the Trusted Mode security policies, while LDAP-based accounts benefit from the security policies offered by the LDAP server. This release of LDAP-UX also enables LDAP-based and local-based accounts to be audited on the Trusted Mode.

The coexistence of LDAP-UX and Trusted Mode supports certain security features, but also has limitations and usage requirements that you need to be aware of. For detailed information, see “Features and Limitations” on page 105.

Features and Limitations

This subsection describes features and limitations of integrating LDAP-UX with Trusted Mode.

Auditing

Integrating LDAP-UX with Trusted Mode enables accounts stored in the LDAP directory to login to a local host and to be audited on the Trusted Mode. The following describes the auditing features and limitations. To use these security features, you must enable the audit subsystem on the Trusted Mode local host:

- Auditing of both LDAP-based and local-based (*/etc/passwd*) accounts is possible. By default, auditing is disabled for all LDAP-based accounts. However, you can use the `audusr` (option `-a` or `-d`) command to alter the auditing flag for individual LDAP-based account.
- For LDAP-based accounts that are not yet known to the system, you can configure an initial setting for the auditing flag. You can configure this flag such that when an account becomes known to the

system for the first time, auditing for that account is immediately enabled or disabled. This flag is defined as the `initial_ts_auditing` parameter in the */etc/opt/ldapux/ldapux_client.conf* file.

- You must manage Trusted Mode attributes for all accounts on each host. Trusted Mode attributes for LDAP-based accounts are not stored in the LDAP directory server. For example, enabling auditing for an account on host A does not enable auditing on host B.
- Audit IDs for LDAP-based accounts are unique on each system. Audit IDs are not synchronized across hosts running in the Trusted Mode.
- When an LDAP-based account name is changed, a new audit ID is generated on each host that the account is newly used on. The initial auditing flag is reset to the default value defined in the */etc/opt/ldapux/ldapux_client.conf* file.
- When an account is deleted from LDAP, the audit information for that account is not removed from the local system. If that account is re-used, the audit information from the previous account is re-used. You can choose to manually remove entries from the Trusted Mode database by removing the appropriate file under the */tcb/files/auth/...* directory, where "..." defines the directory name based on the first character of the account name.
- You can use the `audisp` command to display information about LDAP-based accounts. However, if an LDAP-based account has never logged in to the system (via telnet, rlogin, and so on), the `audisp -u <username>` command displays the message like “`audisp: all specified users names are invalid`."

Password and Account Policies

The primary goal of integrating Trusted Mode policies and those policies enforced by an LDAP server is coexistence. This means that Trusted Mode policies are not enforced on LDAP-based accounts, and LDAP server policies are not enforced on local-based accounts. The password and account policies and limitations are described as followings:

- Accounts stored and authenticated through the LDAP directory adhere to the security policies of the directory server being used. These policies are specific to the brand and version of the directory server product deloyed. Examples of these policies include password

expiration, password syntax checking, and account expiration. No policies of the HP-UX Trusted Mode product apply to accounts stored in the LDAP server.

- When you integrate LDAP-UX on an HP-UX 11i v1 or 11i v2 system with the Netscape Directory Server, if an LDAP-based user attempts to login to the system, but provides the incorrect password multiple times in a row (the default is three times in a row), Trusted Mode attempts to lock the account. However, the Trusted Mode attributes do not impact LDAP-based accounts. So, if the user eventually provides the correct password, he or she can login.

PAM Configuration File

- If you integrate LDAP-UX Client Services with the Netscape Directory Server, you must define the `pam_ldap` library before the `pam_unix` library in the */etc/pam.conf* file for all services. You must set the control flag for both pam_ldap and pam_unit libraries to `required` under session management. Refer to Appendix C, "Sample /etc/pam.ldap.trusted file," on page 191 for the proper configuration.
- If you integrate LDAP-UX Client Services with the Windows 2000/2003 Active Directory Server, you must define the `pam_krb5` library before the `pam_unix` library in the */etc/pam.conf* file for all services. In addition, the control flag for both `pam_krb5` and `pam_unix` libraries must be set to `required` for `Session management`. Refer to *Appendix F and Appendix G* on *LDAP-UX Client Services B.04.00 With Microsoft Windows 2000/2003 Active Directory Administrator's Guide* for the proper configuration.

Others

- The `authck -d` command removes the `/tcb/files/auth/...` files created for LDAP-based accounts. When the LDAP-based account logs into the system again, a new `/tcb/files/auth/...` file with new audit ID is recreated. Therfore, it is not recommended to run the `authck -d` command when you configure LDAP-UX with Trusted Mode.
- You cannot use the Trusted Mode management subsystem in SAM to manage LDAP-based accounts.
- The LDAP repository and */etc/passwd* repository must not contain accounts with the same login name or account number.

- Except for the audit flag, you cannot modify other Trusted Mode properties/policies for LDAP-based accounts. For example, attempting to lock an LDAP-based account by modifying the Trusted Mode field for that user does not prevent that account from logging in to the host. Instead, you must disable the account on the LDAP server itself. No runtime warning will be given that the local locking of the account has no effect. It is important that all system administrators are properly trained, so that administrative locks on accounts have the desired effect.

Configuration Parameter

LDAP-UX Client Services provides one configuration parameter, `initial_ts_auditing`, available for you to configure the initial auditing setting for the LDAP-based account. This parameter is defined in the */etc/opt/ldapux/ldapux_client.conf* file.

PAM_AUTHZ Login Authorization Enhancement

The PAM_AUTHZ service module provides functionality that allows the administrator to control who can login to the system based on netgroup information found in the `/etc/passwd` and `/etc/netgroup` files. PAM_AUTHZ has been created to provide access control similar to the netgroup filtering feature that is performed by NIS.

Starting LDAP-UX Client Services B.04.00, PAM_AUTHZ has been enhanced to provide administrators a simple security configuration file to set up a local access policy to better meet their need in the organization. PAM_AUTHZ uses the access policy to determine which users are allowed to login to the system. A policy specifies which groups, ldap groups, users or other access control objects (such as ldap search filters) are allowed to login to the system. For example, you can allow or deny access to a host or application based on his or her membership in a group, or role within a organization. As an example, PAM_KEREBOS and PAM_AUTHZ can be used together to authenticate and authorize users in a Windows 2000/2003 environment. PAM_KERBEROS authenticates the user. PAM_AUTHZ uses ADS groups or other user information from the policy file, to determine if the user is authorized to access the system.

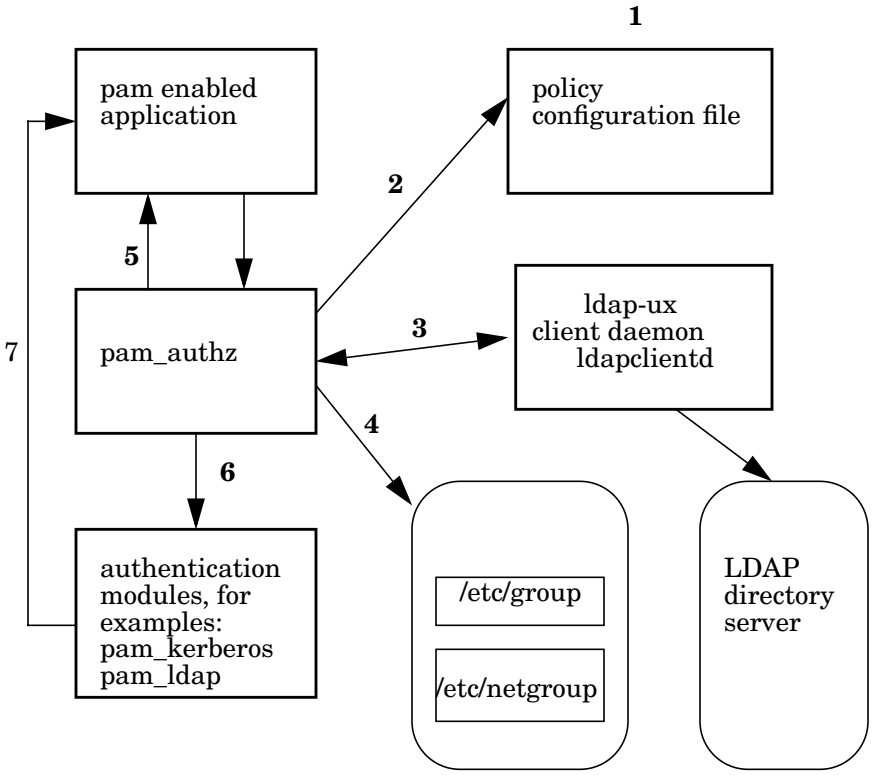
Policy And Access Rules

Access rules are the basic elements of access control. Administrators create access rules that restrict or permit a user's access permission. A policy is the collection of these different sets of access rules in a given order. This consolidated list of rules defines the overall access strategy of a local client machine. PAM_AUTHZ enables administrators to create an access policy by defining different types of access rules and to save the policy in a file.

How Login Authorization Works

The system administrator can define the access rules and store them in the policy file, `/etc/opt/ldapux/pam_authz.policy`. PAM_AUTHZ uses these access rules defined in the policy file to control the login authorization.

Figure 4-1 PAM_AUTHZ Environment



The following describes the policy validation processed by PAM_AUTHZ for the user login authorization shown in figure 4-1:.

1. The administrator defines a local policy file and saves all the defined access rules in the policy configuration file, `/etc/opt/ldapux/pam_authz.policy`.

2. PAM_AUTHZ service module receives an authentication request from PAM framework. It processes all the access rules stored in the /etc/opt/ldapux/pam_authz.policy file.

3. If a rule indicates that the required information is stored in a LDAP server, PAM_AUTHZ constructs a request message and sends to the LDAP client daemon, `ldapclientd`. The LDAP client daemon performs the actual ldap query and returns the result to PAM_AUTHZ. Then the access rule is evaluated and the final access right is returned.

4. If a rule indicates that the required information is in the UNIX files. PAM_AUTHZ retrieves user's information from `/etc/passwd`, `/etc/group` or `/etc/netgroup` file through `getpwname()` or `getgrname()` system calls. Then the rule is evaluated and the final access right is returned.

5. PAM_AUTHZ returns the corresponding pam result to PAM framework. The decision is returned to the application which called the PAM API.

6. If the user has the permission to login. then the decision is returned to the next PAM service module that is configured in `pam.conf` file, such as pam_ldap or pam_kerberos. If the user has no access right, then login is denied.

7. The PAM service module returns the authentication result to the application which called the PAM API.

Policy File

The system administrator can define a local access policy and store all defined access rules in the policy file, `/etc/opt/ldapux/pam_authz.policy`. The PAM_AUTHZ service module uses this local policy file to process the access rules and to control the login authorization.

LDAP-UX Client Services provides a sample configuration file, `/etc/opt/ldapux/pam_authz.policy.template`. This sample file shows you how to configure the policy file to work with PAM_AUTHZ. You can copy this sample file and edit it using the correct syntax to specify the access rules you wish to authorize or exclude from authorization. For detailed information on how to construct an access rule in the policy file, see "Constructing an Access Rule in pam_authz.policy" on page 112.

Constructing an Access Rule in pam_authz.policy

In the policy file, `/etc/opt/ldapux/pam_authz.policy`, an access rule consists of three fields as follows:

<action>:<type>:<rule>

All fields are mandatory. If any field is missing or contains the incorrect syntax, the access rule is considered to be invalid and is ignored by PAM_AUTHZ.

These fields have the following limitations:

- No leading or trailing empty space is allowed in a field
- Fields are separated by a separator, :
- No leading or trailing empty space is allowed in a separator
- An access rule is terminated by a carriage return

Fields in an Access Rule

Table 4-1 shows a summary on all possible values and syntax of an access rule:

Table 4-1 Field Syntax in an Access Rule

<action>	<type>	<object>
`deny, allow`	`unix_user`	A list of user name. It can be the multi-valued field. Each value is a character string that is separated by a separator “,” (ASCII 2C HEX). Example: user1, user2, user3

Table 4-1 Field Syntax in an Access Rule (Continued)

<action>	<type>	<object>
deny, allow	unix_group	A list of group name. It can be the multi-valued field. Each value is a character string that is separated by a separator ",", (ASCII 2C HEX). Example: group1, group2, group3
deny, allow	netgroup	A list of netgroup name. It can be the multi-valued field. Each value is a character string that is separated by a separator ",",(ASCII 2C HEX). Example: netgroup1, netgroup2, netgroup3
deny, allow	ldap_group	It is the Distinguished name of a ldap group with groupofnames objectclass or groupofuniquenames objectclass. It is a single-valued field. No separator is required. The syntax of DN is defined in RFC2253. Example: cn=ldapgroup1,cn=groups,dc=mydomain, dc=com
deny, allow	ldap_filter	It is a single search descriptor that specifies one of more (attribute=value) parirs. It is a single value field. Only one search filter is allowed. No separator is required. The syntax of DN is defined in RFC2254. Example: (&(manager=Joeh)(department=sales))

Table 4-1 Field Syntax in an Access Rule (Continued)

<action>	<type>	<object>
deny, allow	other	No value is required.

The following describes three fields defined in an access rule in details:

<action> This field defines a user's final access permission if an access rule is evaluated to be true. Valid entries are allow and deny, where allow and deny are character strings and the value itself is not case sensitive. PAM_AUTHZ does not evaluate an access rule if no option is defined or if the action field contains an invalid string.

<action> field must be one of following values:

allow
This option indicates that a user is granted the login authorization.

deny
This option indicates that a user's login authorization is denied.

<type> The value in this field represents the type of access rule. It defines what kinds of user information that PAM_AUTHZ needs to look for. The value also helps to determine the correct syntax in the following <object> field.

