LDAP Operation Guide

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Contents

1 Introduction

1.1 Overview

LDAP is short for Lightweight Directory Access Protocol. Here it refers to the simplified edition of the X.500-based Directory Access Protocol (DAP). It runs on the TCP/IP protocol stack or other connection-oriented transmission servers. LDAP exists as an information directory, in which users and groups are defined only once and shared among multiple machines and applications.

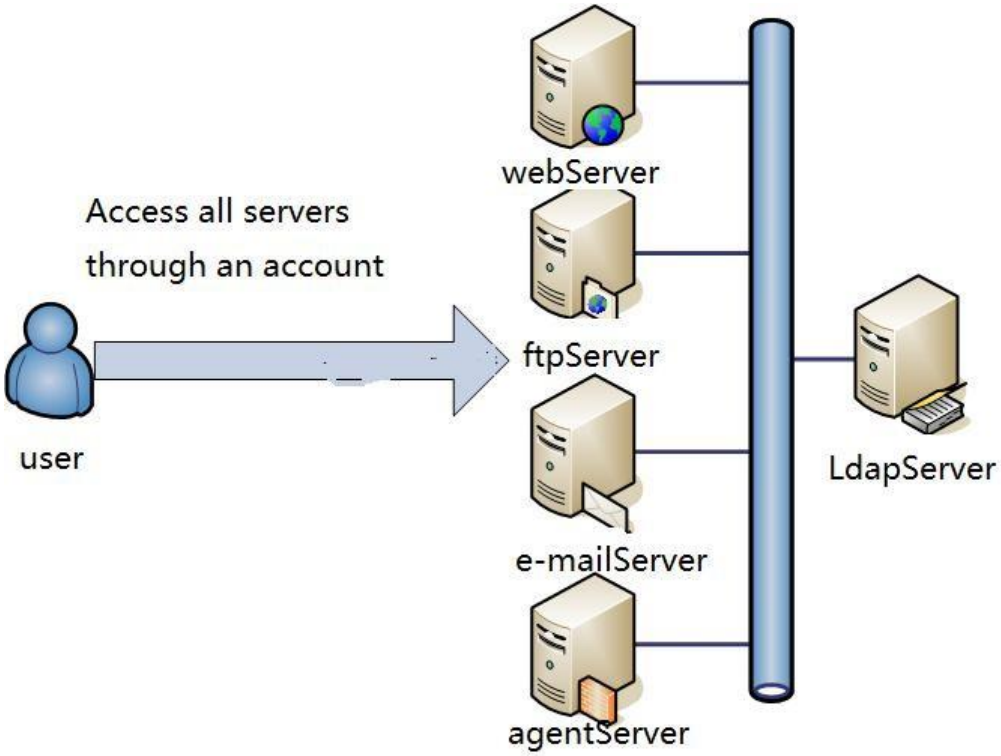


Figure 1-1-1

1.2 LDAP Information Model

The information in the LDAP directory is organized in a tree structure and stored in the data structure of entries. Here entries are similar to records in a relational database. An entry is an attribute with a distinguished name (DN), which is used to reference this entry. DNs are similar to keywords in a relational database. An attribute consists of a type and one or more values. In LDAP, the type can have multiple values to facilitate retrieval. LDAP stores information in a tree structure. The root of the tree is a country (c=CN) or domain name (dc=com) and one or more organizations or organizational units are defined under the root. Figure 1-2-1 shows the structure of the LDAP system.

