



Getting My LDAP Server Up and Running

IBM @server iSeries

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Agenda

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- Basic concepts
- Configuring the server
- Managing the server
- Configuring publishing
- Tools for accessing the directory
- References

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Basic Concepts

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■ Concept Review:

- ▶ Directory Information Tree - directory entries are organized in a hierarchical structure
 - entries have a distinguished name (DN) made up of the entry's name (RDN) in combination with its ancestor entries -- "cn=John McMeeking, cn=users, o=acme, c=us"
- ▶ Data Model - object consists of a set of attribute values
 - objectclass - defines the set of required and allowed attributes for an entry
 - attribute - has a defined syntax (directory string, boolean, etc.) and matching behavior
- ▶ Directory accessed via a standard protocol (LDAP -- Lightweight Directory Access Protocol) defined by various Internet RFCs
 - protocol defines operations for searching the directory, as well as adding, modifying, deleting and moving entries
- ▶ Widely available client APIs: C API defined by draft RFC, the Java Naming and Directory Interface (JNDI) LDAP service provider, others

- What is a suffix (aka naming context)?
 - ▶ Used by many server implementations to define the "namespace" that the server recognizes
 - ▶ "o=ibm,c=us", "dc=ibm,dc=com", "o=acme,c=au", "cn=John Smith,cn=users,o=ibm,c=us" are all valid DNs.
 - ▶ The suffix "o=ibm,c=us" tells the server that DNs that end in "o=ibm,c=us" are in this server's namespace -- a given DN in this namespace might not refer to an existing entry, but... DNs that do not fall within the defined suffixes are not handled by the server. The server will return "no such object" or a redirect the client to another server that might handle that namespace (a "referral").

LDAP Concepts - Authentication

- Each client has an authenticated identity established through a "bind" operation. If no bind is performed, the client is treated as "anonymous".

- "Simple" bind

- ▶ Anonymous - no authentication done or provided a null/empty DN at bind time
- ▶ DN and password - client's identity is the DN provided at bind time. Server verifies the password. This is also called a "simple bind".
- ▶ Administrator - has access to all objects and attributes. The DN (cn=admin) is the default on iSeries) and password are part of the server configuration

- ▶ DN can be the name of an object with a userPassword attribute

```
dn: cn=John Smith,cn=users,o=acme,c=us
objectclass: inetorgperson
userpassword: secret
```

- ▶ DN can also be an entry with a UID attribute the same as an OS/400 user profile and no userPassword. Server calls OS/400 to see if password is valid for that user profile.

```
dn: cn=John Smith,cn=users,o=acme,c=us
objectclass: inetorgperson
uid: JSMITH <== JSMITH must be a user profile on the same system
```

LDAP Concepts - Authentication

- SASL (Simple Security and Authentication Layer) binds:
 - ▶ Kerberos (GSSAPI) - authentication via a Kerberos ticket. This is used in Windows 2000 and other environments.
 - LDAP server can be configured to generate a DN based on the Kerberos principal name: `ibm-kn=jsmith@acme.com`
 - Or server can be configured to search for an object that has an `altSecurityIdentities` attribute matching the Kerberos principal:

```
dn: cn=John Smith,cn=users,o=acme,c=us
objectclass: inetorgperson
objectclass: ibm-securityIdentities
altsecurityidentities: kerberos:jsmith@acme.com
...
```
 - The above would result in a client with the identity `cn=John Smith,cn=users,o=acme,c=us`
 - ▶ EXTERNAL using SSL/TLS - identity is the subject DN from the certificate used to establish the connection.
 - This can (but need not) be the DN of an object in the directory.

Configuring the LDAP Server

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Configuring the LDAP server

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The screenshot displays the AS/400 Operations Navigator interface. The left pane shows a tree view of the system configuration, with 'TCP/IP' selected under the 'Servers' category. The right pane shows a table of server configurations for 'Rchas510: TCP/IP'. The table lists various services and their status. At the bottom, there is a section for 'Server Configuration tasks' with several options available.

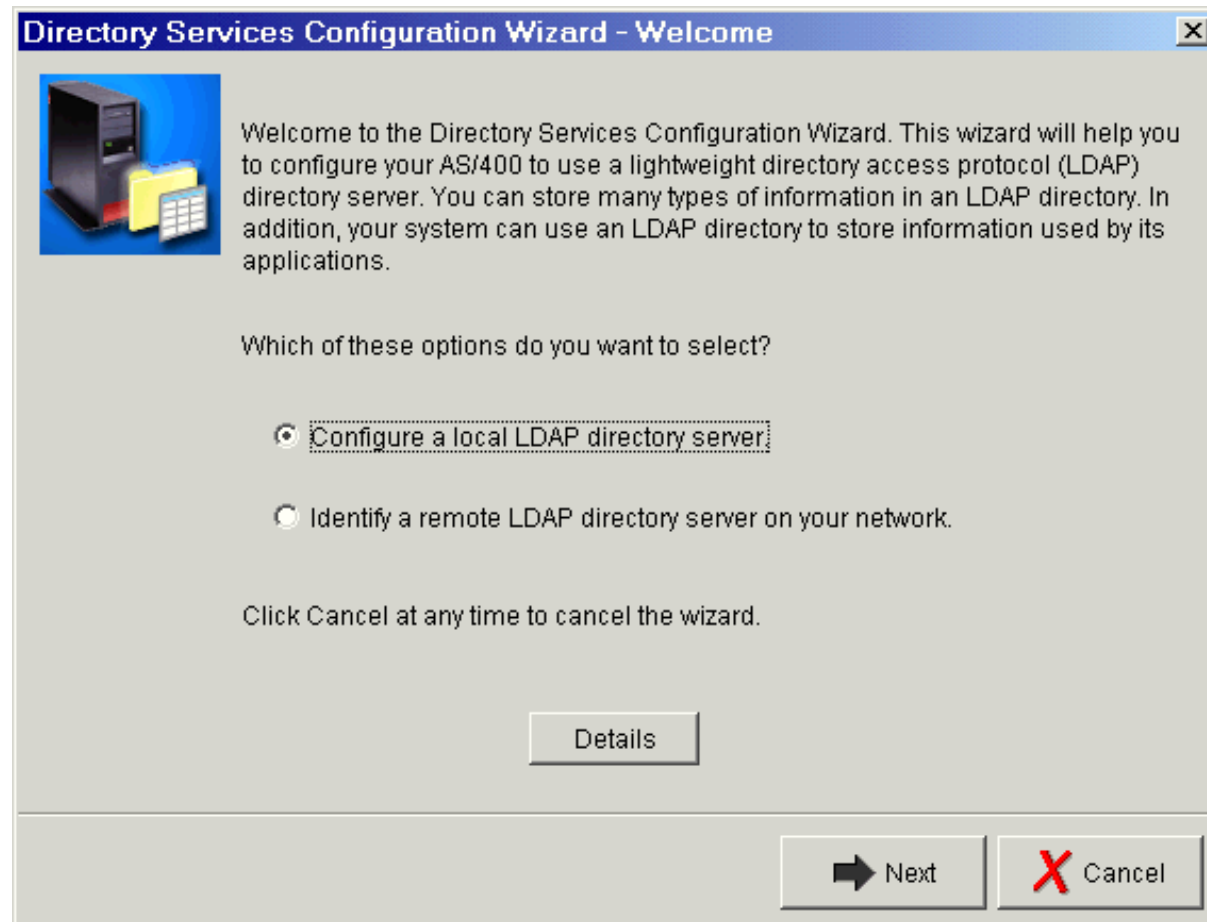
Server Name	Status	Description
DLFM	Stopped	Datalinks File Server
Virtual Private Networking	Stopped	Virtual private networ
Triggered Cache Mana...	Stopped	Triggered cache ma
OnDemand	Stopped	OnDemand
FTP	Started	FTP
LPD	Started	LPD
POP	Started	POP
Remote Execution	Stopped	Remote execution
SMTP	Started	SMTP
TELNET	Started	TELNET
Workstation Gateway	Stopped	Workstation gateway
HTTP Administration	Started	HTTP administration
Directory	Not configured	Directory
DCE	Stopped	DCE

Server Configuration tasks:

- Create a new DNS Name Server
- Configure subsystems for server jobs
- Configure system as DHCP server
- Configure system as Directory server
- Monitor servers
- Help for related tasks

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Configuration Wizard Welcome Panel



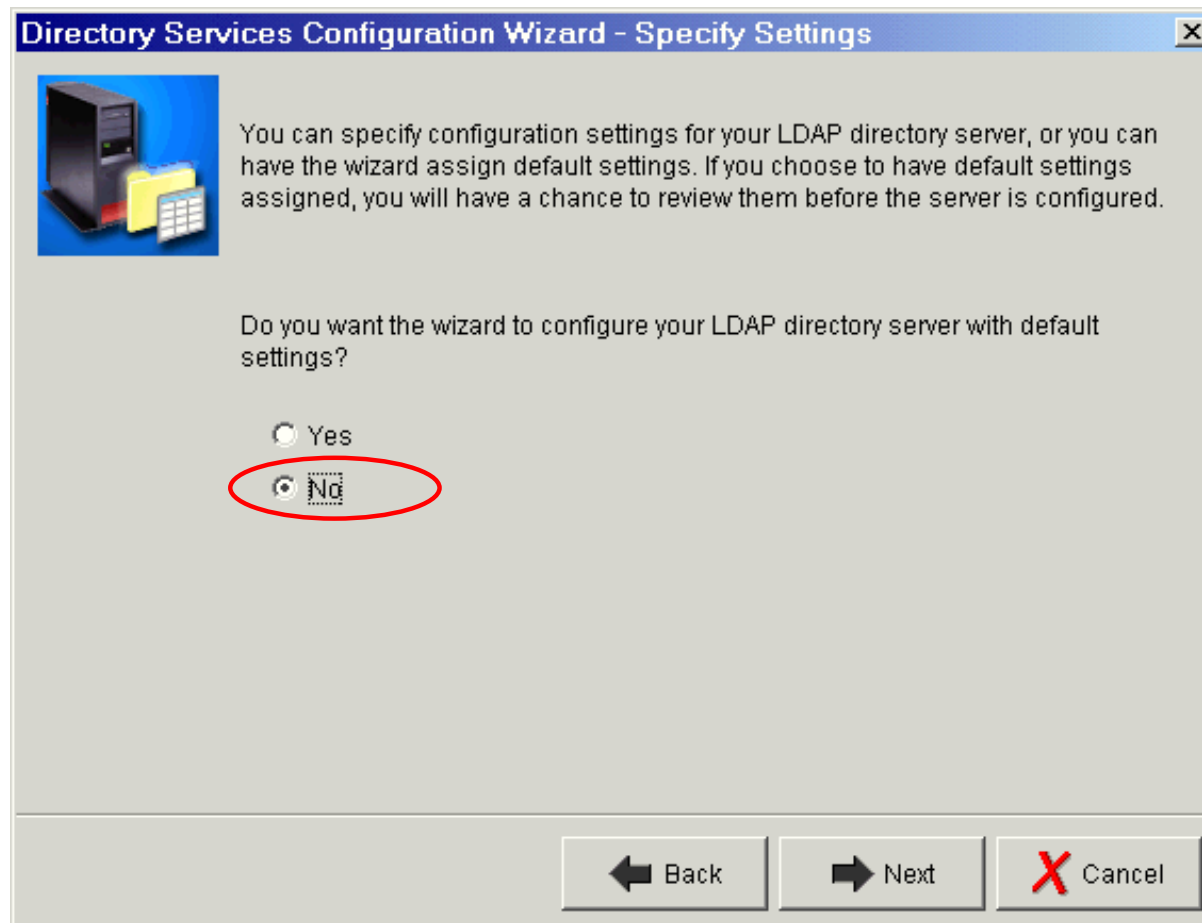
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Before you start - new server

- Do you want to configure a local server (this machine)? You'll need:
 - ▶ administrator dn and password
 - ▶ suffix to add to the server (you can change this later). There are two common naming conventions:
 - organization name (o=acme, c=us) from X.500 standards
 - domain naming (rchas510.acme.com becomes dc=rchas510,dc=acme,dc=com)
- Underlying database will be in library QURDIRDB
- Server will use default port (389), and will use SSL if a certificate has been assigned to the QIBM_GLD_DIRSRV_SERVER server application

Configuration Wizard - Use defaults?

Don't take default configuration. You'll want to know the password.

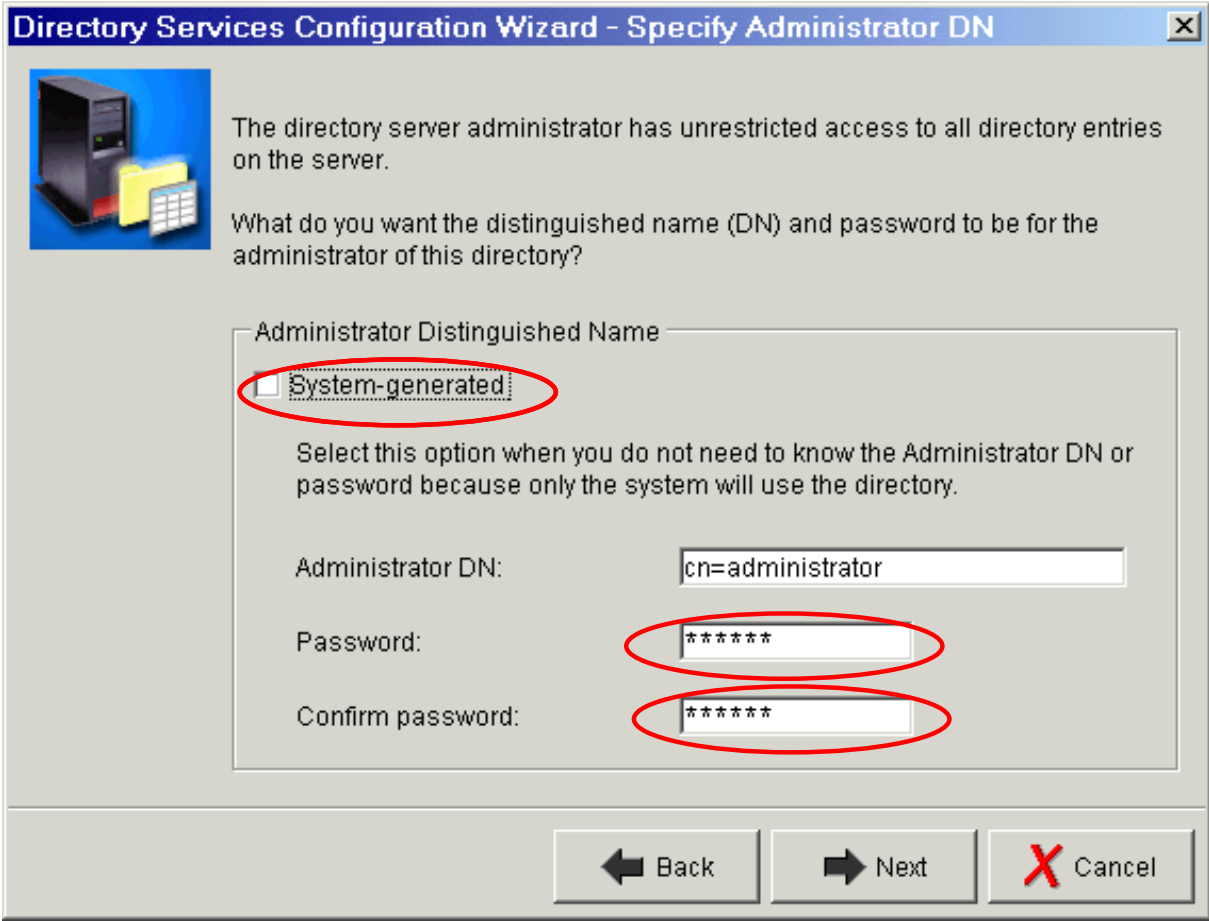


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Configuration Wizard - Administrator

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Uncheck 'System-generated' so you can enter a password - unless you want a random password known only to the server.