The valid values for this field are unix_user, unix_group, , ldap_group, ldap_filter and other. The following describes these valid values for this field in details:

unix_user
This option indicates that an administrator wants to control the login access by examining a user's login name with a list of predefined users. If the login name matches one of the user names in the list, the authorization statement is evaluated to be true. The final access right is determined by evaluating the <action> field. An example of a unix_user type of access rule is as follows:

```
allow:unix_user:myuser1,myuser2,myuser3
```

If a myuser3 user attempts to login, the above access rule is evaluated to be true and the user is granted login access.

unix_group
This option specifies that an administrator wants to control the login access right using the user's group membership. You can specify a list of group name in the <object> field. PAM_AUTH retrieves the group information of each listed group by querying the name services specified in nsswitch.conf. That means the group entries may come from any sources (files, nis, ldap, etc). If the login user belongs to any groups in the list, the access rule is evaluated to be true. Otherwise, the rule is skipped. An example of a unix_group access rule is shown as follows:

```
deny:unix_group:myunixgroup10,myunixgroup11,\
myunixgroup12
```

A user tries to login and he is a member of myunixgroup12. The rule is evaluated to be true and the <action> is applied. The user is restricted from access to the machine even with a valid password.

netgroup
This option specifies that the access permission is determined by the user's netgroup membership. You must specify a list of netgroup name in the <object> field. If the user is a member of one of the netgroups specified in the netgroup list, then the access rule is

evaluated to be true. PAM_AUTH obtains the netgroup information by querying the name services specified in `nsswitch.conf`. For example:

```
allow:netgroup:netgroup1,netgroup2,netgroup3
```

A user tries to login and he belongs to `netgroup1`. The above access rule is evaluated to be true. The user is granted login access

`ldap_group`
This option specifies that an access rule is based on the non-POSIXGroup membership. PAM_AUTHZ supports ldap group with `groupOfNames` or `groupOfUniqueNames` objectclass. A list of `ldap_group` names is specified in the `<object>` field. The group membership information is stored in the LDAP directory server. An example of a `ldap_group` type of access rule is as follows:

```
deny:ldap_group:engineering_ldapgroup,support
_ldapgroup,epartner_ldapgroup
```

PAM_AUTHZ retrieves group membership of each listed group from the directory server through LDAP-UX client services. Then, it examines if the user's Distinguished Name (DN) matches any value in the `member` or `uniquemember` attribute.

`ldap_filter`
In a role based access management, permission to access a resource can be controlled based on the user's role such as sales force, technical support or subscriber status and are typically defined by common business attributes of users based on company policies. The same concept is applied to the `ldap_filter` access rule. A search filter is defined in `<object>` field. A search filter consists of one or more (attribute=value) pairs. If the user entry is successfully retrieved from a directory server by using the search filter, the access rule is considered to be true. An example of `ldap_filter` type of access rule is as follows:

```
allow:ldap_filter:(&(manager=paulw)(business\
category=marketing))
```

In the above example, if a user reports to `paulw` and the user's job is related to `marketing`, then the user is granted the login access. The rule structure is very flexible about how to define access for certain groups of users.

`other`
PAM_AUTHZ ignores any access rules defined in the `<object>` field. The access rule is evaluated to be true immediately. For example,

```
allow:other
```

In the above example, all users are granted the login access to the machine. The primary usage of this type of rule is to toggle PAM_AUTHZ default `<action>`.

<object> The values in this field define the policy criteria that PAM_AUTHZ uses to validate with the login name. The values in this field are dependent on the option that is stated in the `<type>` field.

Policy Validator

PAM_AUTHZ works as a policy validator. Once it receives a PAM request, it starts to process the access rules defined in `pam_authz.policy`. It validates and determines the user's login authorization based on the user's login name and the information it retrieves from various name services. The result is then returned to the PAM framework.

PAM_AUTHZ processes access rules in the order they are defined in the `pam_authz.policy`. It stops processing the access rules when any one of the access rules is evaluated to be true (match). That rule is called the "authorative" rule. If any access rule is evaluated to be false (no match), the rule is skipped. If all access rules in the policy file have been evaluated but the user's access right can not be determined, the user is restricted from login.

NOTE The default `<action>` of PAM_AUTHZ is "`deny`" if no authorative rule is found.

The following describes situations where PAM_AUTHZ skips an access rule and does not process it:

- An access rule contains the wrong syntax.
- PAM_AUTHZ processes the `ldap_filter` and `ldap_gorup` types of access rules by querying the LDAP directory server through `ldapclientd` daemon. If LDAP-UX Client Services is not running, PAM_AUTHZ skips all the `ldap_filter` and `ldap_group` types of rules.

An Example of /etc/opt/ldapux/pam_authz.policy File

The following shows an example of the `/etc/opt/ldapux/pam_authz.policy` file:

```
allow:unix_user:user1,user2,user3
allow:unix_group:group1,group2
deny:unix_group:group11,group12
allow:netgroup:netgroup1,netgroup2
allow::ldap_group:ldapgroup1,ldapgroup2
allow:ldap_filter:(&(manager=Joeh) (department=marketing))
```

PAM_AUTHZ processes access rules in the order they are defined in the `pam_authz.policy` file. It stops evaluating the access rules when any one of the access rule is matched. In the above example, if the `user2` user attempts to login, it matches one of the user names in the first access rule, PAM_AUTHZ stops evaluating the rest of the access rules and allows the `user2` user to login. If the `user3` user is a member of the `ldapgroup2` group, this is only group that this user belongs to. PAM_AUTHZ starts to validate user3's login access by evaluating all the access rule defined in `pam_authz.policy`. The fifth access rule is evaluated, the `user3` is a member of the listed group, `ldapgroup2`. The `user3` user is granted the login access.

Adding a Directory Replica

Your LDAP directory contains configuration profiles downloaded by each client system and name service data accessed by each client system. As your environment grows, you may need to add a directory replica to your

environment. LDAP-UX can take advantage of replica directory servers and the alternates if one of them fails. Follow these steps to inform LDAP-UX about multiple directory servers:

Step 1. Create and configure your LDAP directory replica. For Netscape Directory Server for HP-UX, see the *Netscape Directory Server Deployment Guide*.

Step 2. Edit an existing profile and modify the defaultServerList or preferredServerList attribute to specify a replica directory server. See "Modifying a Profile" on page 122.

See Appendix B, "LDAP-UX Client Services Object Classes," on page 187 for a description of the defaultServerList or preferredServer attribute.

Step 3. On all clients that are to use the replica server, edit the start-up file, /etc/opt/ldapux/ldapux_client.conf, to refer to the replica host. Modify the LDAP_HOSTPORT line to specify the replica server.

Step 4. After modifying an existing profile, each client that regularly downloads its profile automatically will get the changes as scheduled. See"Download the Profile Periodically" on page 74.

NOTE Client systems using an LDAP directory replica may not be able to modify the directory replica. In this case, the *passwd*(1) command will not work on those systems. They can use the *ldappasswd*(8) command described under "The ldappasswd Command" on page 166.

Displaying the Proxy User's DN

You can display the proxy user's distinguished name by running /opt/ldapux/config/ldap_proxy_config -p.

The following command displays the current proxy user:

```
ldap_proxy_config -p
PROXY DN: uid=proxy,ou=people,o=hp.com
```

Verifying the Proxy User

The proxy user information is stored encrypted in the file /etc/opt/ldapux/pcred. You can check if the proxy user can authenticate to the directory by running /opt/ldapux/config/ldap_proxy_config -v as follows:

```
cd /opt/ldapux/config
./ldap_proxy_config -v
File Credentials verified - valid
```

Creating a New Proxy User

If you need to create a new proxy user and change your client systems to use the new proxy user, use the following steps:

Step 1. Add the new proxy user to your directory with appropriate access controls. See the steps “Create a proxy user” and “Set access permissions for the proxy user” under the procedure “Configure Your Directory” on page 21 for details.

Step 2. Configure each client to use the new proxy user by running /opt/ldapux/config/ldap_proxy_config. See “The ldap_proxy_config Tool” on page 146 for details. See below for examples.

Step 3. Run /opt/ldapux/config/ldap_proxy_config -p to display the proxy user you just configured and confirm that it is correct.

Step 4. Run /opt/ldapux/config/ldap_proxy_config -v to verify the proxy user is working.

Example

For example, the following command configures the local client to use a proxy user DN of `uid=proxy,ou=people,o=hp.com` with a password of `abcd1234`:

```
cd /opt/ldapux/config
./ldap_proxy_config -i
uid=proxy,ou=people,o=hp.com
abcd1234
```

The following command displays the current proxy user:

```
./ldap_proxy_config -p
PROXY DN: uid=proxy,ou=people,o=hp.com
```

The following command checks to see if the proxy user can bind to the directory:

```
./ldap_proxy_config -v
File Credentials verified - valid
```

Displaying the Current Profile

You can display the profile in use by any client by running /opt/ldapux/config/display_profile_cache on that client. The current profile is in the binary file /etc/opt/ldapux/ldapux_profile.bin.

```
cd /opt/ldapux/config
./display_profile_cache
```

You can also find out from where in the directory the client downloaded the profile by displaying the file /etc/opt/ldapux/ldapux_client.conf and looking for the line beginning with PROFILE_ENTRY_DN, for example:

```
grep ^PROFILE_ENTRY_DN /etc/opt/ldapux/ldapux_client.conf
PROFILE_ENTRY_DN="cn=profile1,ou=hpuxprofiles,o=hp.com"
```

Creating a New Profile

To create a new profile, run /opt/ldapux/config/setup. When setup asks you for the distinguished name (DN) of the profile, give a DN that does not exist and setup will prompt you for the parameters to build a new profile. The setup program also configures the local client to use the new profile.

Alternatively, you could use your directory administration tools to make a copy of an existing profile and modify it.

You can also use the interactive tool create_profile_entry to create a new profile as follows:

```
cd /opt/ldapux/config
./create_profile_entry
```

Once you create a new profile, configure client systems to use it as described in “Changing Which Profile a Client Is Using” on page 122.

Modifying a Profile

You can modify an existing profile directly using your directory administration tools, for example with Netscape Console. See Appendix B, “LDAP-UX Client Services Object Classes,” on page 187 for a complete description of the DUAConfigProfile object class, its attributes, and what values each attribute can have.

The ldapentry tool can also be used to modify the existing profile. This can be done with the following command:

```
$ /opt/ldapux/bin/ldapentry -m"DN_of_profile"
$ cd /opt/ldapux/config
$ ./get_profile_entry -s nss
```

After modifying a profile, each client that regularly downloads its profile automatically will get the changes as scheduled. See “Download the Profile Periodically” on page 74 for details.

Changing Which Profile a Client Is Using

Each client uses the profile specified in its start-up file /etc/opt/ldapux/ldapux_client.conf. To make a client use a different profile in the directory, edit this file and change the DN specified in the PROFILE_ENTRY_DN line. Then download the profile as described in “Download the Profile Periodically” on page 74.

Changing from Anonymous Access to Proxy Access

If you have anonymous access and you want to change to using a proxy user, do the following:

Step 1. Create the proxy user in the directory. With Netscape Directory Server, you can use the Netscape Console.

Step 2. Change the credentialLevel attribute in your profile to be “proxy” using your directory administration tools, for example the Netscape Console.

If you want proxy access with anonymous access as a backup if proxy access fails, change credentialLevel to be “proxy anonymous”.

Step 3. Download the profile to the client. If you have an automated process to download the profile, you can wait until it executes. Or you can download the profile manually by running the following command:

```
cd /opt/ldapux/config
./get_profile_entry -s nss
```

You can verify that the proxy user is configured with display_profile_cache and ldap_proxy_config. display_profile_cache displays the current configuration profile, including the credential level, which is either “proxy,” “anonymous,” or “proxy anonymous.” ldap_proxy_config displays and verifies the proxy user the client is configured to use. See “The display_profile_cache Tool” on page 144, “The ldap_proxy_config Tool” on page 146, and “The get_profile_entry Tool” on page 145 for more information.

Changing from Proxy Access to Anonymous Access

If you are using proxy access and you want to change to using anonymous access, do the following:

Step 1. Change the credentialLevel attribute in your profile to be “anonymous” using your directory administration tools, for example the Netscape Console.

Step 2. Download the profile to the client. If you have an automated process to download the profile, you can wait until it executes. Or you can download the profile manually as described in “Download the Profile Periodically” on page 74.

Step 3. Remove the proxy information:

```
cd /opt/ldapux/config
./ldap_proxy_config -e
```

Step 4. Optionally, remove the proxy user from the directory if you no longer need it. With Netscape Directory Server, you can use the Netscape Console.

Performance Considerations

This section lists some performance considerations for LDAP-UX Client Services. See the white paper *LDAP-UX Integration Performance and Tuning Guidelines* at:
http://docs.hp.com/hpux/internet/#LDAP-UX%20Integration
for additional performance information.

Minimizing Enumeration Requests

Enumeration requests are directory queries that request all of a database, for example all users or all groups. Enumeration requests of large databases could reduce network and server performance. For this reason, you may want to restrict the use of commands and applications that enumerate.

The following commands generate enumeration requests:

- *finger*(1)
- *grget*(1) with no options
- *pwget*(1) with no options
- *groups*(1)
- *listusers*(1)
- *logins*(1M)
- All netgroup calls

In addition, applications written with routines of families such as the *getpwent*, *getgrent*, *gethostent*, and *getnetent* family of calls can enumerate a map, depending on how they are written.

Client Daemon Performance

Compared to previous networked name service systems, LDAP directory servers support a number of new features. And the general purpose nature of LDAP allows it to support a variety of applications, beyond those just used by a networked OS. Although directory servers have excellent performance and scalability, the addition of these features, such as security, means that directory applications will benefit from a design that considers performance requirements. In order to maximize of the number of HP-UX clients that can be supported by an LDAP directory server, and also improve client response, the ldapclientd daemon supports both data caching and persistent network connections. Their use, benefits and side-effects are described below.

ldapclientd Caching

Caching LDAP data locally allows for much greater response time for name service operations. Caching means that data that has been recently retrieved from the directory server will be retrieved from a local store, instead of the directory server. Caching greatly reduces both directory server load and network usage. For example, when a user logs into the system, the OS typically needs to enquire about his/her account several times in the login process. This occurs as the OS identifies the user, gathers account information and authenticates the user. And further requests often occur as the account starts up new applications once a session is established. With caching, generally only one or two LDAP operations are required.