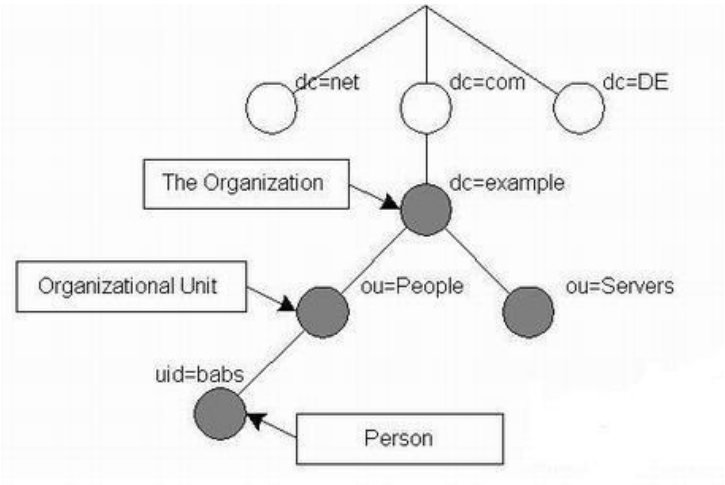


Figure 1-2-1

In the example shown in Figure 1-2-1, the root node of the tree is the domain name (dlw.com) of an organization. The root node comprises three parts: managers, people, and group. The three groups can be considered as three departments of the organization. For example, the managers group manages all management staff, people manages users logged in to the system, and group manages user groups in the system. More branches can be added.

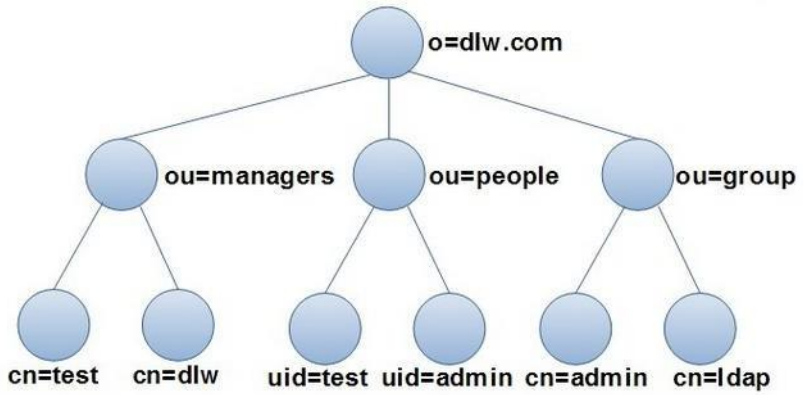


Figure 1-2-2

1.3 objectClass and Attribute in LDAP

LDAP supports setting optional and mandatory attributes for entries through an attribute called objectClass. The value of this attribute determines the rules that an entry must follow. It defines the attributes that can be included by an entry, as well as the mandatory attributes.

In LDAP, an entry must contain an objectClass attribute and assign at least one value. Each value is used by an LDAP entry as a template for storing data. A template contains mandatory and optional attributes of an entry.

Layers are strictly defined for objectClass and top and alias are at the top layer. For example, the objectClass organizationalPerson is subordinate to person and person is subordinate to top.

There are three types of objectClass attributes.

- Structural: such as person and organizationUnit
- Auxiliary: such as extensibleObject
- Abstract: such as top. An abstract objectClass attribute cannot be directly used.

The following lists some mandatory objectClass attributes.

- account: userid
- organization: o
- dcobject: dc
- person: cn and sn
- organizationalPerson: same as person
- organizationalRole: cn
- organizationalRole: ou
- organizationalRole: cn and gidNumber
- organizationalRole: cn, gidNumber, homeDirectory, uid, and uidNumber

Attributes are similar to variables in programming and can be assigned values. Common attributes are described as follows:

- c: country
- dc: domain component, usually refers to a part of a domain name
- givenName: name of a person, not a family name
- l: a place name, such as the name of a city or other geographical area
- mail: email address
- o: organizationName, name of an organization
- ou: organizationalUnitName, name of an organizational unit
- cn: common name, name of an object. If the object refers to a person, the full name should be used.
- sn: surname, family name of a person
- telephoneNumber: phone number, which should carry the country code
- uid: userid, usually refers to the login name of a user

Note: objectClass is a special type of attribute. It contains other in-use attributes and itself.