Directory Services Configuration Wizard - Specify Administrator DN

The directory server administrator has unrestricted access to all directory entries on the server.

What do you want the distinguished name (DN) and password to be for the administrator of this directory?

Administrator Distinguished Name

System-generated

Select this option when you do not need to know the Administrator DN or password because only the system will use the directory.

Administrator DN:

Password:

Confirm password:

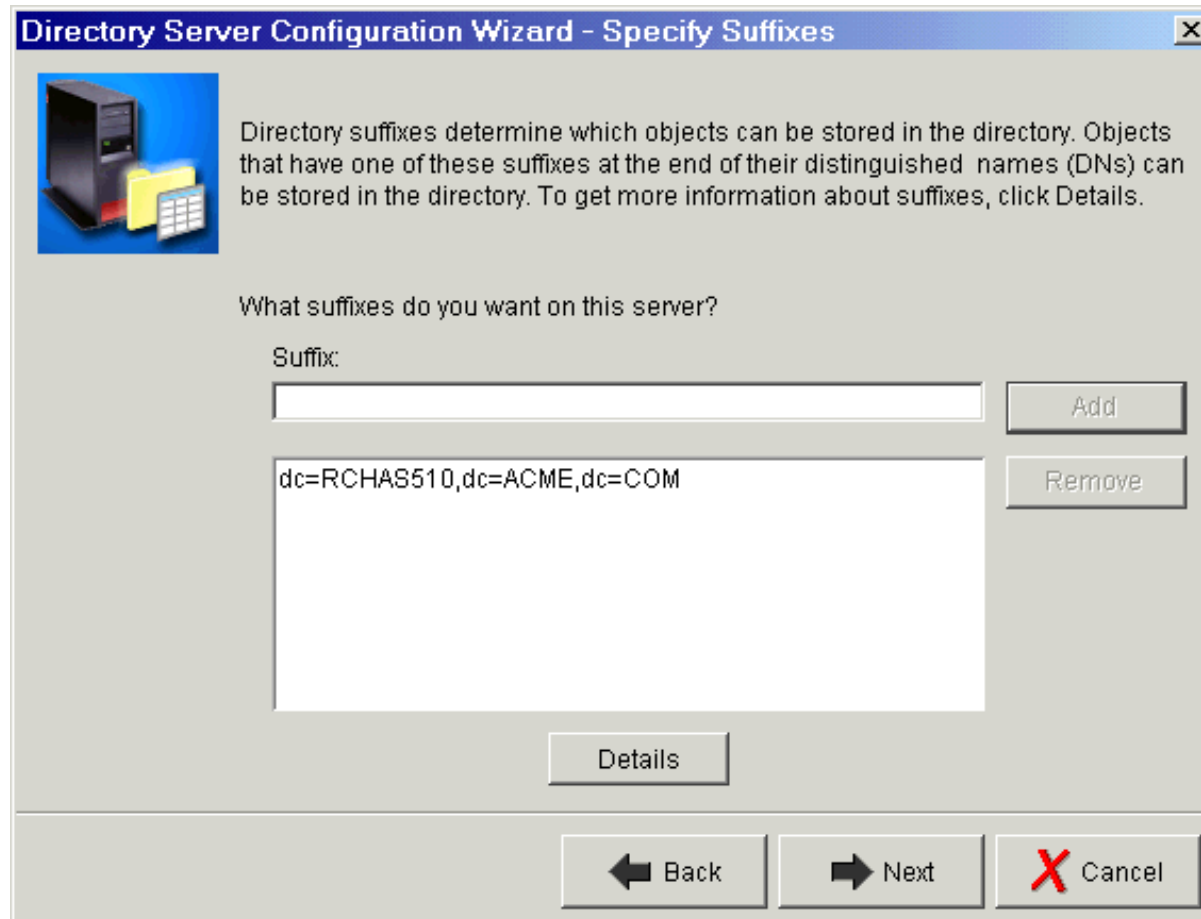
Back Next Cancel

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Configuration Wizard - Suffixes

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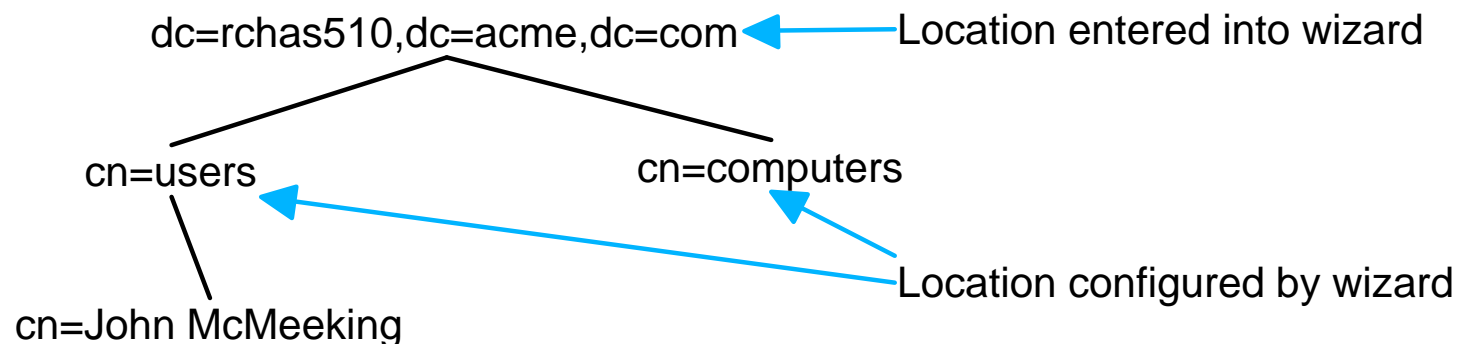
Use the generated suffix or create your own.



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Before you start - Publishing

- Publishing to a local or remote (elsewhere in your network) server
 - ▶ May want to publish users from SDD or publish basic system info
 - ▶ Server name, port, etc.
 - ▶ Location in the directory to publish information




- ▶ Credentials for someone authorized to create/delete/change entries in selected location
 - Could be administrator (`cn=admin`), but you might want to create other identities and give them authority

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Configuration Wizard - Publishing

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Directory Services Configuration Wizard - Specify Directory Server



What are the TCP/IP host name and port number of the LDAP directory server that you want the system to use?

TCP/IP host name: Browse...


Port:

← Back Next → X Cancel

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Configuration Wizard - Publishing

Directory Services Configuration Wizard - Specify DN



When the system performs a search, add, or other LDAP operation, it must connect to the remote LDAP directory server with an authorized distinguished name (DN) and password.

What DN and password do you want the system to use to connect to the remote LDAP directory server?

Note: Use a distinguished name that has authority to write to the LDAP directory server.

Distinguished name (DN):

Password:

Verify

← Back Next → X Cancel

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Configuration Wizard - Publishing

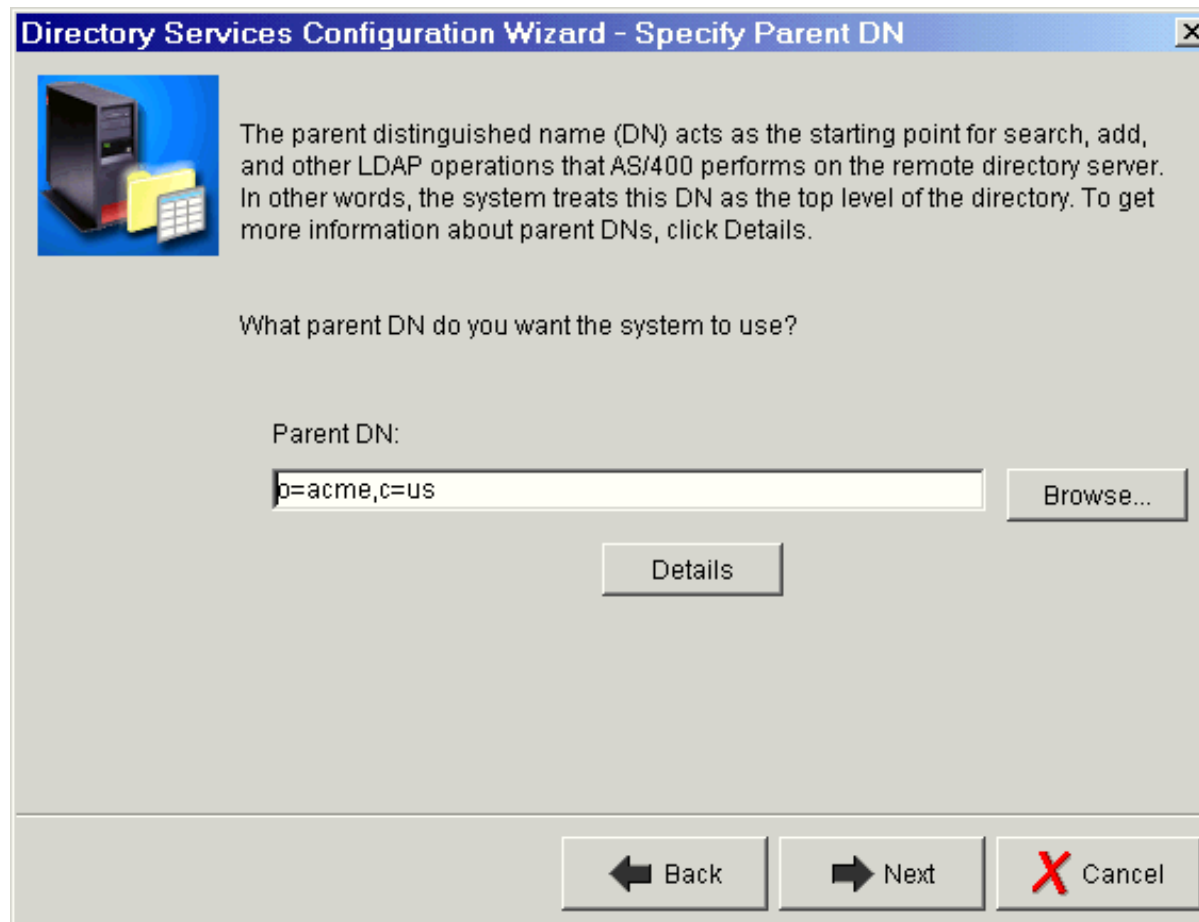
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Wizard will configure agents to use parent DN's beneath this suffix:

"cn=users," + configured parent DN

"cn=computers," + configured parent DN

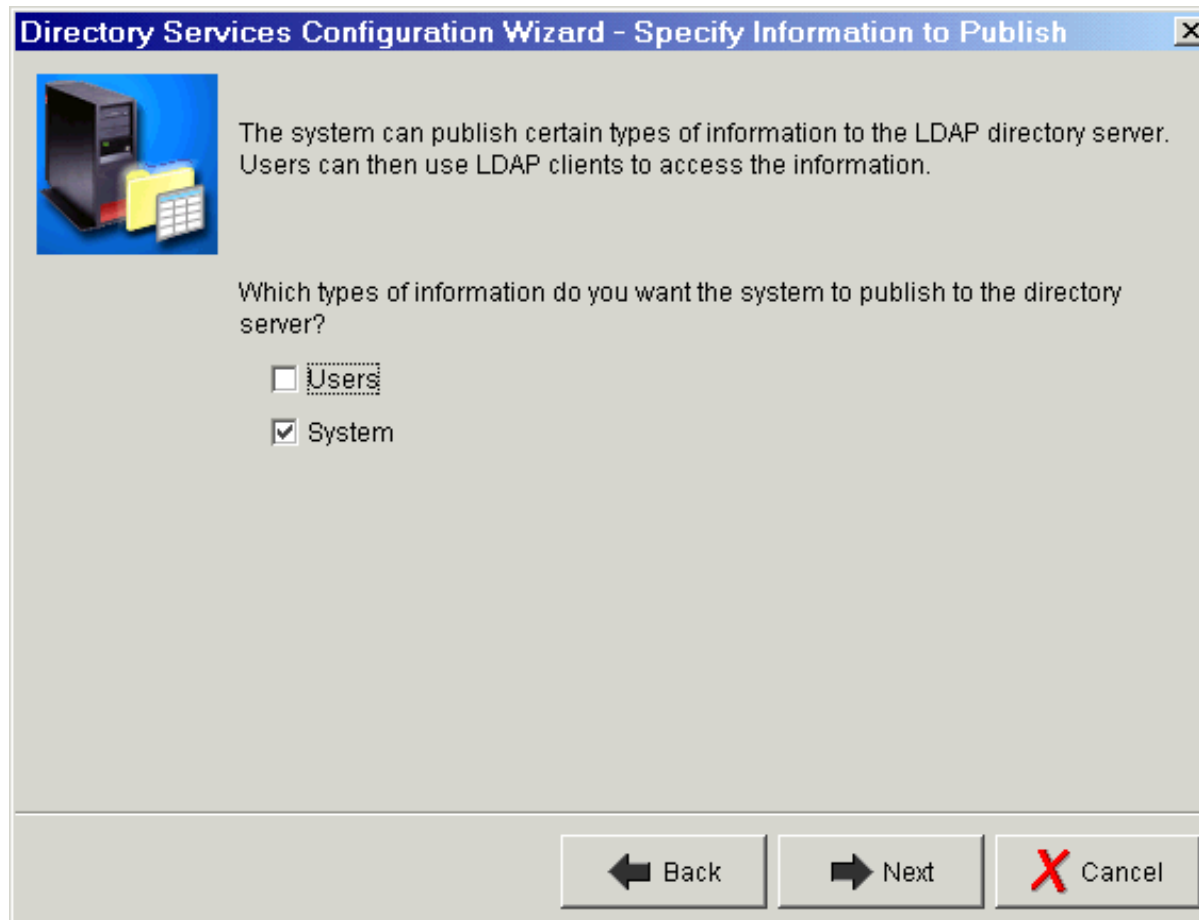
These entries will be created by the publishing engine if they do not exist.