Caching is also critical to support certain types of applications that make frequent demands on the name service system, either because they are malfunctioning or need this specific type of information frequently.

ldapclientd also supports what is known as a negative cache. This type of cache is used to store meta-data about non-existent information. For example, if an application requests information about an account that does not exist, the directory server will not return an entry, and that negative result will be stored in a cache. Intuitively this type of cache would seem to be un-necessary. However, applications exist that may perform these operations frequently, either on purpose or because they are malfunctioning. For example, if a file is created with a group ID that

does not exist, every time a user displays information about this file, using the ls command, a request to the directory server will be generated.

The ldapclientd daemon currently supports caching of passwd, group, netgroup and automount map information. ldapclientd also maintains a cache which maps user's accounts to LDAP DNs. This mapping allows LDAP-UX to support groupOfNames and groupOfUniqueNames for defining membership of an HP-UX group.

Although there are many benefits to caching, administrators must be aware of the side-effects of their use. Here are some examples to consider:

Table 4-2

Map Name	Benefits	Example Side-Effect
`passwd`	Reduces greatly the number of requests sent to a directory server during a login or other operation such as displaying files owned by that user.	Removing this information from the directory may not be visible to the operating system until after the cache has expired. In certain cases, this may allow a user to login to an HP-UX host, even after his account has been removed from the LDAP directory server. (In general this is not a problem when pam_ldap is used for authentication, since authentication requests are not cached.)

Table 4-2 (Continued)

Map Name	Benefits	Example Side-Effect
`group`	Frequent file system access may request information about groups that own particular files. Caching greatly reduces this impact.	Removing a member of a group may not be visible to the file system, until after the cache expires. During this window, a user may be able to access files or other resources based on his/her group membership, which had been revoked.
`netgroup`	netgroups can be heavily used for determining network file system access rights or user login rights. Caching this information greatly reduces this impact	Similar to groups, since netgroups are used to control access to resources, modification of these rights may not appear until after cache information has expired. Users may be allowed or denied login even their rights should allow / deny access,

Table 4-2 (Continued)

Map Name	Benefits	Example Side-Effect
`automount`	Frequent file system access to a directory may request automount information about a network file system. A positive AutoFS cache greatly reduces LDAP-UX Client response time while retrieving the automount data. Whenever a user attempts to access a directory that does not exist on the physical file system, the AutoFS system is called to determine if that directory is available via the network through AutoFS. A negative AutoFS cache is critical to assure that malfunctioning applications do not place redundant bogus requests on the directory server.	For the positive AutoFS cache, an alteration of the automount maps will sometimes not appear immediately. During this expiration window, a network file system may be granted access, when in fact the automount map should have unmounted from a network file system. For the negative AutoFS cache, an alteration of the automount maps will sometimes not appear immediately. During this expiration window, a user attempting to access a network file system may be denied access, when in fact the automount map should have set up a network file system mount.

NOTE The `ldapclientd -f` command will flush all caches. Refer to the man page `ldapclientd (1M)` for more information.

It is possible to alter the caching lifetime values for each service listed above, in the /etc/opt/ldapux/ldapclientd.conf file. See below for additional information. It is also possible to enable or disable a cache using the -E or -D (respectively) options. These options may be useful in determining the effectiveness of caching or helpful in debugging.

ldapclientd Persistent Connections

Since the HP-UX can generate many requests to an LDAP server, the overhead of establishing a single connection for every request can create excessive network traffic and slow response time for name service requests. Depending on network latency, the connection establishment and tear-down can cause relatively severe delays for client response. However, a persistent connection to the directory server will eliminate this delay.

In the ldapclientd daemon, a pool of active connections is maintained to serve requests from the Name Service Subsystem (NSS). If the NSS needs to perform a request to the directory server, one of the free connections in this pool will be used. If there are no free connections in the pool, a new connection will be established, and added to the pool. If system activity is low, then connections that have been idle for a specified period of time (configurable in the ldapclientd.conf file) then those connections will be dropped, to free up directory server resources. Aside from ldapclientd connection time-out configuration, it is also possible to define a maximum number of connections that ldapclientd may establish. Setting a high number of connections means assures that ldapclientd will not become a bottleneck in performing name service operations to the directory server. However, a high number of connections from a large number of HP-UX clients to the same directory server may exhaust all available connection resources on that directory server. Setting a low number of maximum connections will reduce that resource requirement on the directory server, but may create a performance bottleneck in the ldapclientd.

Troubleshooting

This section describes troubleshooting techniques as well as problems you may encounter.

Enabling and Disabling LDAP-UX Logging

When something is behaving incorrectly, enabling logging is one way to examine the events that occur to determine where the problem is. Enable LDAP-UX Client Services logging on a particular client as follows:

Step 1. Edit the local startup file /etc/opt/ldapux/ldapux_client.conf and uncomment the lines starting with #log_facility and #log_level by removing the initial # symbol. You can set log_level to LOG_INFO to log only unusual events. This is a good place to start. If LOG_INFO is not adequate to identify the problem, set log_level to LOG_DEBUG to log trace information. LOG_DEBUG will provide more information but will significantly reduce performance and generate large log files on active systems.

Step 2. Edit the file /etc/syslog.conf and add a new line at the bottom:

```
local0.debug <tab> /var/adm/syslog/local0.log
```

where **<tab>** is the Tab key on your keyboard.

Step 3. Restart the syslog daemon with the following command. (See *syslogd*(1M) for details.)

```
kill -HUP 'cat /var/run/syslog.pid'
```

Step 4. Once logging is enabled, run the HP-UX commands or applications that exhibit the problem.

Step 5. Disable logging by commenting out the log_facility and log_level lines in the startup file /etc/opt/ldapux/ldapux_client.conf. Comment them out by inserting a “#” symbol in the first column.

Step 6. Examine the log file at /var/adm/syslog/local0.log to see what actions were performed and if any are unexpected. Look for functions with “ldap_.” These are standard LDAP function calls.

TIP

Enable LDAP logging only long enough to collect the data you need because logging can significantly reduce performance and generate large log files.

You may want to move the existing log file and start with an empty file: mv /var/adm/syslog/local0.log /var/adm/syslog/local0.log.save

Enabling and Disabling PAM Logging

When something is behaving incorrectly, enabling logging is one way to examine the events that occur to determine where the problem is. Enable PAM logging on a particular client as follows. See *pam*(1), *pam.conf*(4), and *Managing Systems and Workgroups* for more information on PAM.

Step 1. Add the "debug" option to each line in /etc/pam.conf that contains libpam_ldap, for example:

```
login account sufficient /usr/lib/security/libpam_unix.1
login account required   /usr/lib/security/libpam_ldap.1 debug
su    account sufficient /usr/lib/security/libpam_unix.1
su     account required  /usr/lib/security/libpam_ldap.1 debug
...
```

Step 2. Edit the file /etc/syslog.conf and add a new line at the bottom like the following:

```
*.debug   <tab> /var/adm/syslog/debug.log
```

Step 3. Restart the syslog daemon with the following command. (See *syslogd*(1M) for details.)

```
kill -HUP 'cat /var/run/syslog.pid'
```

Step 4. Once logging is enabled, run the HP-UX commands or applications that exhibit the problem.

Step 5. Restore the file /etc/syslog.conf to its previous state; otherwise, you may unintentionally enable logging in other applications.

Step 6. Restart the syslog daemon with the following command. (See *syslogd*(1M) for details.)

```
kill -HUP 'cat /var/run/syslog.pid'
```

Step 7. Remove the "debug" options from /etc/pam.conf.

Step 8. Examine the log file at /var/adm/syslog/debug.log to see what actions were performed and if any are unexpected. Look for lines containing "PAM_LDAP."

TIP

Enable PAM logging only long enough to collect the data you need because logging can significantly reduce performance and generate large log files.

You may want to move the existing log file and start with an empty file: mv /var/adm/syslog/debug.log /var/adm/syslog/debug.log.save. Then restore the file when finished.

Netscape Directory Server Log Files

You can view log files to see if any unusual events have occurred with your directory. The Netscape Directory Server for HP-UX logs information to files under

/var/opt/Netscape/server4/slapd-<*serverID*>/logs

where slapd-<*serverID*> is the name of your directory server.

The error logs contain start-up, shut-down, and unusual events. The access logs contain all requests. See the *Netscape Directory Server Administrator's Guide* for details.

User Cannot Log on to Client System

If a user cannot log in to a client system, perform the following checks.

- Use a command like *pwget*(1) with -n, or *nsquery*(1)[1] to verify that NSS is working:

```
pwget -n username
nsquery passwd username
```

1. *nsquery*(1) is a contributed tool included with the ONC/NFS product.

If the output shows ldap is not being searched, check /etc/nsswitch.conf to make sure ldap is specified. If *username* is not found, make sure that user is in the directory and, if using a proxy user, make sure the proxy user is properly configured.

If *nsquery*(1) displays the user's information, make sure /etc/pam.conf is configured correctly for ldap. If /etc/pam.conf is configured correctly, check the directory's policy management status. It could be the directory's policy management is preventing the bind because, for example the user's password has expired or the login retry limit has been exceeded. To check this try an ldapsearch command and bind as the user, for example:

```
cd /opt/ldapux/bin
./ldapsearch -h servername -b "basdDN" uid=username (get
user's DN)
./ldapsearch -h servername -b "baseDN" -D "userDN" -w passwd \
uid=username
```

where *userDN* is the DN of the user who cannot log in and *username* is the login of the user. If you cannot bind as the user, check if any directory policies are preventing access.

See below for an example of determining the user's bind DN.

- Display the current configuration profile and check all the values to make sure they are as you expect:

  ```
  cd /opt/ldapux/config
  ./display_profile_cache
  ```

  In particular, check the values for the directory server host and port, the default search base DN, and the credential level. Also, if you have remapped any standard attributes to alternate attributes, or defined any custom search descriptors, make sure these are correct and exist in your database. If any of these are incorrect, correct them as described in "Modifying a Profile" on page 122.

- If you are using a proxy user, make sure the configuration is correct as described under "Verifying the Proxy User" on page 120.

- Make sure the client system can authenticate to the directory and find a user in the directory by searching for one of your user's information in the directory. Use the ldapsearch command and information from the current profile.

If you are using a proxy user (determined by the credentialLevel attribute in the configuration profile), try searching for one of your user's information in the directory as the proxy user with a command like the following:

```
cd /opt/ldapux/bin
./ldapsearch -h servername -b "baseDN" -D "proxyuser" -w \
passwd uid=username
```

using the name of your directory server (from display_profile_cache), search base DN (from display_profile_cache), proxy user (from ldap_proxy_config -p), proxy user password, and a user name from the directory.

For example:

```
cd /opt/ldapux/bin
./ldapsearch -h sys001.hp.com -b "ou=people, o=hp.com" \
-D "uid=proxyuser,ou=special users,o=hp.com" -w passwd \
uid=steves
```

You should get output like the following:

```
dn: uid=steves,ou=people o=hp.com
uid: steves
cn: Steve Sy
objectclass: top
objectclass: account
objectclass: posixAccount
loginshell: /bin/ksh
uidnumber: 2875
gidnumber: 191
homedirectory: /home/steves
gecos: Steve Sy, building 5, x50
```

If you don't, your proxy user may not be configured properly. Make sure you have access permissions set correctly for the proxy user. See the steps "Create a proxy user" and "Set access permissions for the proxy user" under the procedure "Configure Your Directory" on page 21 for details on configuring the proxy user.

You can also try binding to the directory as the directory administrator and reading the user's information.

If you are using anonymous access, (determined by the value of the credentialLevel attribute in the configuration profile), try searching for one of your user's information in the directory with a command like the following:

```
./ldapsearch -h servername -b "o=hp.com" uid=username
```

using the name of your directory server (from display_profile_cache), search base DN (from display_profile_cache), and a user name from the directory.

You should get output similar to the previous example. If you don't, anonymous access may not be configured properly. Make sure you have access permissions set correctly for anonymous access. See the steps "Configure anonymous access" and "Set access permissions for anonymous access" under "Configure Your Directory" on page 21 for details on configuring anonymous access.

- Enable PAM logging as described under "Enabling and Disabling PAM Logging" on page 132 then try logging in again. Check the PAM logs for any unexpected events.
- Enable LDAP-UX logging as described under "Enabling and Disabling LDAP-UX Logging" on page 131, then try logging in again. Check the log file for any unexpected events.
- If you are using Netscape Directory Server, use the Netscape Directory Console to authenticate to the directory as the directory administrator. Check the ACIs for the proxy user. Make sure the proxy user or anonymous can view the attributes listed below. If not, change the ACI to allow this. Make sure all users can read their own information. If they cannot, change the ACI to allow this.

  Make sure all users have the following attributes and can read them:

  — cn
  — loginshell
  — uid
  — uidnumber
  — gidnumber
  — memberuid
  — homedirectory
  — gecos

5 Command and Tool Reference

This chapter describes the commands and tools associated with the LDAP-UX Client Services:

- "The LDAP-UX Client Services Components" on page 138 describes many of the files that comprise this product.
- "Client Management Tools" on page 143 describes commands to manage your client systems.
- "LDAP Directory Tools" on page 154 briefly describes the tools ldapsearch, ldapmodify, ldapdelete and certutil.
- "Name Service Migration Scripts" on page 160 describes the shell and perl scripts that migrate your name service data to your LDAP directory.
- "The ldappasswd Command" on page 166 describes a command to change passwords in the directory.

The LDAP-UX Client Services Components

The LDAP-UX Client Services product, comprising the following components, can be found under /opt/ldapux and /etc/opt/ldapux, except where noted. LDAP-UX Client Services libraries are listed on table 5-2 and 5-3.