1.4 Applicable Models

- SNR-VP-52-CG-P, SNR-VP-54-CG-P

2 Building OpenLDAP in Windows

2.1 Downloading and Installing OpenLDAP

2.1.1 Download OpenLDAP

The following describes how to download and install OpenLDAP in Windows 10 enterprise edition. OpenLDAP for Windows is free and available at the following website:
http://www.userbooster.de/en/download/openldap-for-windows.aspx?l=en

2.1.2 Installing OpenLDAP

1. Click the downloaded .exe file. In the dialog box shown in Figure 2-1-1, click Yes.

Figure 2-1-1

2. Click Next and retain the default settings, as shown in Figure 2-1-2.

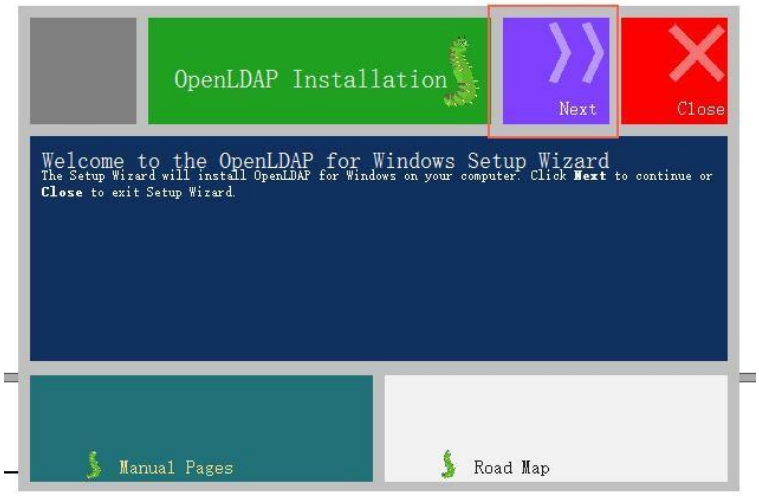


Figure 2-1-2

3. In the dialog box for selecting a path, change the path as required, for example,

D:\OpenLdap, as shown in Figure 2-1-3.

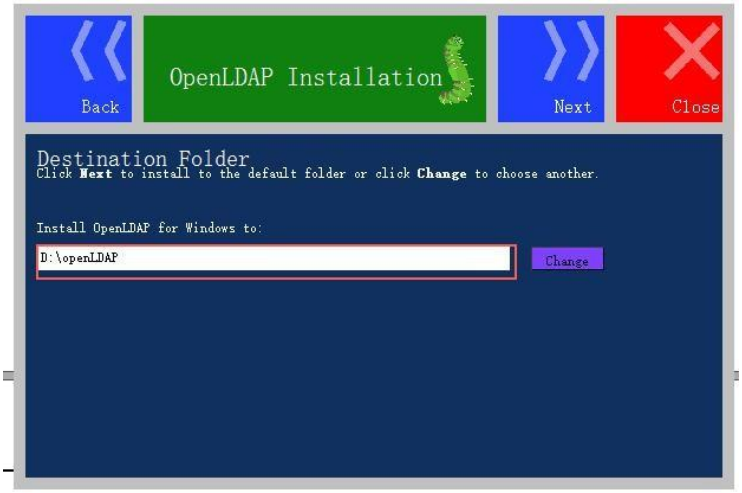


Figure 2-1-3

4. On the installation page, click Install. After the installation is finished successfully, click Close.

For any problems during the installation, visit the following link for solutions.

http://www.userbooster.de/en/support/feature-articles/openldap-for-windows-installation.aspx

During installation, if the system prompts that the gssapi32.dll or gssapi64.dll file is absent, download the file from the Internet and save it under the installation pathof OpenLDAP.

2.2 Configuring the openLDAP Server

2.2.1 Modifying the slapd.conf File

Under the installation directory of OpenLDAP, modify the slapd.conf file.

Specifically, find related configurations in the file, as shown in Figure 2-2-1.

Suffix "dc = maxcrc, dc = com"

Rootdn "cn = Manager,dc = maxcrc, dc = com"

```
database    mdb
suffix      "dc=maxcrc,dc=com"
rootdn      "cn=Manager,dc=maxcrc,dc=com"
# Cleartext passwords, especially for the rootdn, should
# be avoid.  See slappasswd(8) and slapd.conf(5) for details.
# Use of strong authentication encouraged.
rootpw    {SSHA}G8nIcSW6gSCQ6bKD8eCb4M0dJ/olUDDe
```

Figure 2-2-1

Suffix is a component that defines a domain name. Rootdn defines an administrator.

The domain name can be changed to snr.ru or others. The domain name of the administrator also needs to be changed.