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Configuration Wizard - Publishing

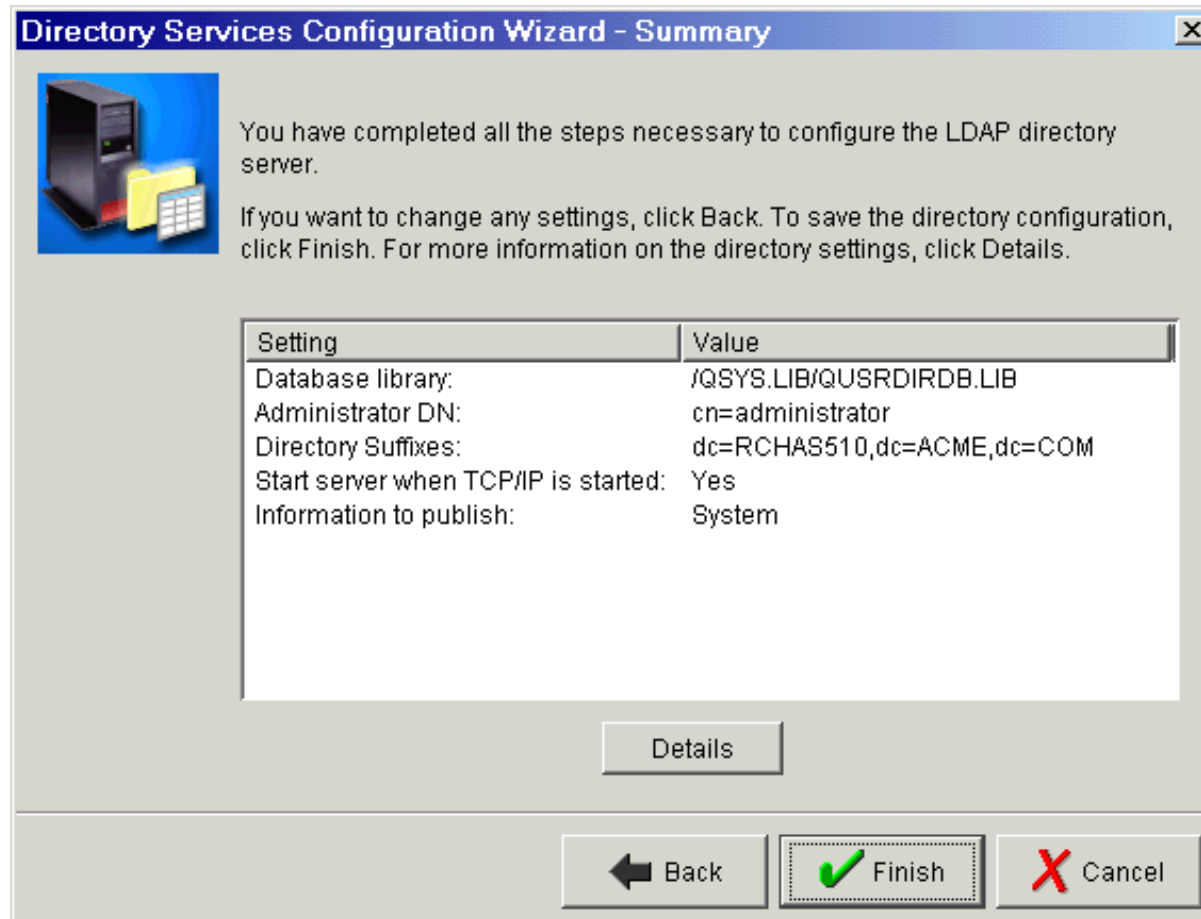
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Configuration Wizard - Summary

Wizard will create server and/or publishing configuration and start the server



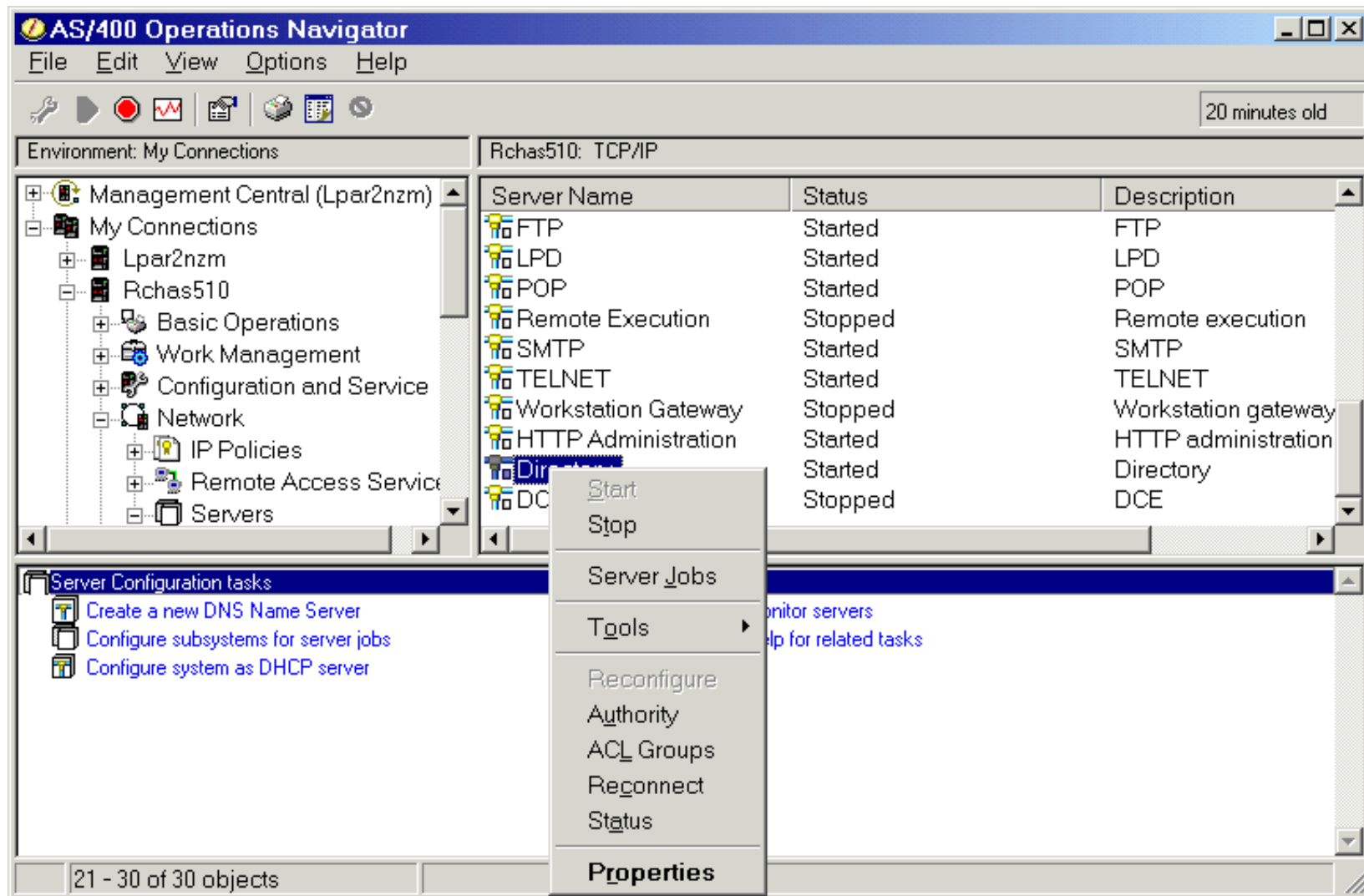
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Managing the Directory Server

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Managing the server with Operations Navigator

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Managing the server with Operations Navigator

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- Start and stop server, monitor status
- Import/export data to/from directory
- Manage access to directory data, including group management
- Server configuration, including:
 - ▶ Database and suffixes
 - ▶ Network (SSL, ports)
 - ▶ Kerberos
 - ▶ Administrative limits associated with various features:
 - Searches, transactions, event notification

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Managing access to the directory

- You can manage access to directory data from Operations Navigator - or any LDAP application by modifying the proper attributes
- IBM specific - currently no standards define a LDAP access control model, but most vendors provide something
- Access defined in terms of:
 - ▶ subject: the authenticated identity of the client, determined at bind time
 - ▶ rights: the permissions granted to a subject or group
 - ▶ object: the entry being accessed
- IBM access control model defines owners and an access control list
 - ▶ Both can apply to a set of objects (a subtree) or a single entry

Managing access to the directory

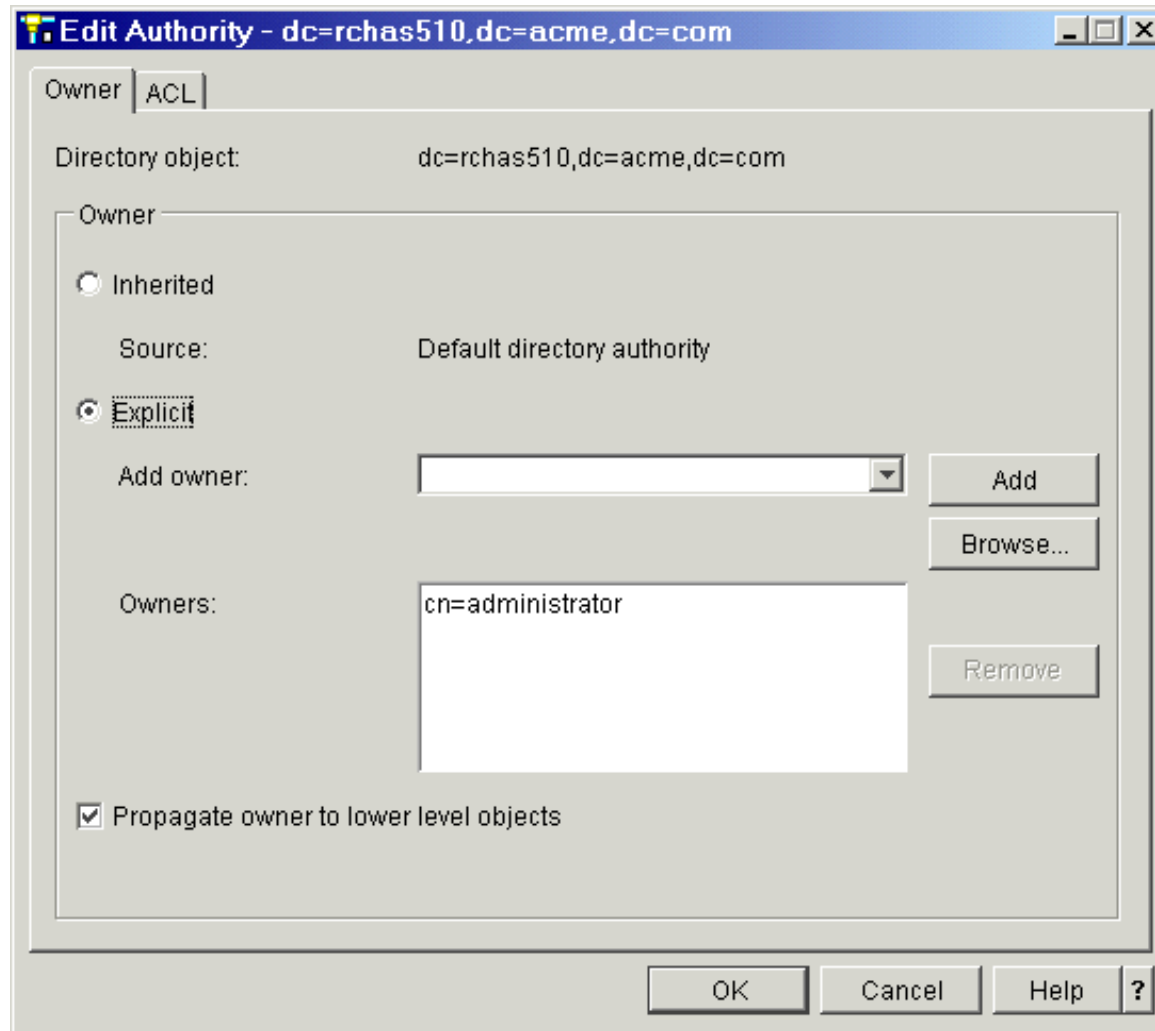
- Special DNs that can be used
 - ▶ cn=anybody - all clients, including anonymous
 - ▶ cn=authenticated - everybody but anonymous
 - ▶ cn=this - client must be authenticated as the entry to which this applies

- Owner has complete access to the entry
 - ▶ Owner can be a group
 - ▶ Entries can inherit ownership