Table 5-1 LDAP-UX Client Services Components

Component	Description
/etc/opt/ldapux/ldapux_client.conf	The LDAP-UX start-up file, specifies where the directory is, where in the directory the profile data is, and logging.
/etc/pam.ldap	A sample PAM configuration file. The actual PAM configuration file is /etc/pam.conf.
/etc/nsswitch.ldap	A sample Name Service Switch configuration file. The actual NSS configuration file is /etc/nsswitch.conf.
/etc/opt/ldapux/ldapux_profile.bin	The configuration profile translated from ldapux_profile.ldif, in binary format, used by the client. See also display_profile_cache below.
/etc/opt/ldapux/ldapux_profile.ldif	The configuration profile downloaded from the LDAP directory, in LDIF format.
/opt/ldapux/config/setup	Program to configure LDAP-UX Client Services.
/opt/ldapux/config/get_profile_entry	Program to download a configuration profile from a directory.
/opt/ldapux/config/display_profile_cache	Program to display the current configuration profile.

Table 5-1 LDAP-UX Client Services Components (Continued)

Component	Description
/opt/ldapux/config/create_profile_entry	Program to create a new configuration profile.
/opt/ldapux/config/create_profile_schema /opt/ldapux/config/create_profile_cache	Programs called by the setup program.
/opt/ldapux/config/ldap_proxy_config	Program to configure and verify the proxy user.
/opt/ldapux/bin/ldapdelete /opt/ldapux/bin/ldapmodify /opt/ldapux/bin/ldapsearch /opt/ldapux/bin/ldapentry /opt/ldapux/bin/ldap_del_entry /opt/ldapux/bin/ldap_new_entry /opt/ldapux/bin/ldap_mod_entry	Tools to delete, modify, and search for entries in a directory. See “LDAP Directory Tools” on page 154 and the *Netscape Directory Server Administrator’s Guide* for details.
/opt/ldapux/bin/ldifdiff	Tool to generate LDIF change records from two input files.
/etc/opt/ldapux/ldapclientd.conf	The ldapclientd daemon configuration file.
/opt/ldapux/bin/ldapclientd	The ldapclientd daemon binary.
/opt/ldapux/bin/ldappasswd	Tool to modify user password in a directory.
/opt/ldapux/migrate	A set of scripts for migrating user, group, and other information into a directory. See “Name Service Migration Scripts” on page 160 for more information.
/opt/ldapux/share	Man pages.
/opt/ldapux/contrib/bin/perl	perl, version 5, used by migration scripts.

Table 5-1 LDAP-UX Client Services Components (Continued)

Component	Description
/opt/ldapux/ypldapd	Files for the NIS/LDAP Gateway product. See *Installing and Administering NIS/LDAP Gateway*.
/opt/ldapux/contrib/bin/beq	Search tool that bypasses the name service switch and queries the backend directly based on the specified library.
/opt/ldapux/contrib/bin/certutil	Command-line tool that creates and modifies the Netscape Communicator *cert7.db* and *key3.db* database files.

NOTE For LDAP C SDK libraries info, refer to Chapter 7, “Mozilla LDAP C SDK,” on page 175 for details.

Table 5-2 shows LDAP-UX Client Services libraries on the HP 11.0 or 11i v1 machine:

Table 5-2 LDAP-UX Client Services Libraries on the HP-UX 11.0 or 11i v1 PA machine

Files	Description
/usr/lib/libldap_send.1 (32-bit) /usr/lib/libldap_util.1 (32-bit) /usr/lib/libnss_ldap.1 (32-bit) /usr/lib/libldapci.1 (32-bit) /usr/lib/libldap.1 (32-bit) /usr/lib/security/libpam_ldap.1 (32-bit) /usr/lib/security/libpam_authz.1 (32-bit) /usr/lib/pa20_64/libldap.1 (64-bit) /usr/lib/pa20_64/libldap_send.1 (64-bit) /usr/lib/pa20_64/libnss_ldap.1 (64-bit)	LDAP -UX Client Services libraries.

Table 5-3 shows LDAP-UX Client Services libraries on 32 or 64 bit of the HP-UX 11i v2 PA machine:

Table 5-3 LDAP-UX Client Services Libraries on the HP-UX 11i v2 PA machine

Files	Description
/usr/lib/libldap_send.1 (32-bit) /usr/lib/libldap_util.1 (32-bit) /usr/lib/libnss_ldap.1 (32-bit) /usr/lib/libldapci.1 (32-bit) /usr/lib/libldap.1 (32-bit) /usr/lib/security/libpam_ldap.1(32-bit) /usr/lib/security/libpam_authz.1 (32-bit) /usr/lib/pa20_64/libldap.1 (64-bit) /usr/lib/pa20_64/libldap_send.1 (64-bit) /usr/lib/pa20_64/libnss_ldap.1 (64-bit) /usr/lib/security/pa20_64/libpam_ldap.1 (64-bit) /usr/lib/security/pa20_64/libpam_authz.1 (64-bit)	LDAP -UX Client Services libraries.

Table 5-4 shows LDAP-UX Client Services libraries on 32 or 64 bit of the HP-UX 11i v2 IA machine:

Table 5-4 LDAP-UX Client Services Libraries on the HP-UX 11i v2 IA machine

Files	Description
/usr/lib/hpux32/libldap_send.so.1 (32-bit) /usr/lib/hpux32/libldap_util.so.1 (32-bit) /usr/lib/hpux32/libnss_ldap.so.1 (32--bit) /usr/lib/hpux32/libldapci.so.1 (32-bit) /usr/lib/hpux32/libldap.so.1 (32-bit) /usr/lib/security/hpux32/libpam_ldap.so.1 (32-bit) /usr/lib/security/hpux32/libpam_authz.so.1 (32-bit) /usr/lib/hpux64/libldap.so.1 (64-bit) /usr/lib/hpux64/libldap_send.so.1 (64-bit) /usr/lib/hpux64/libnss_ldap.so.1 (64-bit) /usr/lib/security/hpux64/libpam_ldap.so.1 (64-bit) /usr/lib/security/hpux64/libpam_authz.so.1 (64-bit) /usr/lib/libldap_send.1 (32-bit) /usr/lib/libldap.1 (32-bit) /usr/lib/libnss_ldap.1 (32--bit) /usr/lib/security/libpam_ldap.1 (32-bit) /usr/lib/security/libpam_authz.1 (32-bit) /usr/lib/pa20_64/libldap_send.1 (64-bit) /usr/lib/pa20_64/libldap.1 (64-bit) /usr/lib/pa20_64/libnss_ldap.1 (64--bit) /usr/lib/security/pa20_64/libpam_ldap.1 (64-bit) /usr/lib/security/pa20_64/libpam_authz.1 (64-bit)	LDAP -UX Client Services libraries.

Client Management Tools

This section describes the following programs for managing client systems. Most of these are called by the setup program when you configure a system.

display_profile_cache	Displays the currently active profile.
create_profile_entry	Creates a new profile in the directory.
get_profile_entry	Downloads a profile from the directory to LDIF, and creates the profile cache.
ldap_proxy_config	Configures a proxy user.

The following tools are called by the setup program and are not typically used separately.

create_profile_schema	Extends the schema in the directory for profiles.
create_profile_cache	Creates a new active profile from an LDIF profile. This is also called by get_profile_entry.

The create_profile_entry Tool

This tool, found in /opt/ldapux/config, creates a new profile entry in an LDAP directory from information you provide interactively. The directory schema must have the DUAConfigProfile extensions.

Syntax

```
create_profile_entry
```

The create_profile_cache Tool

This tool, found in /opt/ldapux/config, creates a binary profile file from an LDIF profile file, thus activating the profile for the client. (You can download a profile to LDIF from the directory with get_profile_entry.) Typically you run the setup program instead of running this program directly. See also “Download the Profile Periodically” on page 74.

Syntax

create_profile_cache [-i *infile*] [-o *outfile*]

where ***infile*** is the LDIF file containing a profile, by default /etc/opt/ldapux/ldapux_profile.ldif and ***outfile*** is the name of the binary output file, by default /etc/opt/ldapux/ldapux_profile.bin. The LDIF file must contain an entry for the object class DUAConfigProfile.

Examples

The following command creates the binary profile file /etc/opt/ldapux/ldapux_profile.bin from the existing LDIF file /etc/opt/ldapux/ldapux_profile.ldif:

create_profile_cache

The following command creates the binary profile file my_profile.bin from the existing LDIF file profile1.ldif:

create_profile_cache -i profile1.ldif -o my_profile.bin

Note that you must copy the file **my_profile.bin** to **/etc/opt/ldapux/ldapux_profile.bin** to activate the profile.

The create_profile_schema Tool

This tool, found in /opt/ldapux/config, extends the schema of a Netscape Directory Server 6.x with the DUAConfigProfile object class using the information you provide interactively. Typically you run the setup program instead of running this program directly.

Syntax

create_profile_schema

The display_profile_cache Tool

This tool, found in /opt/ldapux/config, displays information from a binary profile (cache) file. By default, it displays the currently active profile in /etc/opt/ldapux/ldapux_profile.bin.

Syntax

display_profile_cache [-i *infile*] [-o *outfile*]

where ***infile*** is a binary profile file, /etc/opt/ldapux/ldapux_profile.bin by default, and ***outfile*** is the output file, stdout by default.

NOTE The binary profile contains mappings for all backend commands (even unused ones) all of which are displayed by display_profile_cache. The actual client configuration can be reviewed in the configuration profile LDIF file: `/etc/opt/ldapux/ldapux_profile.ldif`.

Examples

The following command displays the profile in the binary profile file /etc/opt/ldapux/ldapux_profile.bin to stdout:

```
display_profile_cache
```

The following command displays the profile in the binary profile file my_profile.bin and writes the output to the file profile:

```
display_profile_cache -i my_profile.bin -o profile
```

The get_profile_entry Tool

This tool, found in /opt/ldapux/config, downloads a profile from an LDAP directory into an LDIF file and calls create_profile_cache to create a binary profile file, thereby activating it on the client. This tool looks in the local client configuration file /etc/opt/ldapux/ldapux_client.conf for the profile DN.

Syntax

```
get_profile_entry -s service [-o outfile]
```

where ***service*** is the name of a supported service, typically NSS, and ***outfile*** is the name of a file to contain the LDIF output, by default /etc/opt/ldapux_profile.ldif.

Examples

The following command downloads the profile for the Name Service Switch (NSS) specified in the client configuration file /etc/opt/ldapux/ldapux_client.conf and places the LDIF in the file /etc/opt/ldapux/ldapux_profile.ldif:

get_profile_entry -s NSS

The following command downloads the profile for the Name Service Switch (NSS) specified in the client configuration file /etc/opt/ldapux/ldapux_client.conf and places the LDIF in the file profile1.ldif:

get_profile_entry -s NSS -o profile1.ldif

The ldap_proxy_config Tool

This tool, found in /opt/ldapux/config, configures a proxy user or an Admin Proxy user for the client accessing the directory. It stores the encrypted proxy user information in the file `/etc/opt/ldapux/pcred`. The encrypted Admin Proxy user information is stored in the file `/etc/opt/ldapux/acred`. If you are using only anonymous access, you do not need to use this tool. You must run this tool logged in as root.

Syntax

ldap_proxy_config [*options*]

where ***options*** can be any of the following:

-A Action applies to the Admin Proxy user. This option must be specified with other option to apply the operation for the Admin Proxy user.

-e erases the currently configured proxy user from the file `/etc/opt/ldapux/pcred`. Has no effect on the proxy user information in the directory itself.

-i uses the `-i` option to configure the proxy user interactively from stdin. Use `-A -i` options to configure an Admin Proxy user.

If you use `ldap_proxy_config -i` to configure the proxy user using the simple authentication, type the command with -i then press Return. Next type the proxy user DN then press Return. Finally type the proxy user's credential or password and press Return.

If you configure the proxy user using the SASL DIGEST-MD5 with DN authentication (i.e. use the DN to generate the DIGEST-MD5 hash), type the command with -i then press Return. Next type the proxy user DN

then press Return. Next type the proxy user's credential or password and press Return. Finally press Return.

If you configure the proxy user using the SASL DIGEST-MD5 with UID authentication (i.e. use the UID attribute to generate the DIGEST-MD5 hash), type the command with -i then press Return. Next type the proxy user DN then press Return. Next type the proxy user's credential or password and press Return. Finally type the proxy user's UID and press Return.

When you use the `ldap_proxy_config -A -i` command to configure an Admin Proxy user interactively from stdin, the configuration procedures are similar to the procedures used by the `ldap_proxy_config -i` command for a proxy user.

When configuring an Admin Proxy user, if you only enter the Admin Proxy user's DN without password, the root's password will be used instead.

-f *file*

configures the proxy user from ***file***. ***file*** must contain two lines: the first line must be the proxy user DN, and the second line must be the proxy user credential or password.

CAUTION

After using this option you should delete or protect the file as it could be a security risk.

-d *DN*

sets the proxy user distinguished name to be ***DN***. To use this option, the */etc/opt/ldapux/pcred* file must exist.

-c *passwd*

sets the proxy user credential or password to be ***passwd***. To use this option, the */etc/opt/ldapux/pcred* file must exist.

-p prints the distinguished name of the current proxy user.

-v	verifies the current proxy user and credential by connecting to the server.
-h	displays help on this command.

With no options, ldap_proxy_config configures the proxy user as specified in the file `/etc/opt/ldapux/pcred`.

For the proxy user, if you switch the authentication method between simple and DIGEST-MD5, you need to use the `ldap_proxy_config -e` command to delete `/etc/opt/ldapux/pcred`, then use the `ldap_proxy_config -i` command to reconfig the proxy user.

For the Admin Proxy user, if you switch the authentication method between simple and DIGEST-MD5, you need to use the `ldap_proxy_config -A -e` command to delete `/etc/opt/ldapux/acred`, then use the `ldap_proxy_config -A -i` to reconfig the Admin Proxy user.