See Figure 2-2-2.

Suffix "dc =snr, dc = ru"

Rootdn "cn = Manager, dc =snr, dc = ru"

```
database    mdb
suffix      "dc=snr   ,dc=ru  '
rootdn      "cn=Manager,dc=snr   ,dc=ru "
# Cleartext passwords, especially for the rootdn, should
# be avoid.  See slappasswd(8) and slapd.conf(5) for details.
# Use of strong authentication encouraged.
rootpw    {SSHA}G8nIcSW6gSCQ6bKD8eCb4M0dJ/olUDDe
```

Figure 2-2-2

If a domain name contains other components, change it based on Figure 2-2-3.

Suffix "dc =snr, dc = ru, dc = cn"

Rootdn "cn = Manager, dc =snr, dc = ru,dc = cn"

```
database    mdb
suffix      "dc=snr   ,dc=ru ,dc=cn"
rootdn      "cn=Manager,dc=snr   ,dc=ru ,dc=cn"
# Cleartext passwords, especially for the rootdn, should
# be avoid.  See slappasswd(8) and slapd.conf(5) for details.
# Use of strong authentication encouraged.
rootpw    {SSHA}G8nIcSW6gSCQ6bKD8eCb4M0dJ/olUDDe
```

Figure 2-2-3

2.2.2 Changing the Password

1. Disable the LDAP service.
2. Choose Start > Run.
3. Enter cmd to access the command line interface (CLI). (If you cannot find Run in Windows 10, enter win + r and then cmd.)
4. Switch to the navigation directory and run slappasswd. Enter the new password twice.
5. Place the obtained secret code in the slapd.conf file, as shown in Figure 2-2-4 and Figure 2-2-5.
6. Restart the LDAP service.

Note: If you cannot copy the secrete code on the CLI, redirect the secret code generated by the slappasswd command to another file, or press Ctrl+M to select the secret code and then press Ctrl+C to copy it.

slappasswd > \home\test.txt

//Place the secret code generated by the slappasswd command to the test.txt file under the home directory.