Managing access to the directory

Entry Owner

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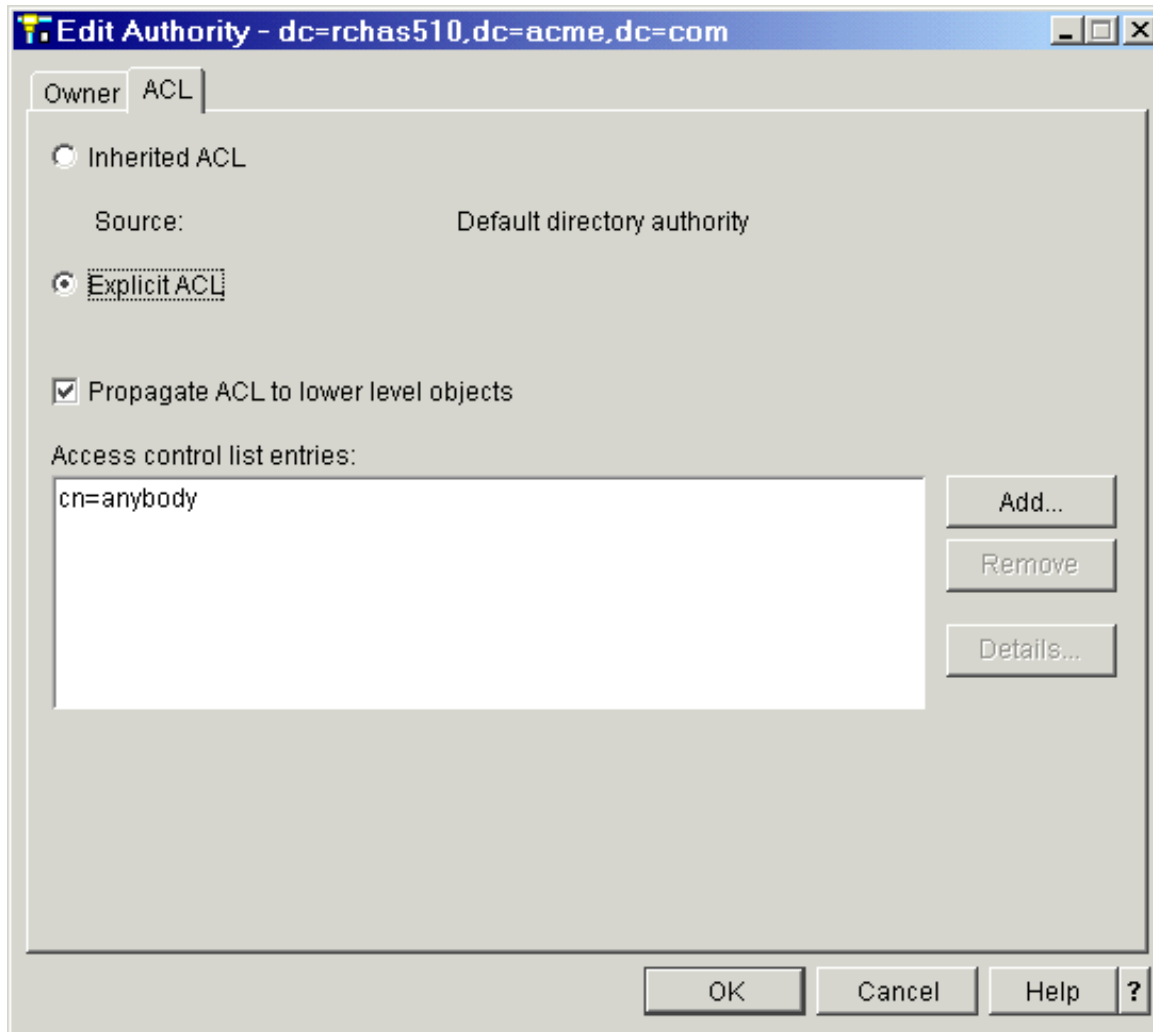
Managing access to the directory

- Access Control List grants permissions to others
 - ▶ attributes assigned to an "access-class"
 - NORMAL (cn, sn, telephoneNumber, ...)
 - SENSITIVE (homePhone, homeFax, ...)
 - CRITICAL (userPassword, userCertificate, ...)
 - ▶ grant write, read, search, compare permissions to attributes
 - ▶ grant add and delete permissions to objects that the ACL applies to

- V5R1 adds attribute level access control
 - ▶ grant or deny access to specific attributes

Managing access to the directory

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Managing access to the directory

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Add ACL Entry

Object | Attributes

Directory object: dc=rchas510,dc=acme,dc=com

User: cn=John McMeeking,cn=users,dc=ac Browse...

Object permissions:

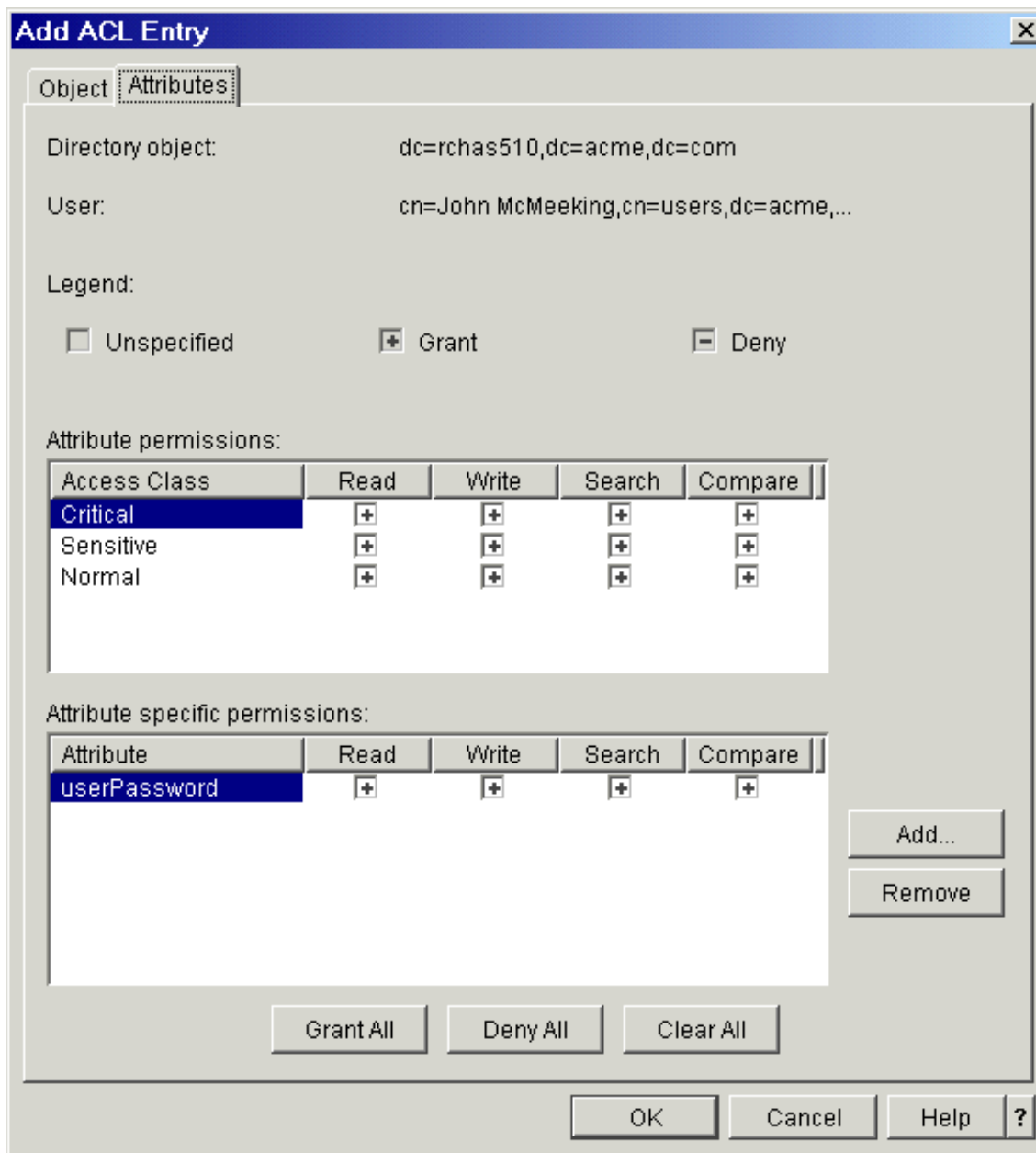
Add: Unspecified

Delete: Unspecified

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Managing access to the directory

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Object **Attributes**

Directory object: dc=rchas510,dc=acme,dc=com

User: cn=John McMeeking,cn=users,dc=acme,...

Legend:

Unspecified Grant Deny

Attribute permissions:

Access Class	Read	Write	Search	Compare
Critical	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sensitive	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Normal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Attribute specific permissions:

Attribute	Read	Write	Search	Compare
userPassword	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Add...
Remove

Grant All Deny All Clear All

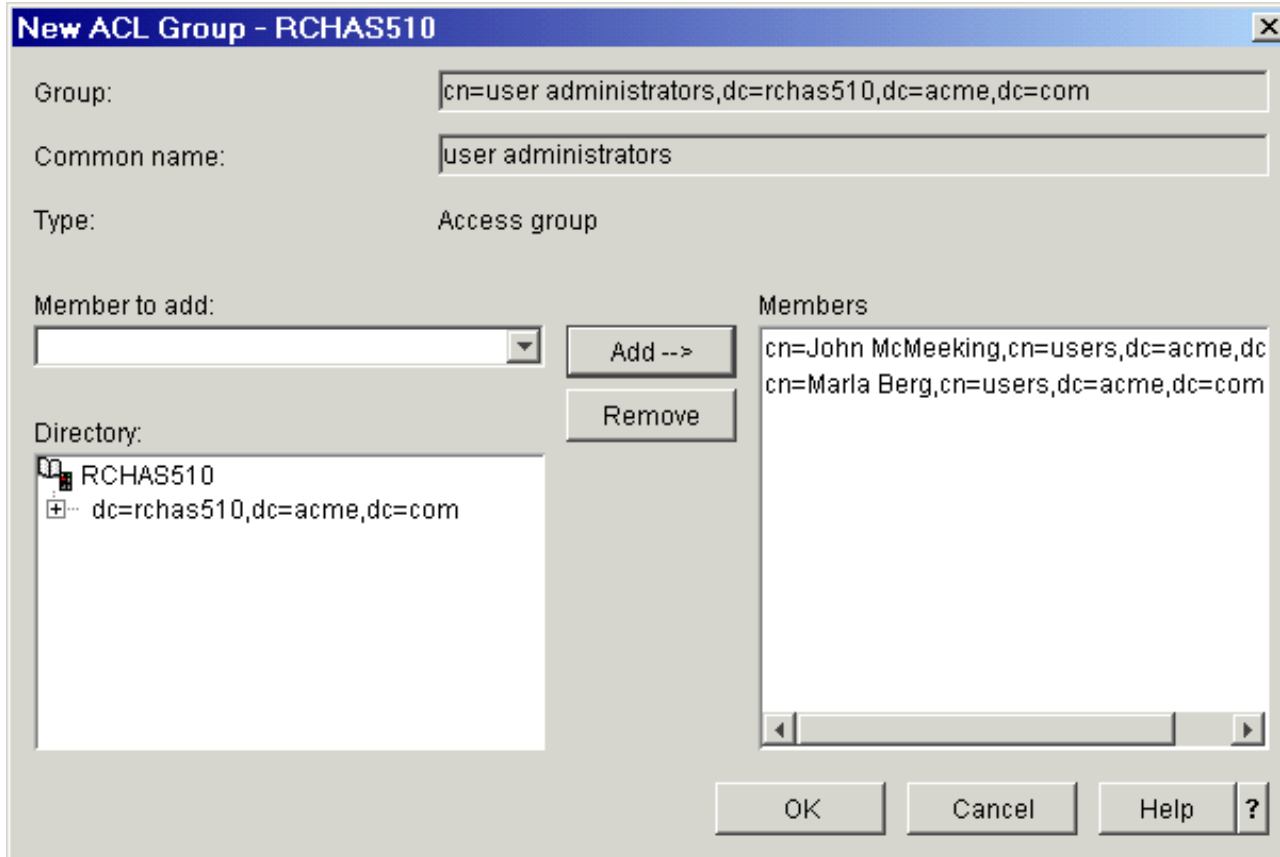
OK Cancel Help ?

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Managing access to the directory

- Groups can be used as the "subject" for access control
 - ▶ Each of the "group" object classes defines membership via the "member" attribute
 - ▶ Member can be a LDAP entry or a pseudo-DN
 - Kerberos: ibm-kn=jmcmeeek@acme.com
 - Digital Certificate: subject DN from certificate
 - ▶ Cannot nest groups for access control
- Initial release supported two "group" objectclasses that could be used in access control: accessgroup and accessrole.
- V5R1 also supports groupOfNames and groupOfUniqueNames
- You can manage groups via DMT, Operations Navigator (accessgroup and accessrole), or any LDAP client

Managing access to directory



dn: cn=user administrators,dc=rchas510,dc=acme,dc=com
objectclass: accessgroup
objectclass: top
member: cn=John McMeeking,cn=users,dc=acme,dc=com
member: cn=Marla Berg,cn=users,dc=acme,dc=com
cn: user administrators