Examples

The following example configures the proxy user as **uid=proxyuser1,ou=special users,o=hp.com** with the password **prox1pw** and creates or updates the file `/etc/opt/ldapux/pcred` with this information, the proxy user uses the simple authentication:

```
ldap_proxy_config -i
uid=proxyuser1,ou=special users,o=hp.com
prox1pw
```

The following example configures the proxy user as **uid=proxyusr2,ou=special users,o=hp.com** with password **prox2pw** and creates or updates the file `/etc/opt/ldapux/pcred` with this information, the proxy user uses the SASL DIGEST-MD5 authentication and uses the DN to generate the DIGEST-MD5 hash:

```
ldap_proxy_config -i
uid=proxyusr2,ou=special users,o=hp.com
prox2pw
CR>
```

The following example configures the proxy user as **uid=proxyusr3,ou=special users,o=hp.com**, UID **proxyusr3** and password **prox3pw** and creates or updates the file `/etc/opt/ldapux/pcred` with this information, the proxy user uses the SASL DIGEST-MD5 authentication and uses the UID to generate the DIGEST-MD5 hash:

```
ldap_proxy_config -i
uid=proxyusr3,ou=special users,o=hp.com
prox3pw
proxyusr3
```

The following example configures the Admin Proxy user as **uid=adminproxy,ou=special users,o=hp.com** with the password **adminproxpw** and creates or updates the file `/etc/opt/ldapux/acred` with this information, the Admin Proxy user uses the simple authentication:

```
ldap_proxy_config -A -i
uid=adminproxy,ou=special users,o=hp.com
adminproxpw
```

The following example configures the Admin Proxy user as **uid=adminproxy2,ou=special users,o=hp.com** with password **admin2pw** and creates or updates the file `/etc/opt/ldapux/acred` with this information, the Admin Proxy user uses the SASL DIGEST-MD5 authentication and uses the DN to generate the DIGEST-MD5 hash:

```
ldap_proxy_config -A -i
uid=adminproxy2,ou=special users,o=hp.com
admin2pw
CR>
```

The following example configures the Admin Proxy as **uid=adminproxy3,ou=special users,o=hp.com**, UID **adminproxy3** and password **admin3pw** and creates or updates the file `/etc/opt/ldapux/acred` with this information, the Admin Proxy user uses the SASL DIGEST-MD5 authentication and uses the UID to generate the DIGEST-MD5 hash:

```
ldap_proxy_config -A -i
uid=adminproxy3,ou=special users,o=hp.com
admin3pw
adminproxy3
```

The following example displays the current proxy user:

```
ldap_proxy_config -p
PROXY_DN: uid=proxyuser,ou=special users,o=hp.com
```

The following example checks the configured proxy user information and checks whether or not the client can bind to the directory as the proxy user:

```
ldap_proxy_config -v
File Credentials verified - valid
```

The following example configures the proxy user as `uid=proxyuser,ou=special users,o=hp.com` with the password `prox12pw` and creates or updates the file /etc/opt/ldapux/pcred with this information:

```
ldap_proxy_config -d "uid=proxyuser,ou=special users,o=hp.com" -c prox12pw
```

The following example configures the proxy user with the contents of the file `proxyfile` and creates or updates the file /etc/opt/ldapux/pcred with this information:

```
ldap_proxy_config -f proxyfile
```

The file `proxyfile` must contain two lines: the proxy user DN on the first line and password on the second line.

beq Search Tool

The new beq tool expands the search capability beyond that currently offered by nsquery, which is limited to hosts, passwd, and group. This search utility bypasses the name service switch and queries the backend directly based on the specified library. The search will include the following services: pwd, grp, shd, srv, prt, rpc, hst, net, ngp, and grm.

NOTE HP does not support the beq tool at the present time.

The syntax for this tool, along with example output, is shown below.

Syntax

```
beq -k [n|d] -s <service> (-l <library>) (-h | -H <#>) <id1> (id1> (<id2> (...))
```

where

k [n | d] Required. The search key may be either n for name string or d for digit (a numeral search).

-s <service>	Required. Indicates what backends are to be searched for information.
-l <library>	Query the backend directly. Bypass the APIs and skip the name service switch.
-h	Provides Help on this command.
-H <#>	Specifies Help level (0-5). Larger numbers provide more information. If you specify -h or -H, no other parameters are needed.

Service	Description
pwd	Password
grp	Group
shd	Shadow Password
srv	Service
prt	Protocol
rpc	RPC
hst	Host
net	Network
ngp	Netgroup
grm	Group Membership

Examples

1. An example beq command using igrp1 (group name) as the search key, grp (group) as the service, and ldap as the library is shown below:

```
./beq -k n -s grp -l /usr/lib/libnss_ldap.1 igrp1

nss_status .............. NSS_SUCCESS
pw_name..........(iuser1)
pw_passwd........(*)
pw_uid...........(101)
pw_gid...........(21)
pw_age...........()
pw_comment.......()
pw_gecos.........(gecos data in files)
```

```
pw_dir.....(/home/iuser1)
pw_shell.....(/usr/bin/sh)
pw_audid.....(0)
pw_audflg.....(0)
```

2. An example beq command using user name adm as the search key, pwd (password) as the service, and files as the library is shown below:

```
./beq -k n -s pwd -l /usr/lib/libnss_files.1 adm

nss_status ..... NSS_SUCCESS
pw_name.....(adm)
pw_passwd.....(*)
pw_uid.....(4)
pw_gid.....(4)
pw_age.....()
pw_comment.....()
pw_gecos.....()
pw_dir.....(/var/adm)
pw_shell.....(sbin/sh)
pw_audid.....(0)
pw_audflg.....(0)
```

3. An example beq command using uid number 102 as the search key, pwd (password) as the service and ldap as the library is shown below:

```
./beq -k d -s pwd -l /usr/lib/libnss_ldap.1 102

nss_status ..... NSS_SUCCESS
pw_name.....(user2)
pw_passwd.....(*)
pw_uid.....(102)
pw_gid.....(21)
pw_age.....()
pw_comment.....()
pw_gecos.....(gecos data in files)
pw_dir.....(/home/iuser2)
pw_shell.....(/usr/bin/sh)
pw_audid.....(0)
pw_audflg.....(0)
```

4. An example beq command using group name grp1 as the search key, grp (group) as the service, and ldap as the library is shown below:

```
./beq -k n -s grp -l /usr/lib/libnss_ldap.1 igrp1
```

```
nss_status .............. NSS_SUCCESS
gr_name...........(igrp1)
gr_passwd.........(*)
gr_gid............(21)
pw_age............()
gr_mem
     (iuser1)
     (iuser2)
     (iuser3)
```

5. An example beq command using a gid number as the search key, grp (group) as the service, and ldap as the library is shown below:

```
./beq -k d -s grp -l /usr/libnss_ldap.l  22
```

```
nss_status .............. NSS_SUCCESS
gr_name...........(igrp2)
gr_passwd.........(*)
gr_gid............(22)
pw_age............()
gr_mem
     (iuser1)
```

The uid2dn Tool

This tool, found in `/opt/ldapux/contrib/bin`, displays user's Distinguish Name (DN) information for a given UID.

Syntax

`uid2dn [UID]`

where ***`UID`*** is a user's UID information.

Examples

The following command displays the user's DN information for a given user's UID `john`:

`./uid2dn john`

The output shows below after you run the above command:

```
CN=john lee,CN=Users,DC=usa,DC=cup,DC=hp,DC=com
```

The get_attr_map.pl Tool

This tool, found in `/opt/ldapux/contrib/bin`, gets the attributemap information for a given name service from the profile file `/etc/opt/ldapux/ldapux_profile.ldif`.

Syntax

`get_attr_map.pl <service> <attribute>`

where ***`services`*** is the name of the supported service, ***`attribute`*** is the name of an attribute.

Examples

The following command gets the `homedirectory` attribute information for the `passwd` service:

`./get_attr_map.pl passwd homedirectory`

The following command gets the `uidnumber` attribute information for the `passwd` service:

`./get_attr_map.pl passwd uidnumber`

NOTE HP does not support the `uid2dn` and `get_attr_map` tools at the present time.

LDAP Directory Tools

This section briefly describes the ldapentry script tool, as well as the tools ldapsearch, ldapmodify, ldapdelete and certutil.

ldapsearch, ldapmodify, and ldapdelete are described in detail in the *Netscape Directory Server for HP-UX Administrator's Guide* available at http://docs.hp.com/hpux/internet.

ldapentry

ldapentry is a script tool that simplifies the task of adding, modifying and deleting entries in a Netscape directory. It supports the following name services: passwd, group, hosts, rpc, services, networks, and protocols.

ldapentry accepts run-time options either on the command line, or via environment variables, which can be defined locally, in the configuration profile or are read in from the configuration profile. The add and modify functions open an entry into an editor with a pre-defined template to aid the user in providing the necessary directory attributes. The template file is customizable and can be found in /etc/opt/ldapux/ldapentry.templates.

Configuration variables can be defined in the following locations (from most specific to most general):

1. as shell environment variables
2. in a user 'rc' configuration file (~/.ux_ldap_admin_rc)
3. in a global configuration file /etc/opt/ldapux/client_admin.conf)
4. in the configuration profile (/etc/opt/ldapux/ldapux_profile.ldif)

The order of evaluation is that any settings on more specific locations will overwrite any settings on more general locations. The following configuration variables can be defined:

LDAP_BINDDN The DN of the LDAP user allowed to add, delete, or modify the entry.

LDAP_BINDCRED The password for the above specified LDAP user. It is recommended to not store the password in any configuration file, the user will be prompted for it when running ldapentry.

LDAP_HOST Host name of LDAP directory server.

LDAP_BASEDN The DN of the search base which tells ldapentry where to start the search for the entry. In case of adding an entry, LDAP_BASEDN determines the insert base.

LDAP_SCOPE The scope of LDAP search (sub, one, base). Will default to sub if LDAP_BASEDN is defined, but LDAP_SCOPE is not. You must define LDAP_BASEDN, if you define LDAP_SCOPE.

INSERT_BASE	This DN tells ldapentry where to insert new entries. This value will default to LDAP_BASEDN or a default discovered by the configuration profile. INSERT_BASE is only used when adding entries.
EDITOR	The editor to use when an entry is added or modified.

Syntax

`ldapentry -<a|m|d> [`*`options`*`] <`*`service value`*` | `*`dn`*`>`

where

-a Adds a new entry to the directory.

-mModifies an existing entry in the directory.

-dDeletes an existing entry in the directory.

`options`

-f Delete warning override

-v Display verbose information

-b search/insert base

-s search scope

-h directory host

-p directory port

-D directory login

`service`

The name of the service that will determine the type of entry to edit. Can be either passwd, group, hosts, rpc, services, or networks.

`value`

The name of the entry recognized by the directory to be added, modified, or deleted.

`dn`

The full distinguished name of the entry to add, modify or delete.

Refer to the ldapentry(1) man page for more detailed information.

Examples

The following configuration variables are defined in the user's configuration file as ~/.ux_ldap_admin_rc:

```
LDAP_BINDDN="cn=Directory Manager"
LDAP_HOST="myhost"
```

The Command

```
ldapentry -a passwd UserA
```

will try to bind to the directory on server myhost as Directory Manager, prompt for the credentials, and retrieve the service search descriptor from the profile LDIF file based on the service name passwd. It will then open the template file with the editor defined by the environment variable EDITOR and collect the input to pass it to ldapmodify to add the new entry.

The Command

```
ldapentry -m "uid=UserA, ou=People, o=hp.com"
```

will try to bind to the directory on server myhost as Directory Manager, prompt for the credentials, and use the entered DN to retrieve the entry from the directory.

It will then populate a template with the retrieved information, and collect the changes to pass to ldapmodify for execution.

NOTE Although the ldapentry tool will allow the users to modify any information on the EDITOR window, the directory server has the final decision on accepting the modification. If the user makes an invalid LDIF syntax, violates the directory's schema or does not have the priviledge to perform the modificaiton, the ldapentry tool will report the error after the EDITOR window is closed when it tries to update the directory server with the information. The user will be given the option to re-enter the EDITOR and correct the error.

ldapsearch

You use the ldapsearch command-line utility to locate and retrieve LDAP directory entries. This utility opens a connection to the specified server using the specified distinguished name and password, and locates

entries based on the specified search filter. Search results are returned in LDIF format. For details, see the *Netscape Directory Server for 6.11 HP-UX Administrator's Guide* available at http://docs.hp.com/hpux/internet.

ldapmodify

You use the ldapmodify command-line utility to add or modify entries in an existing LDAP directory. ldapmodify opens a connection to the specified server using the distinguished name and password you supply, and adds or modifies the entries based on the LDIF update statements contained in a specified file. Because ldapmodify uses LDIF update statements, ldapmodify can do everything ldapdelete can do. For details, see the *Netscape Directory Server for HP-UX Administrator's Guide* available at http://docs.hp.com/hpux/internet.

ldapdelete

You use the ldapdelete command-line utility to delete entries from an existing LDAP directory. ldapdelete opens a connection to the specified server using the distinguished name and password you provide, and deletes the entry or entries. For details, see the *Netscape Directory Server for HP-UX Administrator's Guide* available at http://docs.hp.com/hpux/internet.

certutil

You can use the `certutil` command-line utility to create and modify the Netscape Communicator *cert7.db* and *key3.db* database files. This tool can also list, generate, modify, or delete certificates within the *cert7.db* file. You can also use this tool to create, change the password, generate new public and private key pairs, display the contents of the key database, or delete key pairs within the *key3.db* file. For detailed command options and their arguments, see *Using the Certificate Database Tool* available at *http://www.mozilla.org/projects/security/pki/nss/tools/certutil.html*.

NOTE HP does not support the `certutil` tool at the present time.

Adding One or More Users

You can add one or more users to your system as follows:

Step 1. Add the user's posixAccount entry to your LDAP directory.

You can use your directory's administration tools, the ldapadd command, or the ldapentry tool to add a new user entry to your directory. If you are adding a large number of users, you could create a passwd file with those users and use the migration tools to add them to your directory. See *Installing and Administering LDAP-UX Client Services* for information on these tools.