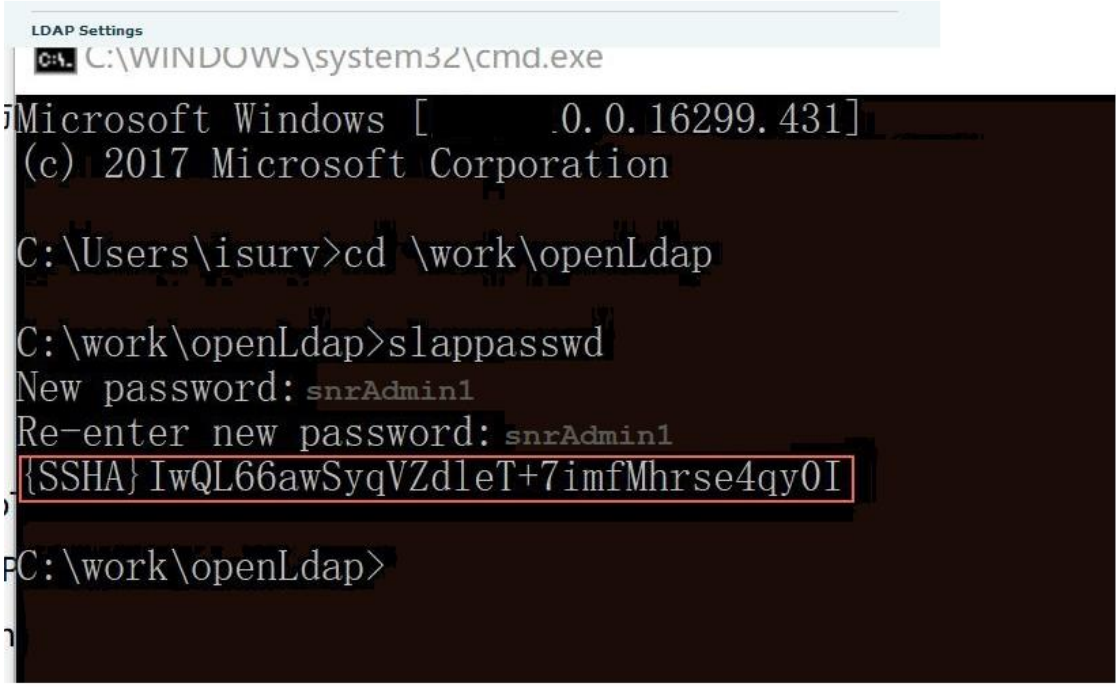


Figure 2-2-4

```
database    mdb
suffix      "dc=snr    ,dc=ru "
rootdn      "cn=Manager,dc=snr    ,dc=ru "
# Cleartext passwords, especially for the rootdn, should
# be avoid.  See slappasswd(8) and slapd.conf(5) for details.
# Use of strong authentication encouraged.
rootpw    {SSHA}IwQL66awSyqVZdleT+7imfMhrse4qy0I
```

Figure 2-2-5

2.3 Starting the SLAPD Service

2.3.1 Procedure

Method 1:

1. Choose Start > Run.
2. Enter cmd to access the CLI. (If you cannot find Run in Windows 10, enter win + r and then cmd.)
3. Access the LDAP installation path, for example, C:/office software/LDAP and run slapd.exe -d 1 -f ./slapd.conf. If conditions allow, it is recommended that LDAP not be installed on drive C and be installed under a pure English path,

as shown in Figure 2-3-1.