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Configuring Publishing

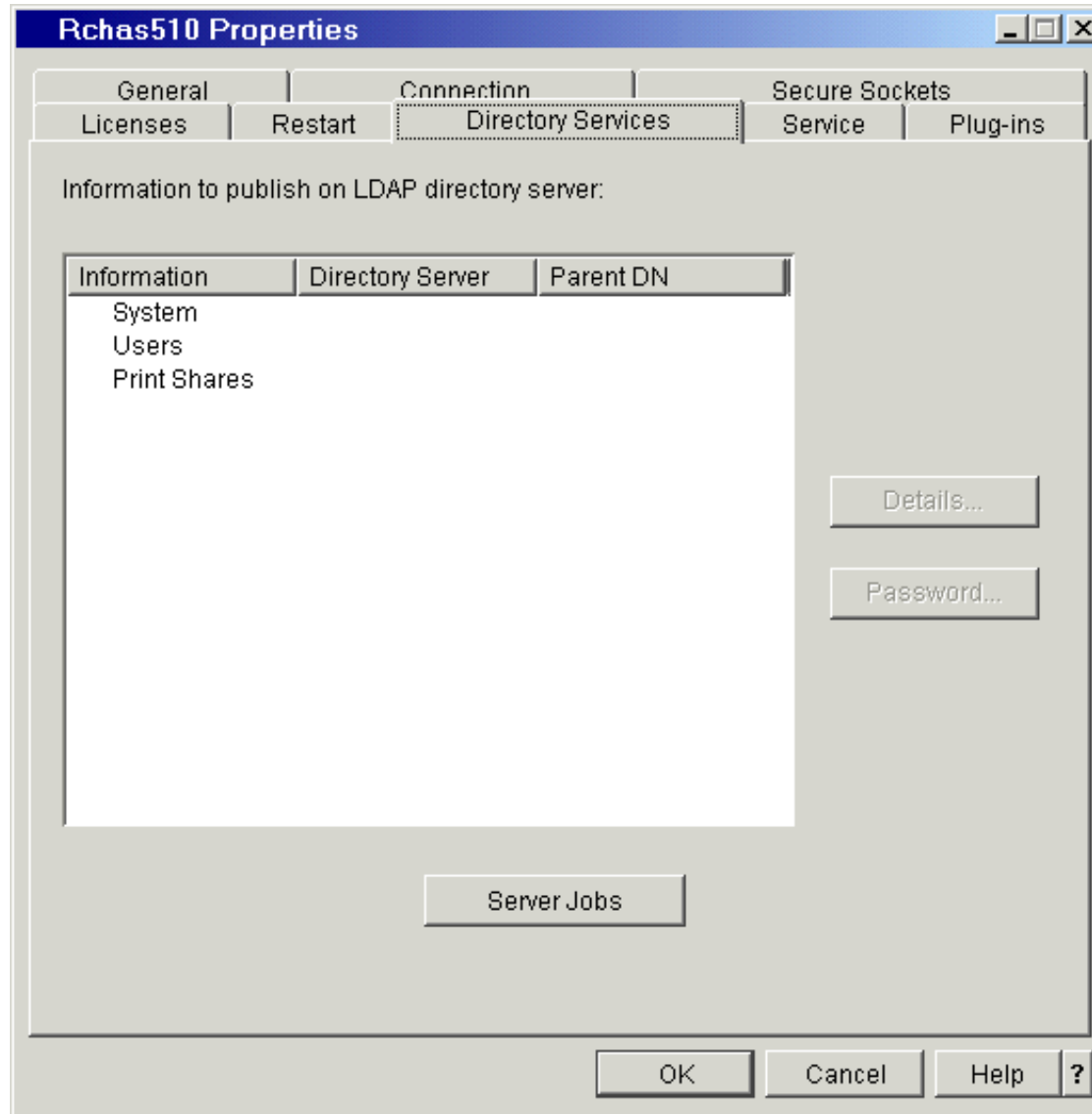
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Configuring Publishing

- Go to Properties for your system and select the Directory Services tab
 - ▶ Make sure you are connected first, or you cannot use this
- Manage configuration of publishing agents
 - ▶ System defined agents for users, system information, printer shares
 - ▶ Define your own agents via QgldChgDirSvrA API
- Users
 - ▶ SDD entries published to LDAP
- Computers
 - ▶ Basic system info published by OS/400
 - ▶ Management Central will publish detailed inventory (see Redbook "Management Central: A Smart Way to Manage AS/400 Systems" SG24-5407)
 - ▶ Can also publish information about OS/400 printers
- Printer Shares
 - ▶ Publish printer shares to Active Directory to use with Add Printer wizard

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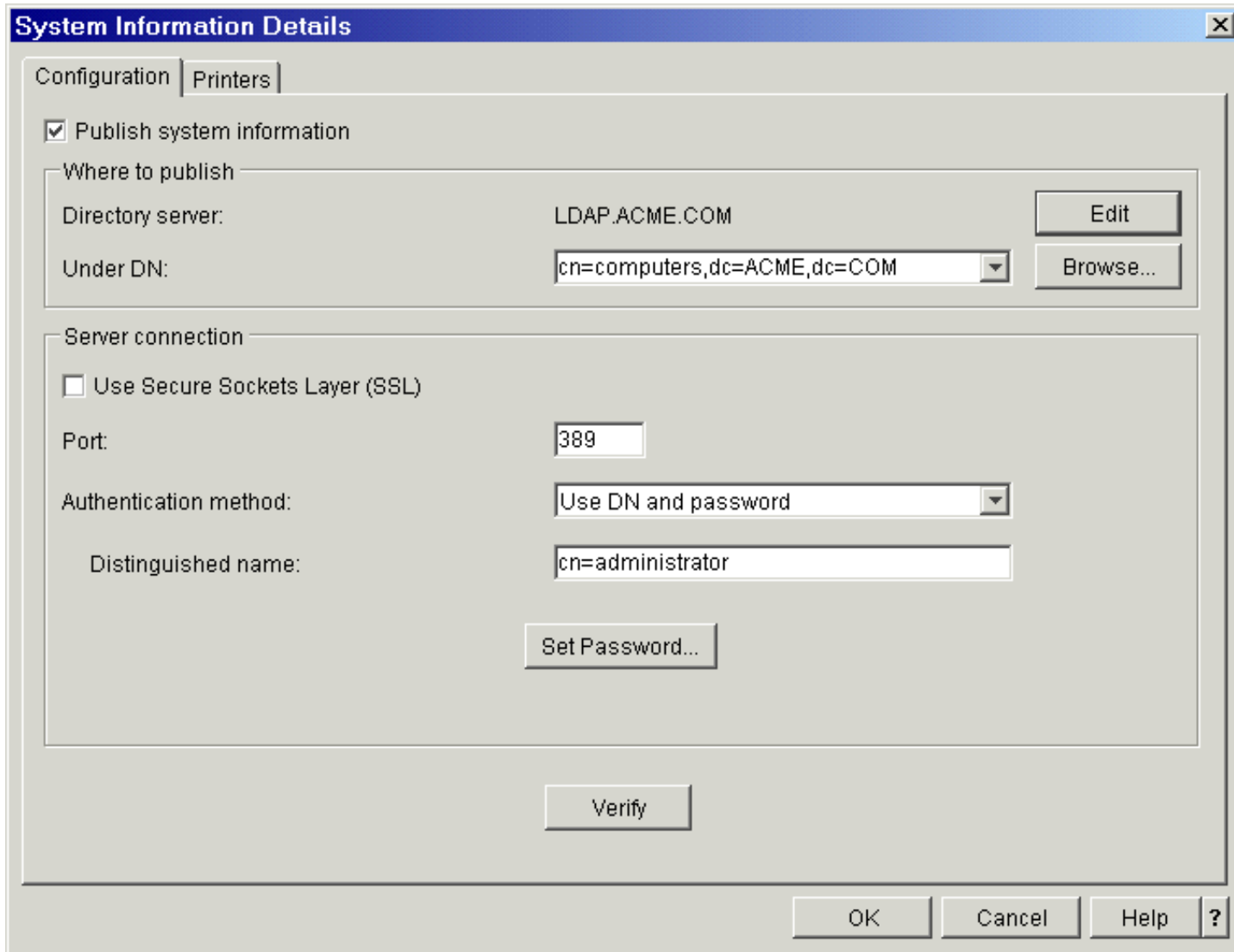
Configuring Publishing



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Configuring Publishing

- Example of the "System" information publishing configuration:



The screenshot shows a window titled "System Information Details" with two tabs: "Configuration" and "Printers". The "Configuration" tab is active. It contains the following settings:

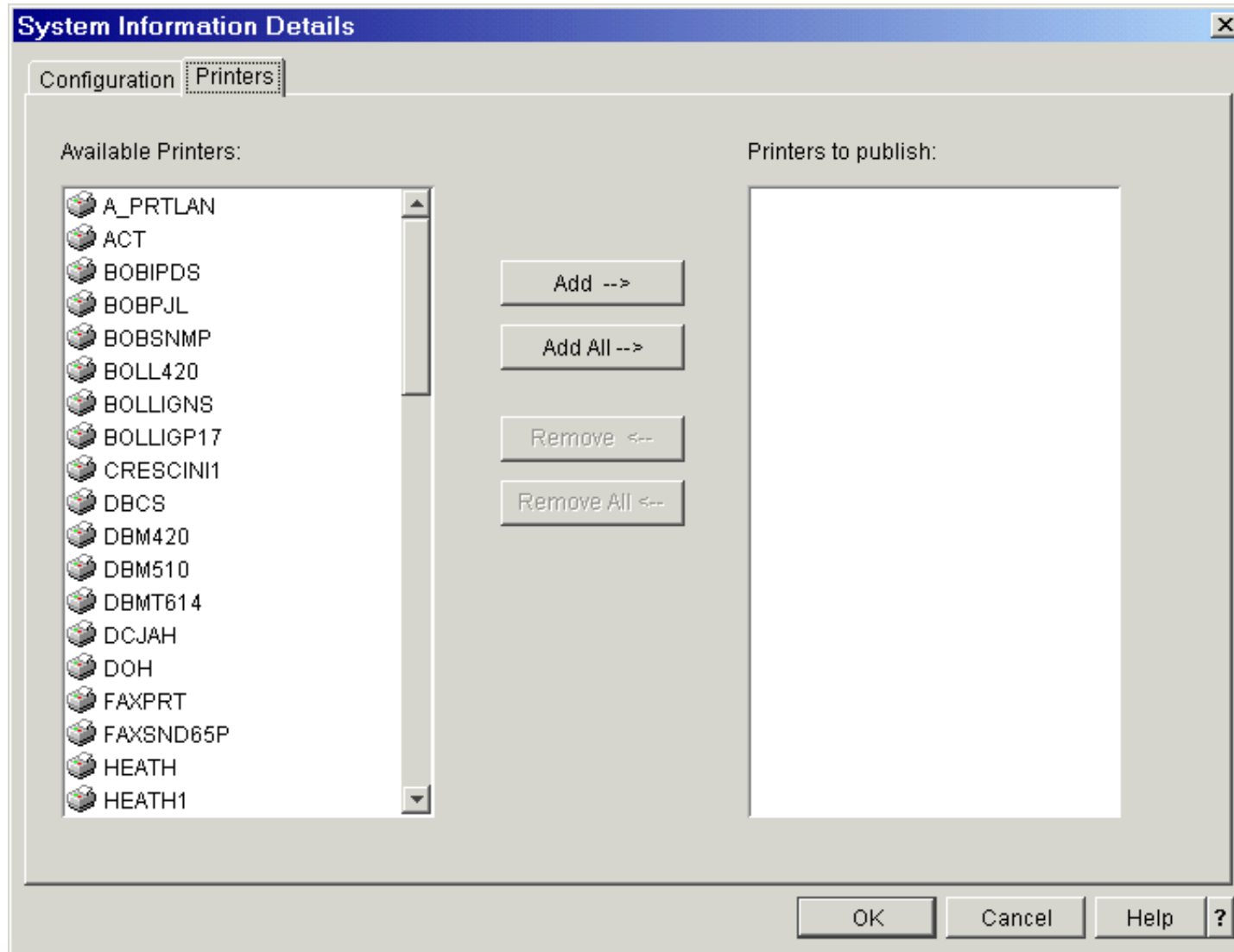
- Publish system information
- Where to publish**
 - Directory server: LDAP.ACME.COM (with an "Edit" button)
 - Under DN: cn=computers,dc=ACME,dc=COM (with a "Browse..." button)
- Server connection**
 - Use Secure Sockets Layer (SSL)
 - Port: 389
 - Authentication method: Use DN and password (dropdown menu)
 - Distinguished name: cn=administrator
 - Set Password... (button)
- Verify (button)

At the bottom of the window are buttons for "OK", "Cancel", "Help", and a question mark icon.

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Configuring Publishingn

- Example of the "System" information publishing configuration:

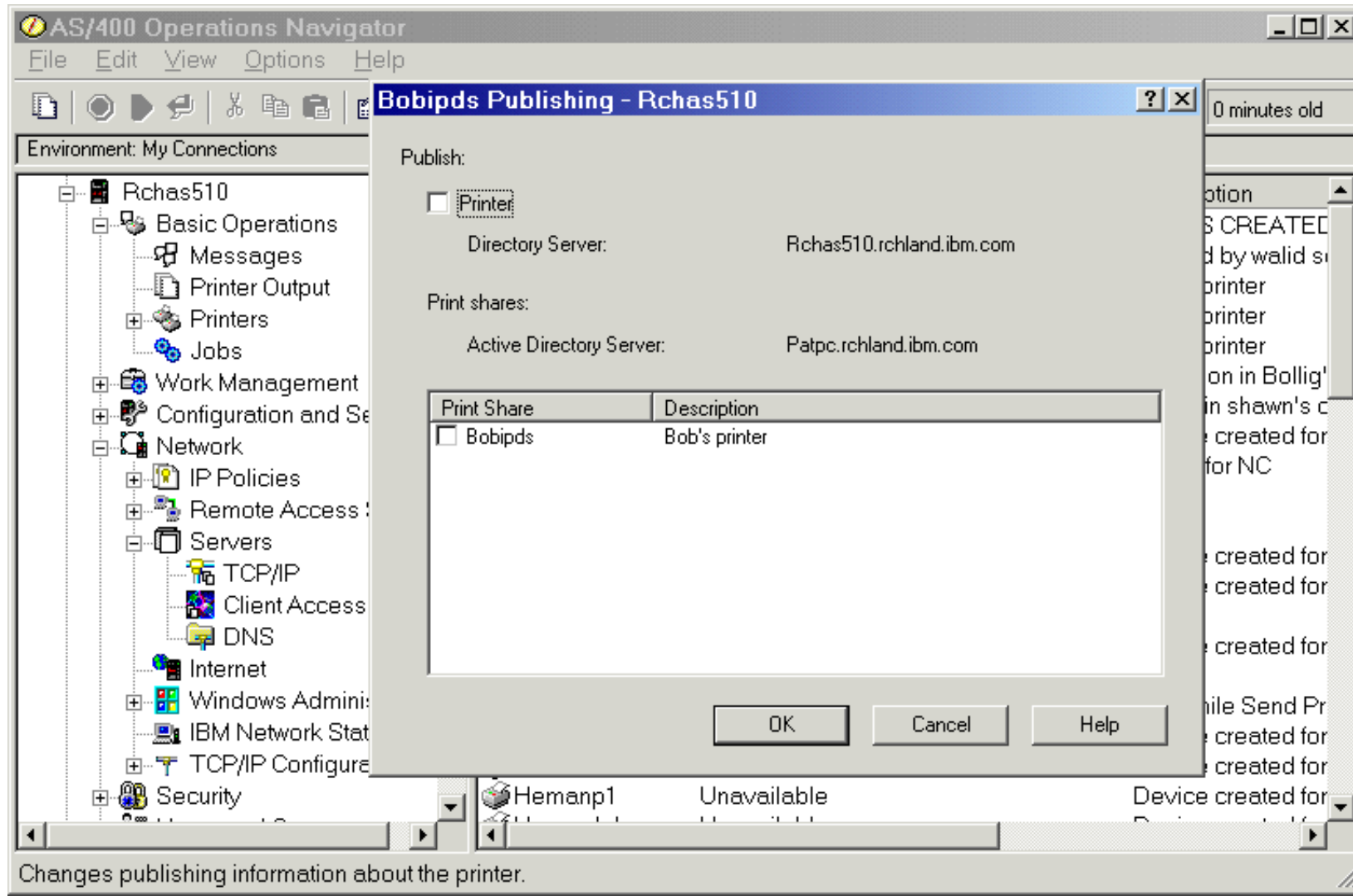


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Configuring Publishing

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- Or you can select printers to publish from the Printers folder and AS/400 NetServer window