To add the new user with the Netscape Directory Console, select the Directory tab. Select the directory location in the left panel where your user information is. Select the Object:New:Other... menu item. Select the posixAccount object class in the dialog box and select OK. Fill in the values for the user and select OK.

Step 2. Add the user to the appropriate posixGroup entry.

You can use your directory's administration tools, or the ldapmodify program to add the user to the appropriate group in the directory. Add the user name to the memberuid attribute. See *Installing and Administering LDAP-UX Client Services* for information on these tools.

To add the new user with the Netscape Directory Console, select the Directory tab. Select the directory location in the left panel where your group information is. Double click on the group where you want to add the user, or select the group and select the Object:Open menu item. Select the memberuid attribute in the dialog box. Select the Edit:Add Value menu item. Fill in the user's uid (login) name in the new field and select the OK button.

Step 3. Use *nsquery*(1) or *pwget*(1) to verify the information was added and is accessible to the client:

```
nsquery passwd user
pwget -n user
```

Name Service Migration Scripts

This section describes the shell and perl scripts that can migrate your name service data either from source files or NIS maps to your LDAP directory. These scripts are found in /opt/ldapux/migrate. The two shell scripts `migrate_all_online.sh` and `migrate_all_nis_online.sh` migrate all your source files or NIS maps, while the perl scripts `migrate_passwd.pl`, `migrate_group.pl`, `migrate_hosts.pl`, and so forth, migrate individual maps. The shell scripts call the perl scripts.

The migration scripts require perl, version 5 or later, which is installed with the NIS/LDAP Gateway in /opt/ldapux/contrib/bin/perl.

Naming Context

The naming context specifies where in your directory your name service data will be, under the base DN. For example, if your base DN is "ou=unix,o=hp.com," the passwd map would be at "ou=People,ou=unix,o=hp.com". Table 5-5 shows the default naming context for the supported services. The default will work in most cases.

Table 5-5 Default Naming Context

Map Name	Location in the Directory Tree
passwd	ou=People
group	ou=Groups
netgroup	ou=Netgroup
hosts	ou=Devices
networks	ou=Networks
protocols	ou=Protocols
rpc	ou=Rcp
services	ou=Services

If you change the default naming context, modify the file migrate_common.ph and change it to reflect your naming context.

Migrating All Your Files

The two shell scripts `migrate_all_online.sh` and `migrate_all_nis_online.sh` migrate all your name service data either to LDIF or into your directory. The `migrate_all_online.sh` shell script gets information from the appropriate source files, such as /etc/passwd, /etc/group, /etc/hosts, and so forth. The `migrate_all_nis_online.sh` script gets information from your NIS maps using the *ypcat*(1) command. The scripts take no parameters but prompt you for needed information. They also prompt you for whether to leave the output as LDIF or to add the entries to your directory. These scripts call the perl scripts described under "Migrating Individual Files" on page 161. You will need to modify these scripts to ensure that any calls to perl scripts not listed in Table 5-6 are commented out, you need to comment out the following scripts in the file:

- `$PERL /opt/ldapux/migrate/migrate_fstab.pl`
- `$PERL /opt/ldapux/migrate/migrate_netgroup_byuser.pl`
- `$PERL /opt/ldapux/migrate/migrate_netgroup_byhost.pl`

NOTE

The scripts use ldapmodify to add entries to your directory. If you are starting with an empty directory, it may be faster for you to use `ldif2db` or `ns-slapd ldif2db` with the LDIF file. See the *Netscape Directory Server Administrator's Guide* for details on `ldif2db` and `ns-slapd`.

Migrating Individual Files

The following perl scripts migrate each of your source files in /etc to LDIF. These scripts are called by the shell scripts described under "Migrating All Your Files" on page 161. The perl scripts get their information from the input source file and output LDIF.

Environment Variables

When using the perl scripts to migrate individual files, you need to set the following environment variable:

LDAP_BASEDN The base distinguished name where you want your data.

For example, the following command sets the base DN to “o=hp.com”:

```
export LDAP_BASEDN=”o=hp.com”
```

General Syntax for Perl Migration Scripts

All the perl migration scripts use the following general syntax:

scriptname inputfile [outputfile]

where

scriptname is the name of the particular script you are using. The scripts are listed below.

inputfile is the name of the appropriate name service source file corresponding to the script you are using.

outputfile is optional and is the name of the file where the LDIF is written. stdout is the default output.

Migration Scripts

The migration scripts are described in the table below.

Table 5-6 Migration Scripts

Script Name	Description
migrate_base.pl	creates base DN information.
migrate_group.pl	migrates groups in /etc/group.
migrate_hosts.pl [a]	migrates hosts in /etc/hosts.
migrate_netgroup.pl[b]	migrates netgroups in /etc/netgroup.
migrate_passwd.pl	migrates users in /etc/passwd.
migrate_protocols.pl	migrates protocols in /etc/protocols.

Table 5-6 Migration Scripts (Continued)

Script Name	Description
migrate_rpc.pl	migrates RPCs in /etc/rpc.
migrate_services.pl[c]	migrates services in /etc/services.
migrate_common.ph	is a set of routines and configuration information all the perl scripts use.

a. systems have been configured with the same hostname, then the migration script migrate_host.pl will create multiple entries in its resulting LDIF file with the same distinguished name for the hostname for each of the IP addresses. Since distinguished names need to be unique in an LDAP directory, users need to first manually merge the IP addresses with one designated host record and delete the duplicated records in their LDIF file. A resulting merge might look as follows:

. . . .
dn: cn=machineA, ou=devices, ou=unix, o=hp.com
objectClass: top
objectClass: ipHost
objectClass: device
ipHostNumber: 15.13.130.72
ipHostNumber: 15.13.104.4
ipHostNumber: 15.13.95.92
cn: mymachine
cn: hpma01.cup.hp.com
. . . .

b. Netgroup
- The NIS optimization maps ‘byuser’ and ‘byhost’ are not utilized.
-Each triple is stored as a single string.
-Each triple must be enclosed by parentheses, e.g “(machine, user, domain)” is a valid triple while “machine, user, domain” is not.

c. When migrating services data into the LDAP directory, users should keep in mind that only multiple protocols can be associated with one service name, but *not* multiple service ports.

Examples

The following are some examples using the migration scripts.

The following command converts all name service files in /etc to LDIF:

```
$ migrate_all_online.sh
```

The following commands convert /etc/passwd into LDIF and output it to stdout:

```
$ export LDAP_BASEDN="dc=aceindustry,dc=com"
$ migrate_passwd.pl /etc/passwd

dn: uid=jbloggs,ou=People,dc=aceindustry,dc=com
uid: jbloggs
cn: Joe Bloggs
objectclass: top
objectclass: posixAccount
objectclass: account
userPassword: {crypt}daCXgaxahRNkg
loginShell: /bin/ksh
uidNumber: 20
gidNumber: 20
homeDirectory: /home/jbloggs
gecos: Joe Bloggs,42U-C3,555-1212
```

The following commands convert /etc/group into LDIF and place the result in /tmp/group.ldif:

```
$ export LDAP_BASEDN="o=hp.com"
$ migrate_group.pl /etc/group /tmp/group.ldif

dn: cn=mira.aceindustry.com,ou=Groups,o=hp.com
objectclass: posixGroup
objectclass: top
cn: mira
cn: www.hp.com
cn: mira.hp.com
userPassword: {crypt}*
gidNumber: 325
```

The following command migrates /etc/hosts:

```
migrate_hosts.pl /etc/hosts
```

The ldappasswd Command

This section describes the ldappasswd command and its parameters. The ldappasswd command, installed in /opt/ldapux/bin, is needed on clients that use an LDAP directory replica because the replica cannot be modified by the *passwd*(1) command, or any other command.

Syntax

ldappasswd [*options*]

where ***options*** can be any of the following:

-b *basedn*

specifies ***basedn*** as the base distinguished name of where to start searching.

-h *host*

specifies ***host*** as the LDAP server name or IP address.

-c generates an encrypted password on the client. Use this parameter for directories that do not automatically encrypt passwords. The default is to send the new password in plain text to the directory. Netscape Directory Server 4.x for HP-UX supports automatic encryption of passwords.

-v prints the software version and exits.

-p *port*

specifies ***port*** as the LDAP server TCP port number.

-D *binddn*

specifies ***binddn*** as the bind distinguished name.

-w *passwd*

specifies ***passwd*** as the bind password (for simple authentication).

-l login specifies ***login*** as the uid of the account to change; defaults to the current user.

Examples

The following is a command the directory administrator can use to change the password in the directory for the user **steves**:

```
ldappasswd -h sys001.hp.com -p 389 -b "ou=people,o=hp.com" \
-D "cn=directory manager" -w passwd -l steves
```

6 User Tasks

This chapter describes the following tasks your users will need to do:

To Change Passwords

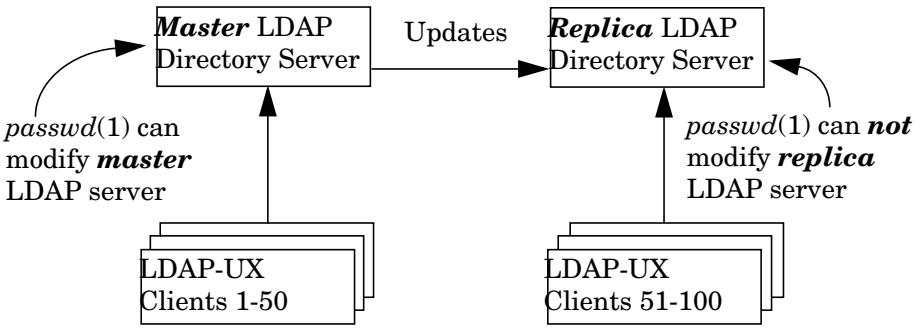
With LDAP-UX Client Services, users change their password with the *passwd*(1) command. Depending on how you have PAM configured and depending on where the user's information is, in the directory or in /etc/passwd, users may get prompted for their password twice as PAM looks in the configured locations for the user's information.

Since LDAP directory replicas may not be modifiable, the *passwd*(1) command may not work on clients configured to use a directory replica. In this case you could use the *ldappasswd*(8) command. You might wrap an ldappasswd command in a passwd wrapper, similar to the *yppasswd*(1) command. The wrapper would ask the user for the old password, call ldapsearch to find the current user's DN, then call *ldappasswd*(8) and specify the master LDAP directory server. See Figure 6-3 on page 171 for an example you can modify and use.

For example, say clients 1-50 use the master directory server on sys001 and clients 51-100 use the replica directory server on sys002. The *passwd*(1) command on clients 1-50 can modify passwords in the master

directory on sys001. However, the *passwd*(1) command on clients 51-100 will fail because the replica server on sys002 cannot be modified. See the diagram below.

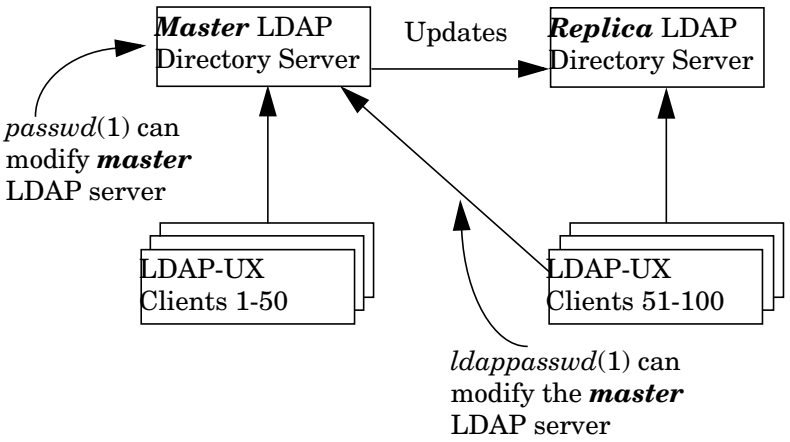
Figure 6-1 Cannot Change Passwords on Replica Servers



One way to allow clients 51-100 to change their passwords is to create a new *passwd*(1) command wrapper on these clients that calls *ldappasswd*(1), which modifies the master directory. When the replica server is updated depends on how you have configured the replication. All other LDAP requests continue to go to the replica server through

PAM and NSS. See Figure 6-2, Changing Passwords on Master Server with ldappasswd, below. See also Figure 6-3 on page 171 for a sample passwd wrapper command.

Figure 6-2 Changing Passwords on Master Server with ldappasswd



See “The ldappasswd Command” on page 166 for details of this command.

Figure 6-3 Sample passwd Command Wrapper

```
#!/usr/bin/ksh
#
# You can put a default master LDAP server host name
# here.  Otherwise the local host is the default.
#
#LDAP_MASTER="masterHostName"

if [[ "$1" != "" ]]
  then
  LDAP_MASTER="$1"
fi

if [[ "$LDAP_MASTER" = "" ]]
  then
  eval "$(sed -e "1,/Service: NSS/d" /etc/opt/ldapux/ldapux_client.conf | \
    grep "^LDAP_HOSTPORT")"
  LDAP_MASTER="$(echo $LDAP_HOSTPORT | cut -d" " -f 1)"
fi
```

```
LDAP_BASEDN="$(grep -i "^defaultsearchbase:" \
  /etc/opt/ldapux/ldapux_profile.ldif | cut -d" " -f 2-99)"

/opt/ldapux/bin/ldappasswd -b "$LDAP_BASEDN" -h $LDAP_MASTER
```

Alternatively, your users can use a simple LDAP gateway through a web browser connected to the directory to change their password. The advantage to this method is that your users can also change their other personal information as described below.

To Change Personal Information

On HP-UX, users change their personal information (sometimes called “gecos” information) such as full name, phone number, and location with the *chfn*(1) command which changes /etc/passwd. HP-UX users change their login shell with the *chsh*(1) command, which also changes /etc/passwd. See the *LDAP-UX Integration B.03.20 Release Notes* for whether or not these commands change entries in the directory with this release.

If you have Netscape Directory Server for HP-UX, you can use the Netscape Console or the ldapmodify command to change personal information. Or you can use a simple LDAP gateway through a web browser to display and change this information.