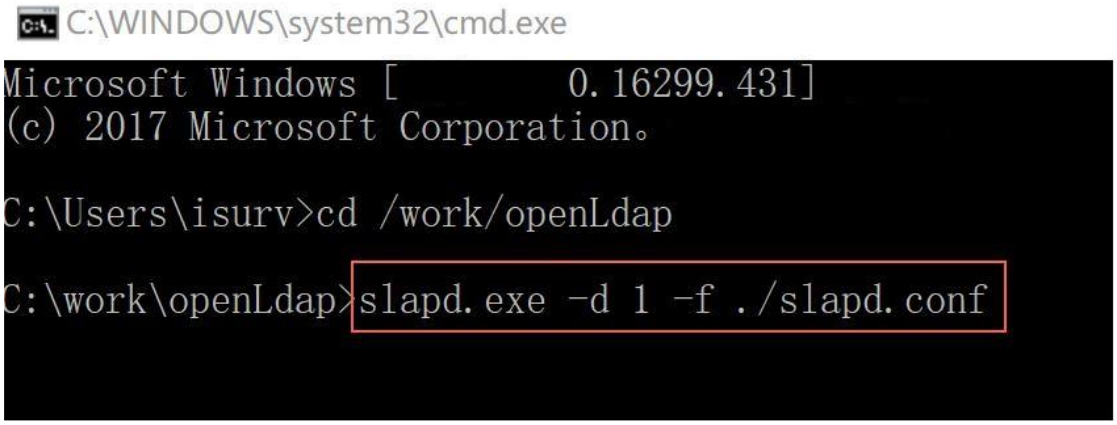


Figure 2-3-1

4. After the service is started successfully, the field slapd starting can be viewed in the place shown in Figure 2-3-2.

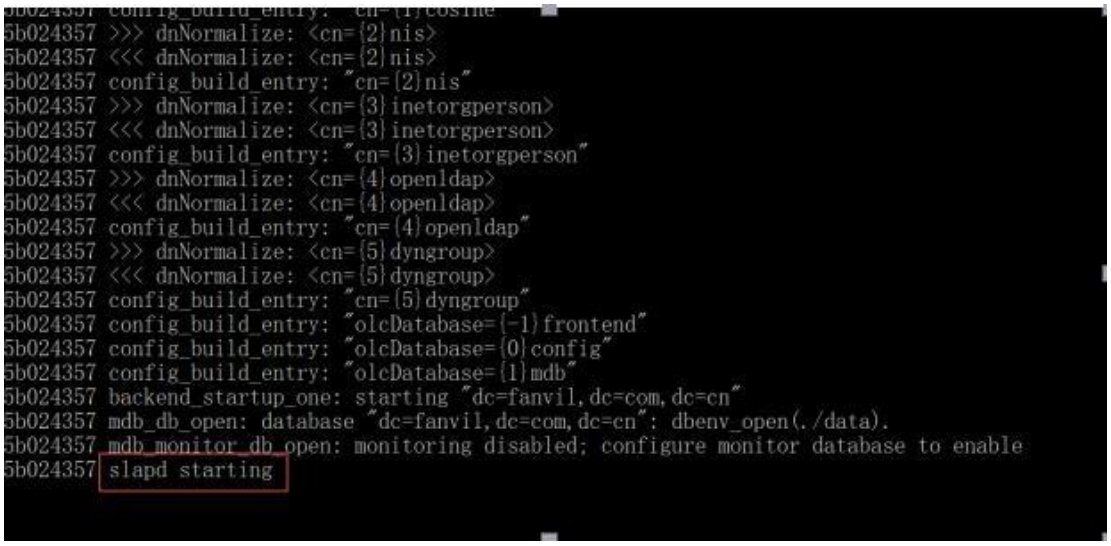


Figure 2-3-2

Note: Do not close the CLI to ensure that the LDAP server runs continuously.

Method 2:

Choose My Computer > Management > Services, find the LDAP service, and enable or disable it.

2.3.2 Adding LDAP Entries

Add the file suffix LDIF, store the added empty file in the installation path of OpenLDAP, open the file with a file editor, and fill in content.

For example, right-click an added test.txt file, change its file name extension to ldif (test.ldif), and open the file with a file editor.

The following is an example of test.ldif.

dn: ou=snr, dc=beijing,dc=ru

ou: snr
objectClass: organizationalUnit

dn: ou=organizationalRolemun, ou=snr,

dc=beijing,dc=ruou: organizationalRolemun
objectClass: organizationalUnit

dn: cn=bingwang1,ou=organizationalRolemun, ou=snr,

dc=beijing,dc=rutelephoneNumber: 8231
registeredAddress: WWWEEE
objectClass: organizationalPerson
telexNumber: 8110
postalAddress: 332211
sn: bing
street: Zqq
cn: bingwang1

dn: cn=zhangqiang1,ou=organizationalRolemun, ou=snr,

dc=beijing,dc=comtelexNumber: 2000
street: Zqw
sn: zhang
telephoneNumber: 2000
ou: 3ou
objectClass: organizationalPerson
postalAddress: 334411
registeredAddress: ACXCXCCXC
cn: zhangqiang1

dn: cn=sunliang,ou=organizationalRolemun, ou=snr, dc=beijing,dc=ru
telephoneNumber: 123333
registeredAddress: WEEWEWEE
objectClass: organizationalPerson
telexNumber: 6564
sn: sun
cn: sunliang

dn: cn=zhangchao,ou=organizationalRolemun, ou=snr, dc=beijing,dc=ru

```
telephoneNumber: 7777
registeredAddress: ZZZWWW
objectClass: organizationalPerson
telexNumber: 54646
sn: zhang
street: XAZ
cn: zhangchao

dn: cn=xieqian,ou=organizationalRolemun, ou=snr, dc=beijing,dc=ru
telephoneNumber: 3312123
registeredAddress: XXXZZZ
objectClass: organizationalPerson
telexNumber: 242342
postalAddress: 332221
sn: xie
cn: xieqian
```

Note: No space is allowed at the beginning or end of each line. An error will be reported if the format is incorrect.

1. Choose Start > Run.
2. Enter cmd to access the CLI. (If you cannot find Run in Windows 10, enter win + r and then cmd.)
3. Access the LDAP installation path, for example, C:/work/openLdap and run slapadd -v -l ./test.ldif. If conditions allow, it is recommended that LDAP not be installed on drive C and be installed under a pure English path.

Note: The slapadd command can be used to operate only the local LDAP service. Before operation, the local LDAP service must be stopped.

Common LDAP attributes:

DN: The DN is unique under a directory. It is used to identify a node. Its attributes are described as follows:

1. CN=Common Name: user name or server name. The maximum length is 80 characters. It can be in Chinese.
2. OU=Organization Unit: There are a maximum of four levels of organizational units. Each level of organizational unit is 32 characters long at most. It can be in Chinese.
3. DC= Domain Component: directory structure
4. O=Organization: organization name. It is optional and contains 3 to 64 characters.