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■ Sample published user:

```
C:\>ldapsearch -h lpar2nzm -b "cn=users,dc=lpar2nzm,dc=rchland,dc=ibm,dc=com"  
  "(sn=mcmeeking)"  
cn=John A McMeeking,cn=users,dc=lpar2nzm,dc=rchland,dc=ibm,dc=com  
objectclass=top  
objectclass=person  
objectclass=organizationalPerson  
objectclass=inetOrgPerson  
objectclass=publisher  
objectclass=ePerson  
cn=John A McMeeking  
cn=John McMeeking  
cn=JAM  
sn=McMeeking  
uid=JAM  
givenname=John  
description=JAM  
title=OS/400 Directory Services  
departmentnumber=G8RA  
telephonenumber=(507)253-4596  
roomnumber=F115  
registeredaddress=3605 Highway 52 N$Rochester, MN 55901  
mail=jmcmeeek@US.IBM.COM  
publishername=dc=LPAR2NZM,dc=RCHLAND,dc=IBM,dc=COM
```

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Tools for accessing the directory

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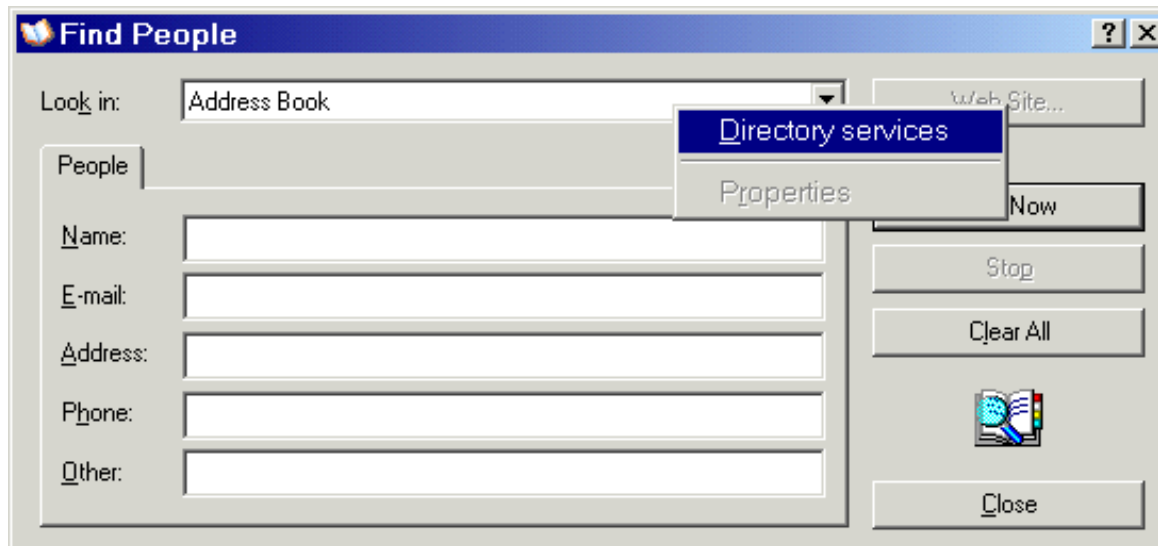
Tools for accessing the directory

- Pointing your address book at an LDAP server
- IBM Directory Management Tool (DMT)
- Command line utilities
- Operations Navigator for management of access control
- Other tools
 - ▶ the Jarek Gawor LDAP Browser/Editor

Pointing your address book at an LDAP server

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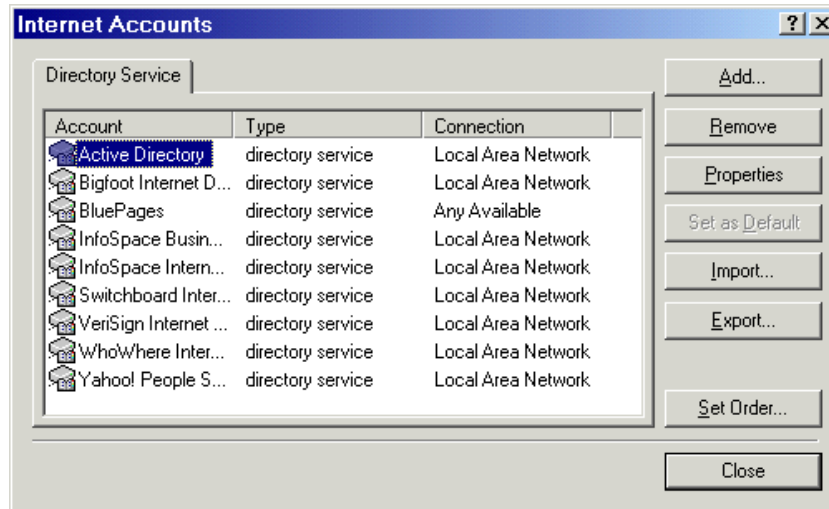
- Accessing the LDAP server via Outlook Express (similar for other e-mail clients)
 - ▶ Launch 'Find People'
 - ▶ Right Click on "Look in:" to select "Directory services"



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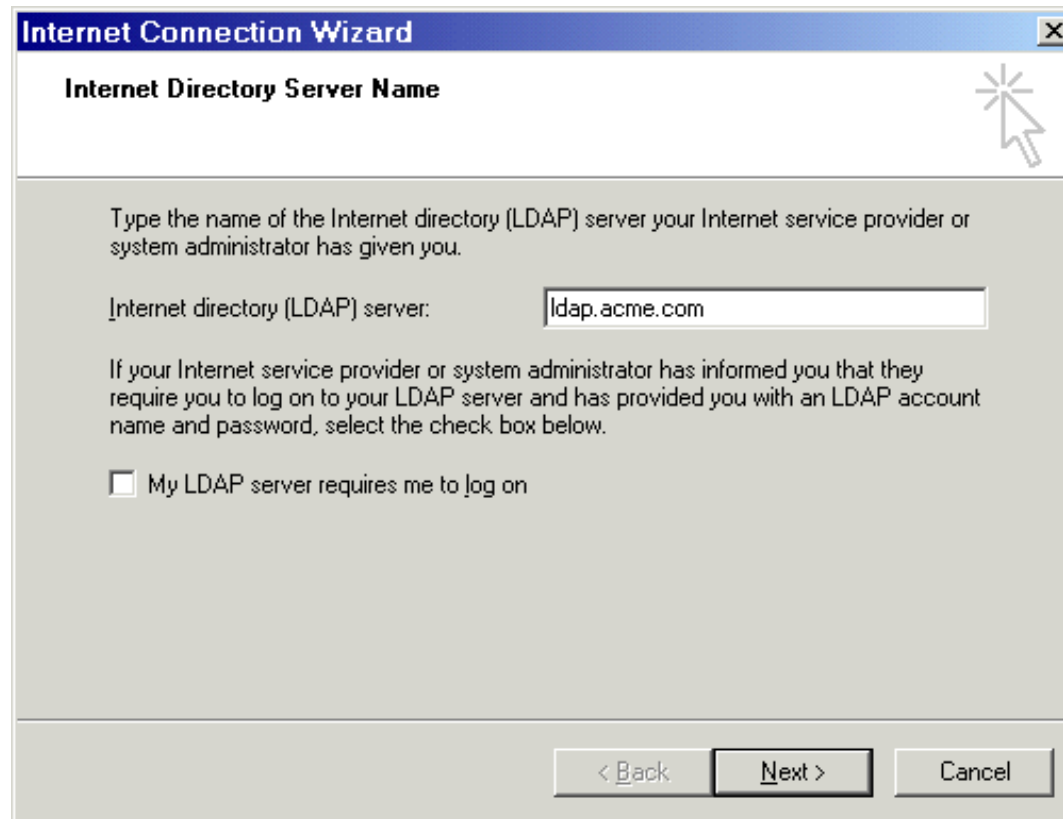
Address book setup

- Click "Add..." in Internet Accounts window



Address book setup

- Fill in Server name and continue to end of wizard



The screenshot shows a Windows-style dialog box titled "Internet Connection Wizard". The main heading is "Internet Directory Server Name". Below this, there is a text box for the server name containing "ldap.acme.com". A mouse cursor is pointing at the top right corner of the dialog box. Below the text box, there is a checkbox labeled "My LDAP server requires me to log on" which is currently unchecked. At the bottom of the dialog box, there are three buttons: "< Back", "Next >", and "Cancel".

Internet Connection Wizard

Internet Directory Server Name

Type the name of the Internet directory (LDAP) server your Internet service provider or system administrator has given you.

Internet directory (LDAP) server:

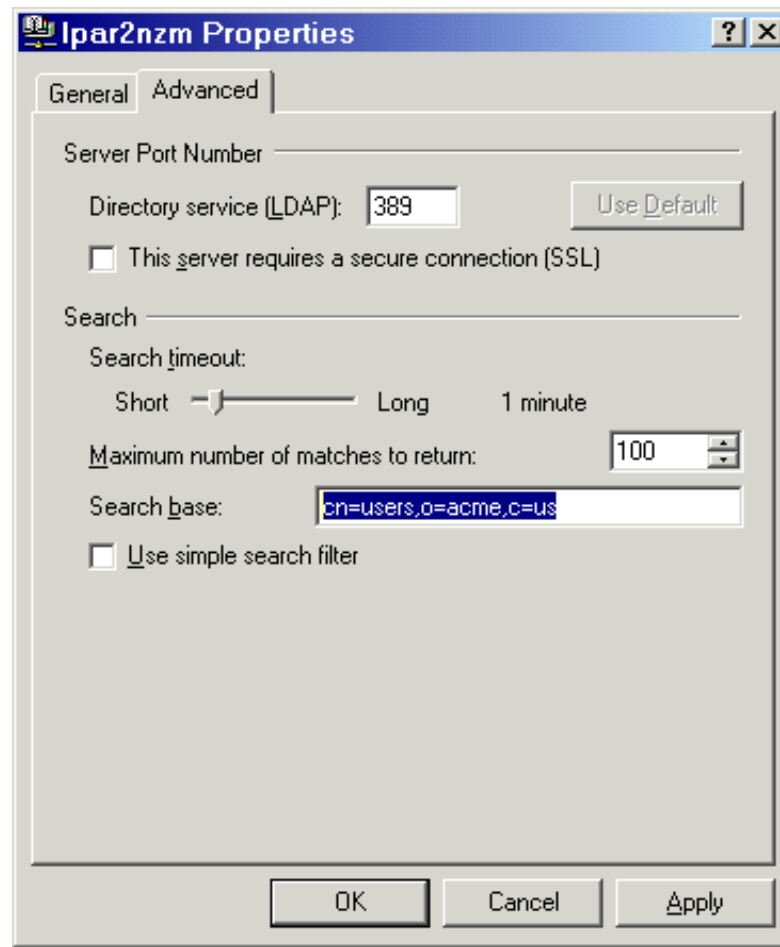
If your Internet service provider or system administrator has informed you that they require you to log on to your LDAP server and has provided you with an LDAP account name and password, select the check box below.

My LDAP server requires me to log on

< Back Next > Cancel

Address book setup

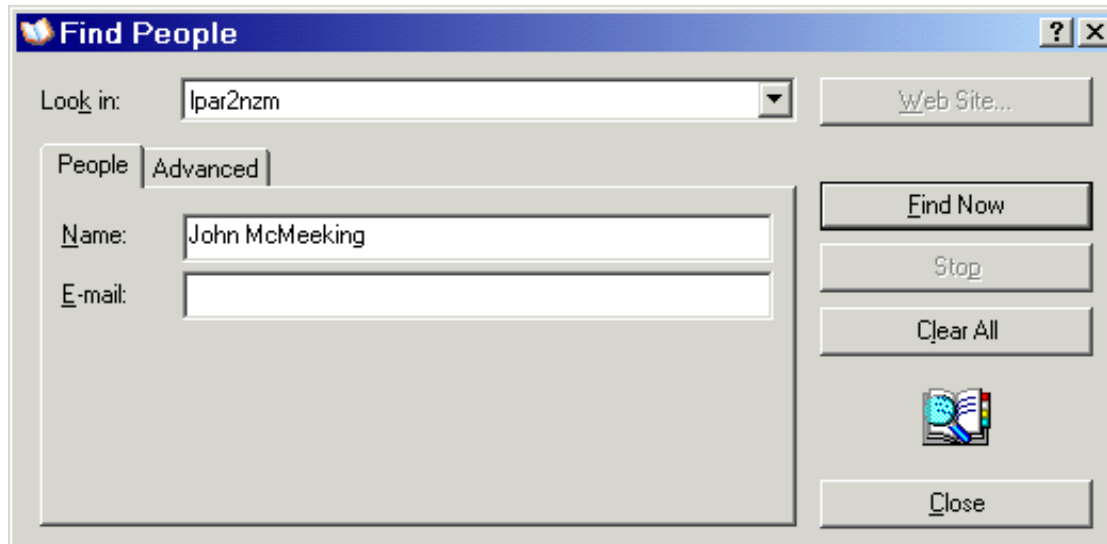
- After completing the wizard, select the server in the "Internet Accounts" window and click Properties. Go to advanced tab and fill in parent DN where users are published:



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Address book setup

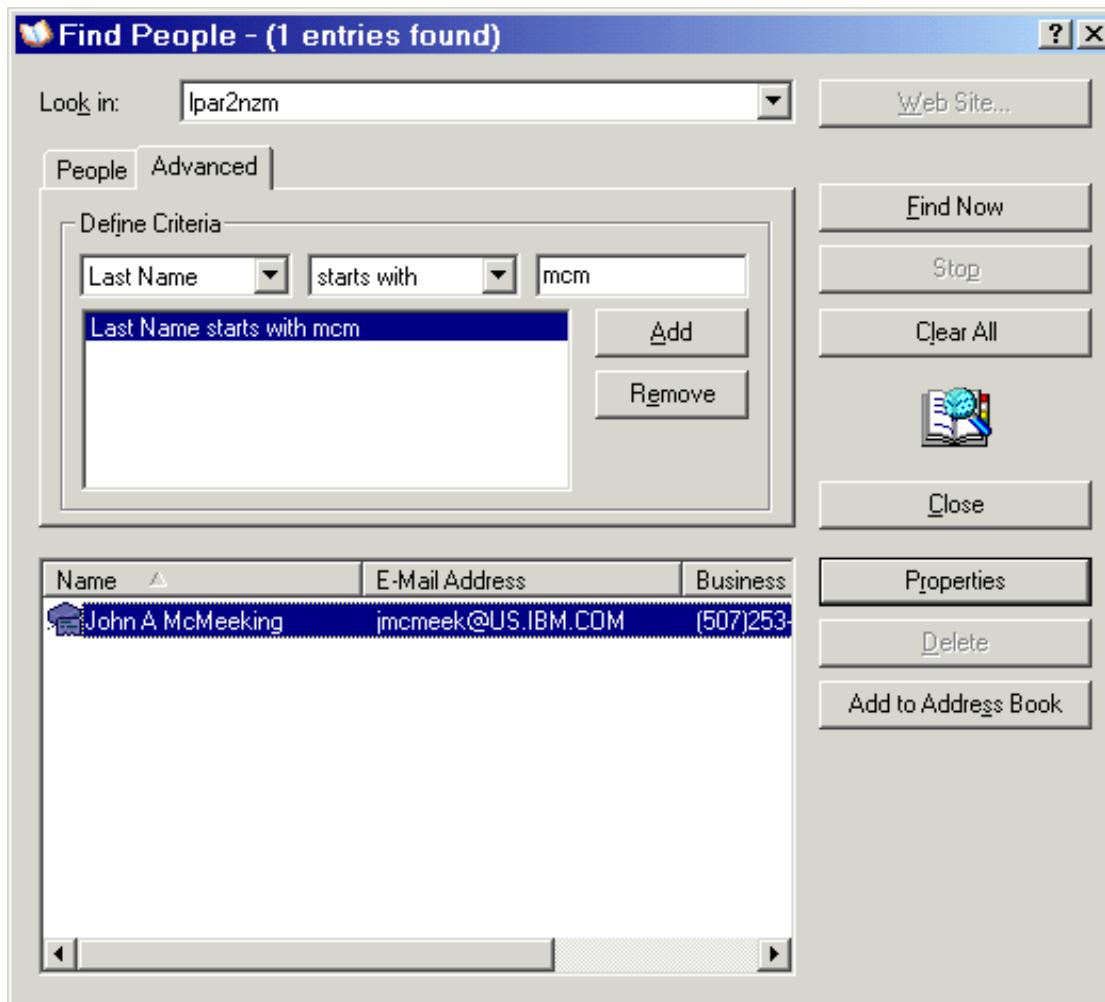
- Now look for someone in the directory:



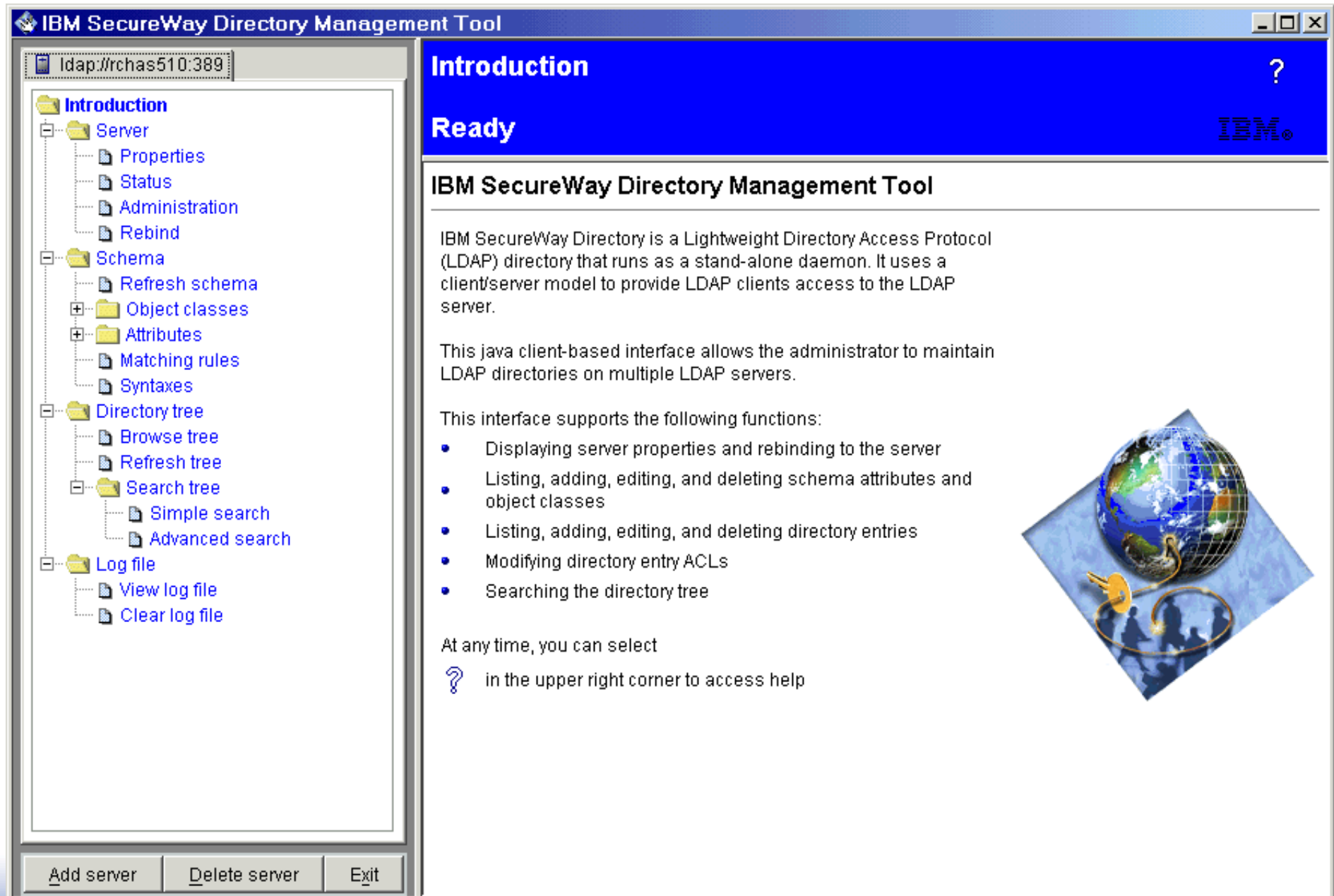
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Address book setup

- Or maybe try an advanced search:



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Introduction

Ready


IBM SecureWay Directory Management Tool


IBM SecureWay Directory is a Lightweight Directory Access Protocol (LDAP) directory that runs as a stand-alone daemon. It uses a client/server model to provide LDAP clients access to the LDAP server.

This java client-based interface allows the administrator to maintain LDAP directories on multiple LDAP servers.

This interface supports the following functions:

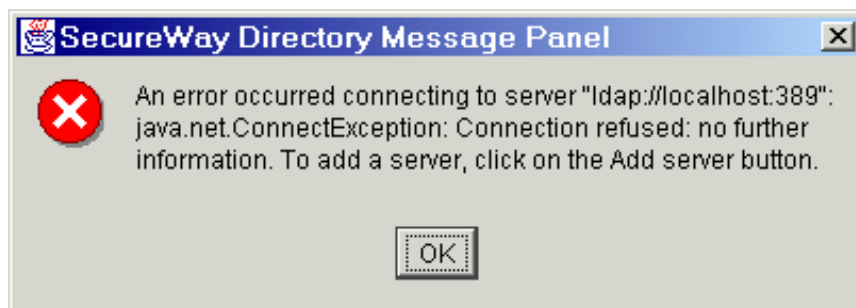
- Displaying server properties and rebinding to the server
- Listing, adding, editing, and deleting schema attributes and object classes
- Listing, adding, editing, and deleting directory entries
- Modifying directory entry ACLs
- Searching the directory tree

At any time, you can select  in the upper right corner to access help



Add server Delete server Exit

- Install the IBM SecureWay Directory Client SDK
 - ▶ from your iSeries machine:
`/qibm/proddata/os400/dirsrv/usertools/windows/setup.exe`
 - ▶ Or download from the IBM Directory web site:
<http://www.ibm.com/software/network/directory/downloads>
- Default configuration of DMT attempts to connect to server running on "localhost" -- your PC



- Ignore this error and click "Add Server" on main window, OR...

- Or, edit C:\Program Files\IBM\LDAP\etc\dmt.conf, and uncomment/edit lines to look like:

```
server1.url=ldap://rchas510.acme.com      << was localhost
server1.security.bindDN=cn=administrator  << was blank
server1.security.password=secret         << was blank
```

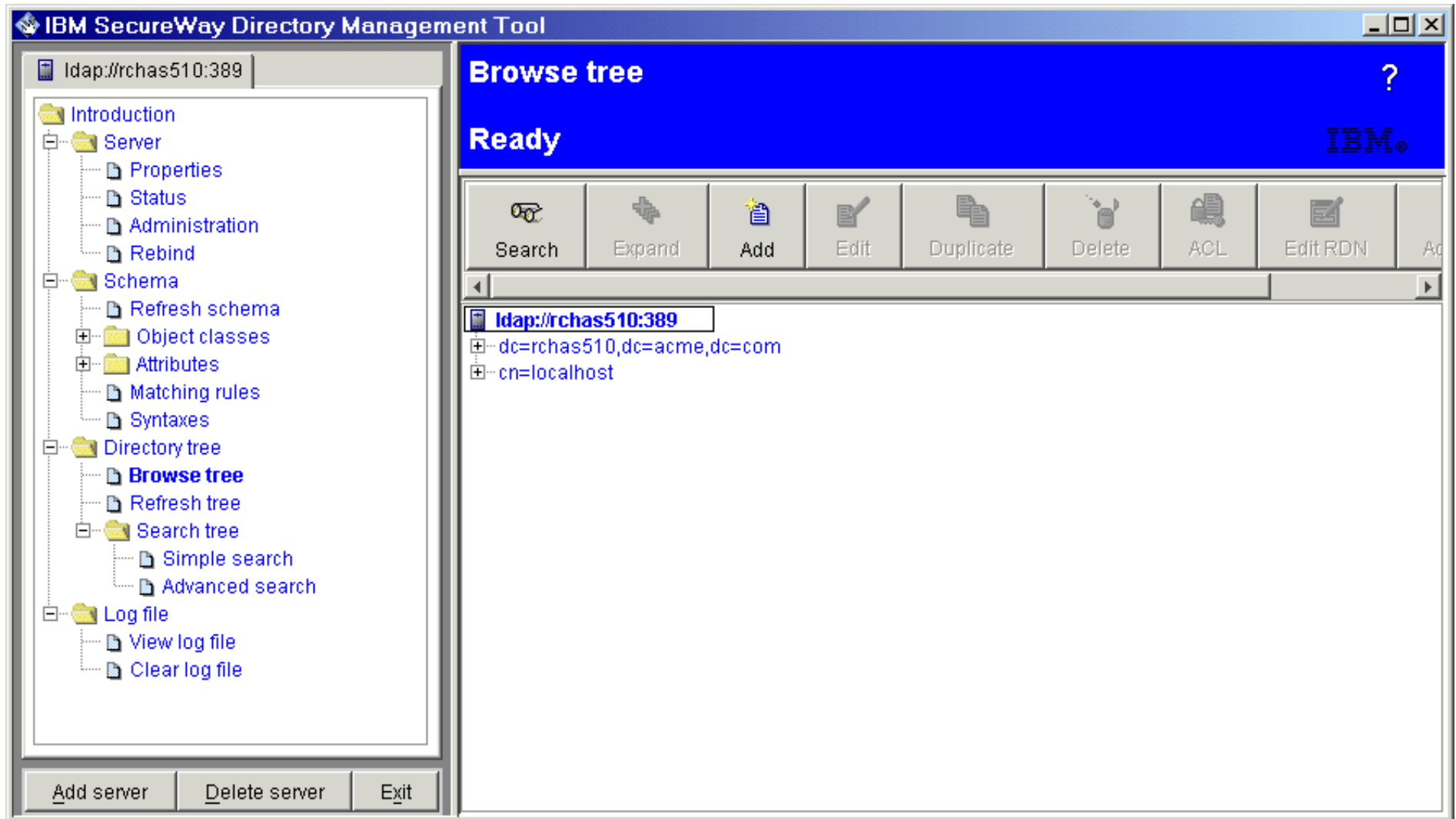
- Okay, I did that, but now I get:



- Your server has a suffix, but you haven't created any entries yet. Let's do that with DMT.