7 Mozilla LDAP C SDK

This chapter describes the Mozilla LDAP SDK for C and the SDK file components. This chapter contains the following sections:

Overview

The LDAP-UX Client Services provides the Mozilla LDAP C SDK 5.14.1 support. The LDAP C SDK is a Software Development Kit that contains a set of LDAP Application Programming Interfaces (API) to allow you to build LDAP-enabled clients. The functionality implemented in the SDK closely follows the interface outlined in RFC 2251. Using the functionality provided with the SDK, you can enable your clients to connect to LDAP v3-compliant servers and perform the LDAP functions.

The API functions provided by the Netscape LDAP C SDK allow you to perform the following major LDAP operations:

- Search for retrieving a list of entries
- Add new entries to the directory
- Update existing entries
- Delete entries
- Rename entries

NOTE

For the detailed information on how to use the LDAP API functions contained in the Mozilla SDK for C, and how to enable your client applications to connect to the LDAP servers, refer to *Mozilla LDAP C SDK Programmer's Guide* at *http://www.mozilla.org/directory/csdk-docs/*.

The Mozilla LDAP C SDK File Components

Table 7-1 shows the Mozilla LDAP C SDK 5.14.1file components on the HP-UX 32 or 64 bit PA machine:

Table 7-1 Mozilla LDAP C SDK File Components on the PA machine

Files	Description
/usr/lib/libldap.sl (32-bit) /usr/lib/pa20_64/libldap.sl (64-bit)	Main LDAP C SDK API libraries that link to the */opt/ldapux/lib* libraries.
/opt/ldapux/lib/libnspr4.sl (32-bit) /opt/ldapux/lib/libnss3.sl (32-bit) /opt/ldapux/lib/libsoftokn3.sl (32-bit) /opt/ldapux/lib/libssl3.sl (32-bit) /opt/ldapux/lib/libfreebl_hybrid_3.sl (32-bit) /opt/ldapux/lib/libfreebl_pure32_3.sl (32-bit) /opt/ldapux/lib/libplc4.sl (32-bit) /opt/ldapux/lib/pa20_64/libnspr4.sl (64-bit) /opt/ldapux/lib/pa20_64/libnss3.sl (64-bit) /opt/ldapux/lib/pa20_64/libplc4.sl (64-bit) /opt/ldapux/lib/pa20_64/libsoftokn3. sl (64-bit) /opt/ldapux/lib/pa20_64/libssl3.sl (64-bit) /opt/ldapux/lib/pa20_64/libplds4.sl (64-bit)	LDAP C SDK dependency libraries.
/usr/include/*	Include files from LDAP C SDK
/opt/ldapux/contrib/bin/certutil	Unsupported command tool that creates and modifies the certificate database files, *cert8.db* and *key3.db*.
/opt/ldapux/contrib/ldapsdk/examples	Unsupported Netscape LDAP C SDK examples.

Table 7-1 Mozilla LDAP C SDK File Components on the PA machine

Files	Description
/opt/ldapux/contrib/ldapsdk/source.tar.gz	Mozilla LDAP C SDK source (for license compliance).
/opt/ldapux/bin/ldapdelete /opt/ldapux/bin/ldapmodify /opt/ldapux/bin/ldapsearch /opt/ldapux/bin/ldapcmp /opt/ldapux/bin/ldapcompare	Tools to delete, modify, and search for entries in a directory. See the *Netscape Directory Server Administrator's Guide* for details.

Table 7-2 shows the Mozilla LDAP C SDK 5.14.1 file components on the HP-UX 32 or 64 bit IA machine:

Table 7-2 Mozilla LDAP C SDK File Components on the IA machine

Files	Description
/usr/lib/hpux32/libldap.so (32-bit) /usr/lib/hpux64/libldap.so (64-bit)	Main LDAP C SDK API libraries that link to the */opt/ldapux/lib* libraries.

Table 7-2 Mozilla LDAP C SDK File Components on the IA machine

Files	Description
/opt/ldapux/lib/hpux32/libnspr4.so (32-bit) /opt/ldapux/lib/hpux32/libnss3.so (32-bit) /opt/ldapux/lib/hpux32/libplc4.so (32-bit) /opt/ldapux/lib/hpux32/libsoftokn3.so (32-bit) /opt/ldapux/lib/hpux32/libssl3.so (32-bit) /opt/ldapux/lib/hpux32/libfreebl_pure32_3.so /opt/ldapux/lib/hpux32/libplds4.so (32-bit) /opt/ldapux/lib/hpux64/libnspr4.so (64-bit) /opt/ldapux/lib/hpux64/libnss3.so (64-bit) /opt/ldapux/lib/hpux64/libplc4.so (64-bit) /opt/ldapux/lib/hpux64/libsoftokn3.so (64-bit) /opt/ldapux/lib/hpux64/libssl3.so (64-bit) /opt/ldapux/lib/hpux64/libplds4.so (64-bit) /opt/ldapux/lib/libnspr4.sl (32-bit) /opt/ldapux/lib/libnss3.sl (32-bit) /opt/ldapux/lib/libplc4.sl (32-bit) /opt/ldapux/lib/libsoftokn3.sl (32-bit) /opt/ldapux/lib/libssl3.sl (32-bit) /opt/ldapux/lib/freebl_pure32_3.sl (32-bit) /opt/ldapux/lib/libplds4.sl(32-bit) /opt/ldapux/lib/pa20_64/libnspr4.sl (64-bit) /opt/ldapux/lib/pa20_64/libnss3.sl (64-bit) /opt/ldapux/lib/pa20_64/libplc4.sl (64-bit) /opt/ldapux/lib/pa20_64/libsoftokn3.sl (64-bit) /opt/ldapux/lib/pa20_64/libssl3.sl (64-bit) /opt/ldapux/lib/pa20_64/libplds4.sl (64-bit)	LDAP C SDK dependency libraries.
/usr/include/*	Include files from LDAP C SDK
/opt/ldapux/contrib/bin/certutil	Unsupported command tool that creates and modifies the certificate database files, *cert8.db* and *key3.db*.
/opt/ldapux/contrib/ldapsdk/examples	Unsupported Mozilla LDAP C SDK examples.

Table 7-2 Mozilla LDAP C SDK File Components on the IA machine

Files	Description
/opt/ldapux/contrib/ldapsdk/source.tar.gz	Mozilla LDAP C SDK source (for license compliance).
/opt/ldapux/bin/ldapdelete /opt/ldapux/bin/ldapmodify /opt/ldapux/bin/ldapsearch /opt/ldapux/bin/ldapcmp /opt/ldapux/bin/ldapcompare	Tools to delete, modify, and search for entries in a directory. See the *Netscape Directory Server Administrator's Guide* for details.

Table 7-3 shows header files that support the LDAP libraries existing under /usr/include, except where noted:

Table 7-3 Mozilla LDAP C SDK API Header Files

Header Files	Description
/usr/include/ldap.h	Main LDAP functions, structures and defines.
/usr/include/ldap-extension.h	Support for LDAP v3 extended operations, controls and other server specific features. This file must be included in source code that uses LDAP v3 extended operations or controls.
/usr/include/ldap_ssl.h	Support for creation of SSL connections. This file must be included in source code that requires SSL connections.
/usr/include/srchpref.h	Support for LDAP search preferences configuration files (ldapsearchprefs.conf). A common method used by applications that use the OpenLDAP API to define organizational search preferences.

Table 7-3 Mozilla LDAP C SDK API Header Files (Continued)

Header Files	Description
/usr/include/disptmpl.h	Support for LDAP display templates. Allows applications to convert LDAP entries into displayable text strings and HTML.
/usr/include/lber.h	Support for creating messages that follow the Basic Encoding Rules syntax. These APIs are used when building extended LDAP operations or controls. This file is a support file for ldap.h and does not need to included in source code.
/usr/include/ldap-standard.h	Contains basic LDAP defines. This file is a support file for ldap.h and does not need to be included in source code.
/usr/include/ldap-platform.h	Contains platform specific information for compiling on a variety of platforms. This file is a support file for ldap.h and does not need to be included in source code.
/opt/ldapux/include/ldap-to-be-deprecated.h	LDAP APIs that will not be available in the future. Do not use this header file for newly created LDAP-enabled applications.
/opt/ldapux/include/ldap-deprecated.h	LDAP APIs that have been deprecated. Do not use.

NOTE If you attempt to use the LDAP C SDK in your code , you only need to put in "`#include <ldap.h>`" in the code and compile with the `-lldap` parameter to load the LDAP C SDK library.

A Configuration Worksheet

Use this worksheet to help you configure LDAP-UX Client Services. See Chapter 2, “Installing And Configuring LDAP-UX Client Services,” on page 9 for details.

Table A-1 LDAP-UX Client Services Configuration Worksheet

LDAP-UX Client Services Configuration Worksheet	
Directory administrator DN:	
Directory server host:	
Directory server port:	
Configuration profile DN:	
Base DN of name service data:	
Credential type:	
Proxy user DN:	
Source of user, group data:	
Migration method:	

See the next page for an explanation and sample table. For installation and configuration details, see Chapter 2, “Installing And Configuring LDAP-UX Client Services,” on page 9.

Table A-2 LDAP-UX Client Services Configuration Worksheet Explanation

LDAP-UX Client Services Configuration Worksheet	
Directory administrator DN:	The distinguished name of a directory administrator allowed to modify the directory. Example: cn=directory manager
Directory server host:	The host name or IP address where your directory server is running. Example: sys001.hp.com (12.34.56.78)
Directory server port:	The TCP port number your directory server is using. Example: 389
Configuration profile DN:	The distinguished name where your configuration profile is. Example: cn=profile1, o=hp.com
Base DN of name service data:	The distinguished name where your name service data is. Example: ou=People, o=hp.com
Credential type:	The method clients use to access the directory. Can be “anonymous,” “proxy,” or “proxy anonymous.” Example: anonymous Default: anonymous
Proxy user DN:	The distinguished name of the proxy user, if needed. Example: cn=proxyuser,ou=special users, o=hp.com
Source of user, group data:	Where you get your user and group data from to migrate into the directory. Example: /etc/passwd and /etc/group on sys001

Table A-2 LDAP-UX Client Services Configuration Worksheet Explanation (Continued)

LDAP-UX Client Services Configuration Worksheet	
Migration method:	How you will migrate your user and group data into the directory, for example, using the migration scripts. Example: migrate_all_online.sh edited to remove all but migrate_passwd.pl, migrate_group.pl, and migrate_base.pl

B LDAP-UX Client Services Object Classes

This Appendix describes the object classes LDAP-UX Client Services uses for configuration profiles.

In release B.02.00, LDAP-UX Client Services used two object classes for configuration profiles:

1. posixDUAProfile
2. posixNamingProfile

With release B.03.00, the posixDUAProfile and posixNamingProfile objectlcasses have been replaced by a single STRUCTURAL objectclass DUAConfigProfile.

In addition, four new attributes are added. These changes are to reflect the definition shown in the most current IETF draft “A Configuration Schema for LDAP Based Directory User Agents” (in the document file titled, draft-joslin-config-schema-07.txt). This allows LDAP-UX to integrate with configuration profiles that are supported by other vendors.

The object class DUAConfigProfile is defined as follows:

objectclass `DUAConfigProfile`

superior `top`
requires

`cn`

allows

`authenticationMethod`,
`attributeMap`,
`bindTimeLimit`,
`credentialLevel`,
`defaultSearchBase`,
`defaultSearchScope`,
`defaultServerList`,
`followReferrals`,
objectclassMap,
`preferredServerList`,
`profileTTL`,

```
searchTimeLimit,
serviceAuthenticationMethod,
serviceCredentialLevel,
servicesearchDescriptor
```

Profile Attributes

The attributes of DUAConfigProfile is defined as follows:

`cn` is the common name of the profile entry.

`attributeMap` is a mapping from RFC 2307 attributes to alternate attributes. Use this if your entries do not conform to RFC 2307. Each entry consists of: *`Service`*:*`Attribute`*=*`Altattribute`* where *`Service`* is one of the supported services: passwd, group, shadow, pam, networks, hosts, protocols, services, rpc, or netgroup. *`Attribute`* is an attribute of the service as defined by RFC 2307. *`Altattribute`* is the attribute that should be used instead of the standard attribute.

For example, pam:userPassword=ntUserPassword maps the userPassword attribute to ntUserPassword for the pam service.
passwd:uidnumber=employeeNumber maps the uidnumber attribute to employeeNumber for the passwd service.

NOTE

The userPassword attribute is mapped to *NULL* to prevent passwords from being returned for increased security and to prevent PAM_UNIX from authenticating users in the LDAP directory. Mapping to *NULL* or any other nonexistent attribute means do not return anything.

`authenticationMethod` is how the client binds to the directory. The value can be “simple” indicating bind using a user name and password. If this attribute has no value, “simple” is the default.

`bindTimeLimit` is how long, in seconds, the client should wait to bind before aborting. 0 (zero) means no time limit. If this attribute has no value, the default is no time limit.

`credentialLevel` is the identity clients use when binding to the directory. The value must be one of the following: “proxy”, “anonymous”, or “proxy anonymous”. “proxy” means use the configured proxy user. “anonymous” means use anonymous access. “proxy anonymous” means use the configured proxy user and if that fails, bind anonymously. If this attribute has no value, “anonymous” is the default.

`defaultSearchBase` is the base DN where clients can find name service information, for example `ou=hpusers,o=hp.com`. This attribute must have a value.

`defaultServerList` is the same as preferredServerList except the order in which the specified hosts is tried can be interpreted, and defaultServerList is used only after preferredServerList. If neither defaultServerList nor preferredServerList specifies a host, the client tries the host where the profile is. See preferredServerList below.

`followReferrals` specifies whether or not referrals should be followed. If the entry is 0 (zero) or FALSE, referrals will not be followed. If the attribute has no value, any other numeric value, or TRUE referrals will be followed.

`preferredServerList` is a list of one or more host IP addresses and optional port numbers where LDAP directory servers are running. Each host is searched in the order given. If this attribute has no value, or if none of the specified servers satisfies the client’s request, the defaultServerList is used. See defaultServerList above.

For example, `15.13.128.145:250` is the host at IP address 15.13.128.145 using port number 250. When specifying multiple hosts, each host:port entry must be separated by a space.

`profileTTL` is the recommended time interval before refreshing the cached configuration profile.

`searchTimeLimit` is how long, in seconds, a client should wait for directory searches before aborting. 0 (zero) means no time limit. If this attribute has no value, the default is no time limit.

`serviceSearchDescriptor` is one to three custom search descriptors for each service. The format is *`Service`*:*`BaseDN`*?*`Scope`*?(*`Filter`*) where *`Service`* is one of the supported services passwd, group, shadow, or pam. *`BaseDN`* is the base DN at which to start searches. *`Scope`* is the search scope and can be one of the following: one, base, sub. *`Filter`* is an LDAP search filter, typically the object class. Each service can have up to three custom search descriptors.

For example, the following defines a search descriptor for the passwd service specifying a baseDN of `ou=people,ou=unix,o=hp.com`, a search scope of sub, and a search filter of the posixAccount object class.

```
passwd:ou=people,ou=unix,o=hp.com?sub?(objectclass=posixAccount)
```

C Sample /etc/pam.ldap.trusted file

This Appendix provides the sample PAM configuration file, `/etc/pam.ldap.trusted`, used as the `/etc/pam.conf` file to support the coexistence of LDAP-UX and Trusted Mode. This `/etc/pam.ldap.trusted` file must be used as the /`etc/pam.conf` file if your directory server is the Netscape Directory Server and your LDAP client is in the Trusted Mode. If your system is in a standard mode, you still need to use the `/etc/pam.ldap` file as the `/etc/pam.conf` file.

The following is a sample PAM configuration file, `/etc/pam.ldap.trusted`, used on the HP-UX 11.0 or 11i v1 system:

```
#
# PAM configuration
#
# This pam.conf file is intended as an example only.
#
#

#################################################################
# This configuration file has only been modified for default    #
# services. Other services can be added or modified as needed   #
# or desired. If a service is not listed, it will use the       #
# OTHER classification.                                         #
#                                                               #
# the format for a entry is                                     #
# <service> <module_type> <control> <module path> <options>     #
#                                                               #
# see pam.conf(4) for more details                              #
#                                                               #
# NOTE: This pam.conf file is recommended only if you convert   #
# your system to a Trusted System. If your system is in the     #
# Standard Mode, use the pam.ldap file as an example.           #
#                                                               #
#                                                               #
#################################################################

#
# Authentication management
#
login      auth sufficient   /usr/lib/security/libpam_ldap.1
login      auth required     /usr/lib/security/libpam_unix.1 try_first_pass
su         auth sufficient   /usr/lib/security/libpam_ldap.1
su         auth required     /usr/lib/security/libpam_unix.1 try_first_pass
dtlogin    auth sufficient   /usr/lib/security/libpam_ldap.1
dtlogin    auth required     /usr/lib/security/libpam_unix.1 try_first_pass
dtaction   auth sufficient   /usr/lib/security/libpam_ldap.1
dtaction   auth required     /usr/lib/security/libpam_unix.1 try_first_pass
ftp        auth sufficient   /usr/lib/security/libpam_ldap.1
ftp        auth required     /usr/lib/security/libpam_unix.1 try_first_pass
OTHER      auth sufficient   /usr/lib/security/libpam_ldap.1
OTHER      auth required     /usr/lib/security/libpam_unix.1 try_first_pass
# Account management
#
login      account sufficient  /usr/lib/security/libpam_ldap.1
login      account required    /usr/lib/security/libpam_unix.1
su         account sufficient  /usr/lib/security/libpam_ldap.1
```

```
su          account required    /usr/lib/security/libpam_unix.1
dtlogin     account sufficient  /usr/lib/security/libpam_ldap.1
dtlogin     account required    /usr/lib/security/libpam_unix.1
dtaction    account sufficient  /usr/lib/security/libpam_ldap.1
dtaction    account required    /usr/lib/security/libpam_unix.1
ftp         account sufficient  /usr/lib/security/libpam_ldap.1
ftp         account required    /usr/lib/security/libpam_unix.1
OTHER       account sufficient  /usr/lib/security/libpam_ldap.1
OTHER       account required    /usr/lib/security/libpam_unix.1
# Session management
#
login       session requried    /usr/lib/security/libpam_ldap.1
login       session required    /usr/lib/security/libpam_unix.1
dtlogin     session required    /usr/lib/security/libpam_ldap.1
dtlogin     session required    /usr/lib/security/libpam_unix.1
dtaction    session required    /usr/lib/security/libpam_ldap.1
dtaction    session required    /usr/lib/security/libpam_unix.1
OTHER       session required    /usr/lib/security/libpam_ldap.1
OTHER       session required    /usr/lib/security/libpam_unix.1
# Password management #
login       password sufficient  /usr/lib/security/libpam_ldap.1
login       password required    /usr/lib/security/libpam_unix.1 try_first_pass
passwd      password sufficient  /usr/lib/security/libpam_ldap.1
passwd      password required    /usr/lib/security/libpam_unix.1 try_first_pass
dtlogin     password sufficient  /usr/lib/security/libpam_ldap.1
dtlogin     password required    /usr/lib/security/libpam_unix.1 try_first_pass
dtaction    password sufficient  /usr/lib/security/libpam_ldap.1
dtaction    password required    /usr/lib/security/libpam_unix.1 try_first_pass
OTHER       password sufficient  /usr/lib/security/libpam_ldap.1
OTHER       password required    /usr/lib/security/libpam_unix.1 try_first_pass
```

The following is a sample PAM configuration file, `/etc/pam.ldap.trusted`, used for the HP-UX 11i v2 system:

```
#
# PAM configuration
#
# This pam.conf file is intended as an example only.
#
#

#################################################################
# This configuration file has only been modified for default    #
# services. Other services can be added or modified as needed   #
# or desired. If a service is not listed, it will use the       #
# OTHER classification.                                         #
#                                                               #
# the format for a entry is                                     #
# <service> <module_type> <control> <module path> <options>     #
#                                                               #
# see pam.conf(4) for more details                              #
#                                                               #
# NOTE: This pam.conf file is recommended only if you convert   #
# your system to a Trusted System. If your system is in the     #
# Standard Mode, use the pam.ldap file as an example.           #
#                                                               #
# NOTE: If the path to a library is not absolute, it is assumed#
# to be relative to the directory /usr/lib/security/$ISA.       #
# The "$ISA (i.e Instruction Set Architecture) token is         #
# replaced by the PAM engine (libpam) with "hpux64" for IA      #
# 64-bit modules, or with "hpux32" for IA 32-bit modules, or    #
# with "pa20_64" for PA 64-bit modules, or with NULL for PA     #
# 32-bit modules.                                               #
```

```
# For PA applications, library name ending with "so.1" is a    #
# symbolic link that points to the corresponding PA (32 or 64  #
# bit) backend library.                                        #
################################################################

#
# Authentication management
#
login      auth required       libpam_hpsec.so.1
login      auth sufficient     libpam_ldap.so.1
login      auth required       libpam_unix.so.1 try_first_pass
su         auth required       libpam_hpsec.so.1
su         auth sufficient     libpam_ldap.so.1
su         auth required       libpam_unix.so.1 try_first_pass
dtlogin    auth required       libpam_hpsec.so.1
dtlogin    auth sufficient     libpam_ldap.so.1
dtlogin    auth required       libpam_unix.so.1 try_first_pass
dtaction   auth required       libpam_hpsec.so.1
dtaction   auth sufficient     libpam_ldap.so.1
dtaction   auth required       libpam_unix.so.1 try_first_pass
ftp        auth required       libpam_hpsec.so.1
ftp        auth sufficient     libpam_ldap.so.1
ftp        auth required       libpam_unix.so.1 try_first_pass
rcomds     auth required       libpam_hpsec.so.1
rcomds     auth sufficient     libpam_ldap.so.1
rcomds     auth required       libpam_unix.so.1 try_first_pass
sshd       auth required       libpam_hpsec.so.1
sshd       auth sufficient     libpam_ldap.so.1
sshd       auth required       libpam_unix.so.1 try_first_pass
OTHER      auth sufficient     libpam_ldap.so.1
OTHER      auth required       libpam_unix.so.1 try_first_pass
# Account management
#
login      account required    libpam_hpsec.so.1
login      account sufficient  libpam_ldap.so.1
login      account required    libpam_unix.so.1
su         account required    libpam_hpsec.so.1
su         account sufficient  libpam_ldap.so.1
su         account required    libpam_unix.so.1
dtlogin    account required    libpam_hpsec.so.1
dtlogin    account sufficient  libpam_ldap.so.1
dtlogin    account required    libpam_unix.so.1
dtaction   account required    libpam_hpsec.so.1
dtaction   account sufficient  libpam_ldap.so.1
dtaction   account required    libpam_unix.so.1
ftp        account required    libpam_hpsec.so.1
ftp        account sufficient  libpam_ldap.so.1
ftp        account required    libpam_unix.so.1
rcomds     account required    libpam_hpsec.so.1
rcomds     account sufficient  libpam_ldap.so.1
rcomds     account required    libpam_unix.so.1
sshd       account required    libpam_hpsec.so.1
sshd       account sufficient  libpam_ldap.so.1
sshd       account required    libpam_unix.so.1
ftp        account required    libpam_unix.so.1
OTHER      account sufficient  libpam_ldap.so.1
OTHER      account required    libpam_unix.so.1
# Session management
#
login      session required    libpam_hpsec.so.1
login      session requried    libpam_ldap.so.1
login      session required    libpam_unix.so.1
dtlogin    session required    libpam_hpsec.so.1
```

```
dtlogin    session required    libpam_ldap.so.1
dtlogin    session required    libpam_unix.so.1
dtaction   session required    libpam_hpsec.so.1
dtaction   session required    libpam_ldap.so.1
dtaction   session required    libpam_unix.so.1
ftp        session  required    libpam_hpsec.so.1 bypass_limit_login
bypass_umask bypass_nologin
ftp        session requried    libpam_ldap.so.1
ftp        session required    libpam_unix.so.1
rcomds     session required    libpam_hpsec.so.1 bypass_limit_login
rcomds     session required    libpam_ldap.so.1
rcomds     session required    libpam_unix.so.1
sshd       session required    libpam_hpsec.so.1
sshd       session required    libpam_ldap.so.1
sshd       session required    libpam_unix.so.1
OTHER      session required    libpam_ldap.so.1
OTHER      session required    libpam_unix.so.1
# Password management
#
login      password required    libpam_hpsec.so.1
login      password sufficient  libpam_ldap.so.1
login      password required    libpam_unix.so.1 try_first_pass
passwd     password required    libpam_hpsec.so.1
passwd     password sufficient  libpam_ldap.1
passwd     password required    libpam_unix.so.1 try_first_pass
dtlogin    password required    libpam_hpsec.so.1
dtlogin    password sufficient  libpam_ldap.so.1
dtlogin    password required    libpam_unix.so.1 try_first_pass
sshd       password required    libpam_hpsec.so.1
sshd       password sufficient  libpam_ldap.so.1
sshd       password required    libpam_unix.so.1 try_first_pass
OTHER      password sufficient  libpam_ldap.so.1
OTHER      password required    libpam_unix.so.1 try_first_pass
```

Glossary

See also the Glossary in the *Netscape Directory Server for HP-UX Administrator's Guide* available at http://docs.hp.com/hpux/internet.

Access Control Instruction A specification controlling access to entries in a directory.

Access Control List One or more ACIs.

ACI *See See Access Control Instruction*

IETF Internet Engineering Task Force; the organization that defines the LDAP specification. See http://www.ietf.org.

Configuration profile An entry in an LDAP directory containing information common to many clients, that allows clients to access user, group and other information in the directory. Clients download the profile from the directory.*See also See also Client Configuration File.*

DIGEST-MD5 Message Digest version 5. It is a one-way hash function and always generates 20 bytes of output from text data.

LDAP *See See Lightweight Directory Access Protocol*

LDIF *See See LDAP Data Interchange Format*

LDAP Data Interchange Format (LDIF)

The format used to represent directory server entries in text form.

Lightweight Directory Access Protocol (LDAP) A standard, extensible set of conventions specifying communication between clients and servers across TCP/IP network connections.*See also See also SLAPD.*

Name Service Switch (NSS) A framework that allows a host to get name information from various sources such as local files in /etc, NIS, NIS+, or an LDAP directory without modifying applications. See *switch*(4) for more information.

Network Information Service (NIS) A distributed database system providing centralized management of common configuration files, such as /etc/passwd and /etc/hosts.

NIS *See See Network Information Service*

NSS *See See Name Service Switch*

PAM *See See Pluggable Authentication Mechanism*

PAM Authorization Service Module

See The PAM Authorization Service Module allows the administrator to control which user subgroups of a large repository can login to the system `pam_authz(5)`.

Pluggable Authentication Module (PAM) A framework that allows different authentication service modules to be made available without modifying applications. See *pam_ldap*(5), *pam*(3), and *pam.conf*(4) for more information.

Profile *See See Configuration profile*

RFC Request for Comments; a document and process of standardization from the IETF.

RFC 2307 The IETF specification for using LDAP as a Network Information Service. See http://www.ietf.org/rfc/rfc2307.txt.

SLAPD The University of Michigan's stand-alone implementation of LDAP, without the need for an X.500 directory.

Start-up file A text file containing information the client needs to access an LDAP directory and download a configuration profile. *See also See also Configuration profile.*

ypldapd The NIS/LDAP Gateway daemon, part of the NIS/LDAP Gateway subproduct. ypldapd replaces the NIS ypserv daemon by accepting NIS client requests and getting the requested information from an LDAP directory rather than from NIS maps.

See *Installing and Administering NIS/LDAP Gateway* at http://docs.hp.com/hpux/internet

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