Using DMT - Create an entry

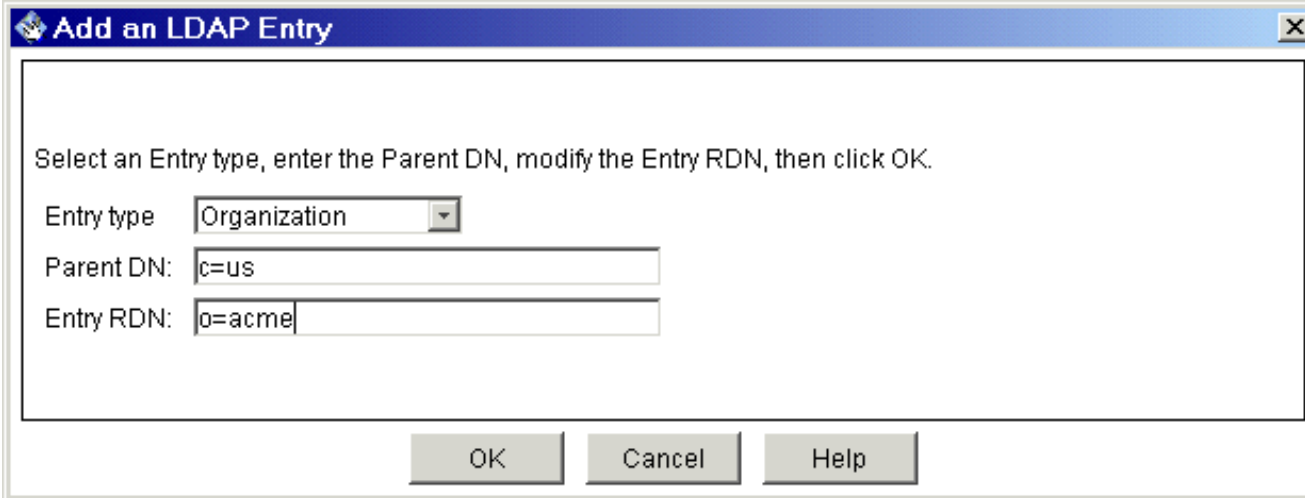
- Click "Browse tree", then the "Add" button



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Using DMT - Create an entry

- Select the object class -- commonly used ones, like "organization", are listed in the dropdown, or chose "Other"
- Enter Parent DN (c=us) and entry DN (o=acme). Even though there is no c=us entry, DMT will combine these to get "o=acme,c=us"



Add an LDAP Entry

Select an Entry type, enter the Parent DN, modify the Entry RDN, then click OK.

Entry type: Organization

Parent DN: c=us

Entry RDN: o=acme

OK Cancel Help

Using DMT - Create an entry

- Fill in any other information you might want to provide here, and click "Add"

Add an LDAP Entry

To add a new entry, enter values for the attributes, then click Add.

objectClass (Object class): organization

dn (DN): o=acme,c=us

Attributes

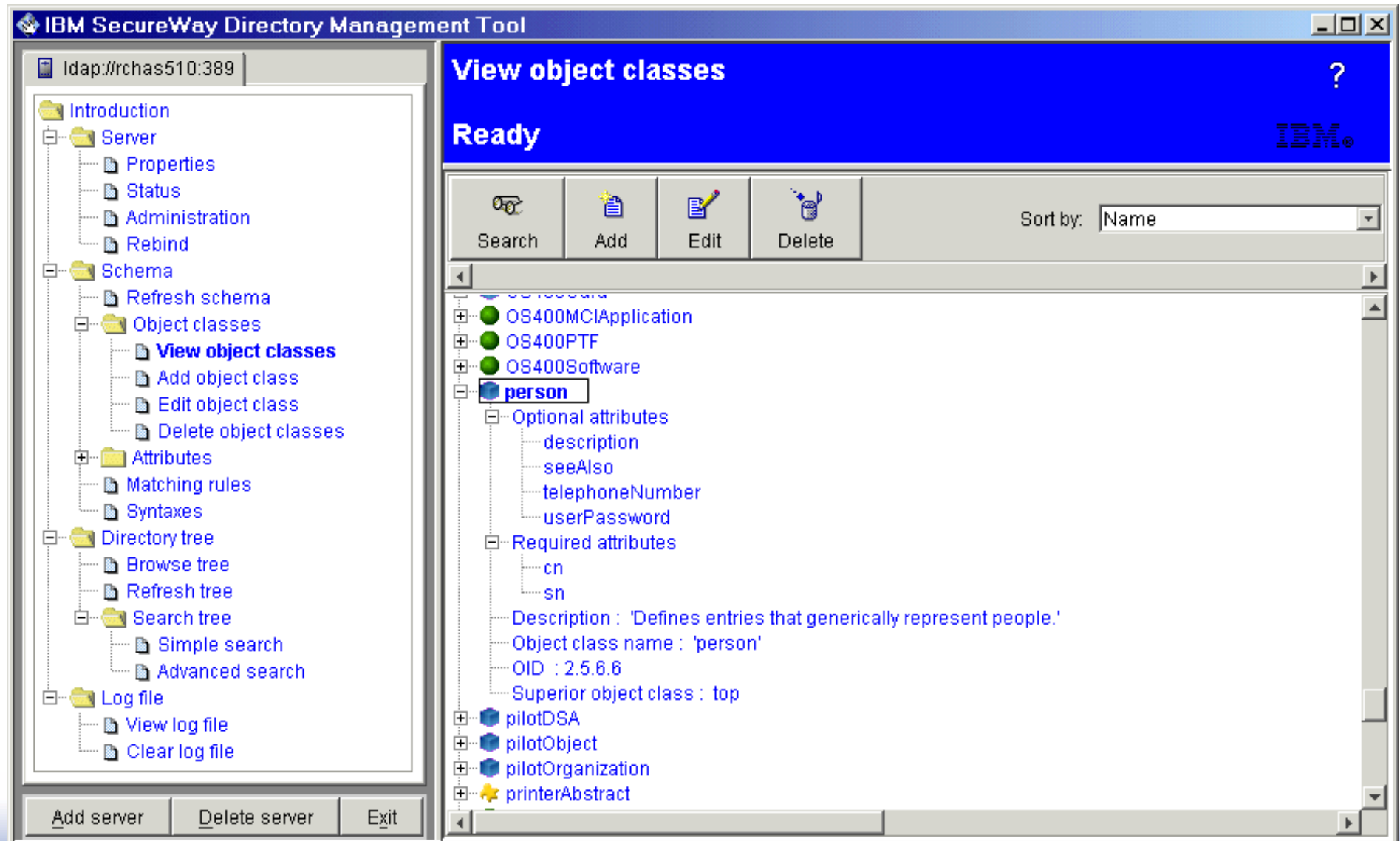
o:	<input checked="" type="checkbox"/>	acme
businessCategory:	<input checked="" type="checkbox"/>	
description:	<input checked="" type="checkbox"/>	
destinationIndicator:	<input checked="" type="checkbox"/>	
facsimileTelephoneNumber:	<input checked="" type="checkbox"/>	
internationalISDNNumber:	<input checked="" type="checkbox"/>	
l:	<input checked="" type="checkbox"/>	
physicalDeliveryOfficeName:	<input checked="" type="checkbox"/>	
postalAddress:	<input checked="" type="checkbox"/>	
postalCode:	<input checked="" type="checkbox"/>	

Add Cancel Help

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Using DMT

- View or edit schema



The screenshot displays the IBM SecureWay Directory Management Tool interface. The main window is titled "View object classes" and shows a list of object classes. The "person" class is selected and expanded, showing its attributes and description.

IBM SecureWay Directory Management Tool

Idap://rchas510:389

View object classes ?

Ready IBM

Search Add Edit Delete Sort by: Name

- OS400MCIApplication
- OS400PTF
- OS400Software
- person**
 - Optional attributes
 - description
 - seeAlso
 - telephoneNumber
 - userPassword
 - Required attributes
 - cn
 - sn
 - Description : 'Defines entries that generically represent people.'
 - Object class name : 'person'
 - OID : 2.5.6.6
 - Superior object class : top
- pilotDSA
- pilotObject
- pilotOrganization
- printerAbstract

Add server Delete server Exit

- LDAP command line utilities can be invoked from QSH:
 - ▶ Idapadd, Idapmodify, Idapsearch, Idapdelete, Idapmodrdrn
- Utilities accept input from standard input or from a file
- Search output can be redirected to a file
- Can be invoked from CL or a program

■ ldapsearch examples

```
> ldapsearch -h rchas510 -D cn=administrator -w secret -b "DC=LPAR2NZM,DC=RCHLAND,DC=IBM,DC=C
  "(sn=mcmeek*)"
cn=John A McMeeking,cn=users,dc=rchas510,dc=acme,dc=com
objectclass=top
objectclass=person
objectclass=organizationalPerson
objectclass=inetOrgPerson
cn=John A McMeeking
sn=McMeeking
uid=JAM
givenname=John
```

```
PGM
QSH          CMD('ldapsearch -h rchas510 -b "" -s base "(objectclass=*)" > rootdse.out')
ENDPGM
```

```
CALL QSYS/QGLDSEARCH PARM('-h' 'rchas510' '-b' '' '-s' 'base' '(objectclass=*)')
```


■ ldapmodify examples

- ▶ ldapmodify command can be used to add, modify, delete and rename entries via 'changetype' directive. See LDAP articles in Info Center for more information - particularly reference to RFC 2849

```
> ldapmodify -D cn=administrator -w secret -f mods.ldif
```

mods.ldif looks like:

```
dn: cn=john mcmeeking,cn=users,dc=acme,dc=com
changetype: modify
add: userpassword
userpassword: secret
```

```
dn: cn=mary jones,cn=users,dc=acme,dc=com
changetype: add
cn: mary jones
sn: jones
telephonenumber: 555.5555
```

```
dn: cn=paul smith,cn=users,dc=acme,dc=com
changetype: delete
```

Jarek Gawor's LDAP Browser/Editor

IBM @server iSeries

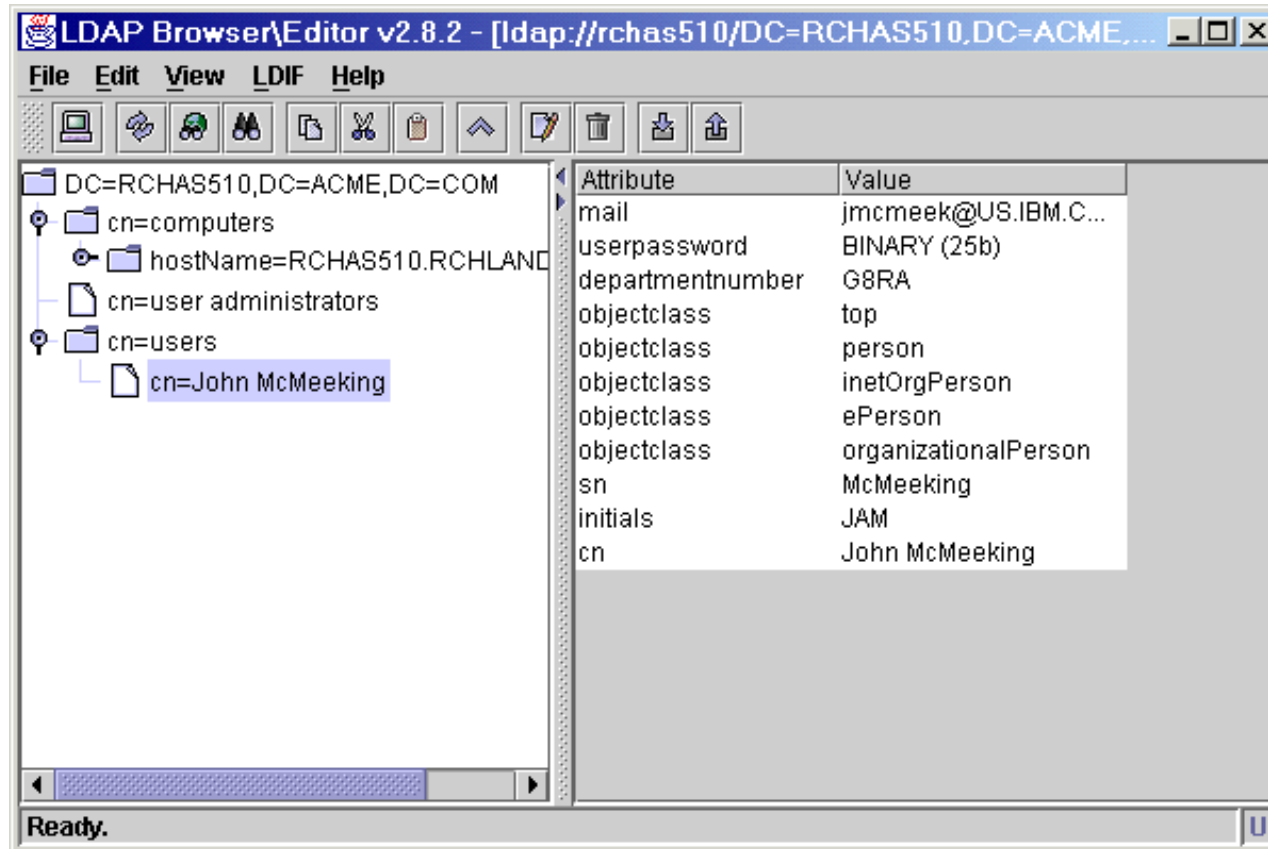
- LDAP edit/browser available from <http://www.iit.edu/~gawojar/ldap/>
 - ▶ Looks like it may now be licensed from Argonne National Laboratory. See <http://www.techtransfer.anl.gov/software/ldapbrowser.html>

- Features include:
 - ▶ Browsing, searching and editing of the DIT.
 - ▶ Entire trees and single entries can be exported to and imported from LDIF
 - ▶ Object templates are used for creating and adding new entries. The templates can be manually or automatically (from existing entries) created.
 - ▶ Attribute contents can be saved or loaded from a file.
 - ▶ Attribute viewers/editors

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Jarek Gawor's LDAP Browser/Editor

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References

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For More Information

- iSeries LDAP home page at <http://www.ibm.com/servers/eserver/series/ldap>
- iSeries Information Center
 - ▶ Networking -> TCP/IP -> Directory Services (LDAP)
 - ▶ Programming -> CL and APIs -> APIs, look for Directory Services in APIs by category
- IBM Directory Server home page at <http://www.ibm.com/software/network/directory/>
- Redbooks (<http://www.redbooks.ibm.com>)
 - ▶ SG24-4986-00 Understanding LDAP
 - ▶ SG24-5110-00 LDAP Implementation Cookbook
 - ▶ SG24-6163-00 Using LDAP for Directory Integration: A Look at IBM SecureWay Directory, Active Directory, and Domino
 - ▶ SG24-6193-00 Implementation and Practical Use of LDAP on IBM eServer iSeries (draft Redbook available as a Redpiece)
- e-Directories Enterprise Software, Solutions, and Services by Daniel E. House, Timothy Hahn, Louis Mauget and Richard Daugherty. ISBN 0-201-70039-5. Published by Addison-Wesley Professional.

For More Information

- Programming:

- ▶ The IBM SecureWay Directory Client SDK includes sample source code using the C APIs.
- ▶ For Java programming using JNDI, refer to Sun's JNDI tutorial available at <http://java.sun.com/products/jndi/docs.html>, including the "Tips for LDAP Users" section

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