2.3.3 Schema in LDAP

In LDAP, schema specifies the types of objects contained in a directory and the mandatory and optional attributes of each objectClass. Therefore, schema is a data model that determines how data is stored, the type of tracked data, and relationships among data stored in different entries. A schema needs to be specified in the main configuration file slapd.conf to determine the objectClass to be used in the local directory. The administrator can design a schema, which usually comprises the following parts: AttributeDefinition, ClassDefinition, and SyntaxDefinition.

After creating a schema file, copy it to the schema directory of LDAP. Then modify the slapd.conf file and add the new schema file.

For any problems about the creation or the schema, see related network materials for a solution.

2.4 Graphic Management Tool

2.4.1 LDAP Browser

LDAP Browser is an LDAP graphic management tool that can run on Windows systems. It can be used to browse and modify LDAP data and manage contacts entries on LDAP.

2.4.2 Downloading and Installing LDAP Browser

Download jdk1.4 orjdk1.5 or a later version and then download LDAP Browser. For details about how to install and configure environment variables, search for related materials on the Internet for reference.

http://www.blogjava.net/Files/Unmi/LdapBrowser282.rar

LDAP Browser can be directly used without installation. Click lbe.bat under the installation directory to run LDAP Browser.

2.4.3 Adding Initial Data

After you click lbe.bat under the installation directory, the dialog box shown in the following figure is displayed. Click Edit for operation or New to create a session list, as shown in Figure 2-4-1.

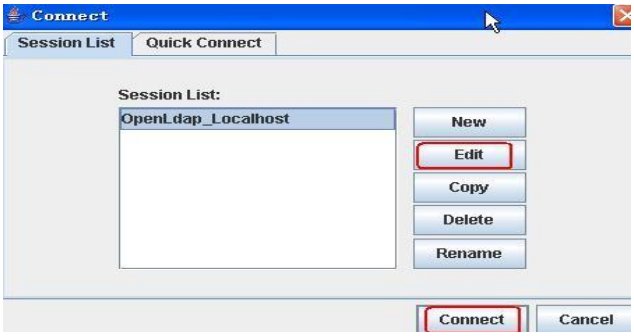


Figure 2-4-1

The following describes the items on the page for creating a session list.

Host: OpenLDAP host name or IP address. Click Fetch DNs to automatically match the root domain of OpenLDAP in slapd.conf.

Port: port reserved by default.

Version: version, which is 3 by default.

Here append base DN must be selected.

User DN: administrator account used during OpenLDAP installation. Here cn=manager is entered.

Password: new password. If the initial password is not changed, the initial password (secret) at installation takes effect by default.

Click Save. On the Connect page, click Connect. To perform anonymous login, select Anonymous bind. It should be noted that an anonymously logged-in user can only view data, as shown in Figure 2-4-2.

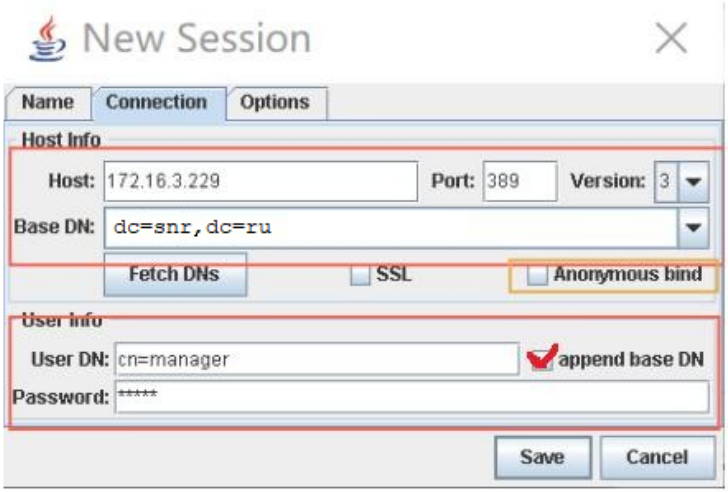


Figure 2-4-2

After related information is filled in, the page is shown in Figure 2-4-3.

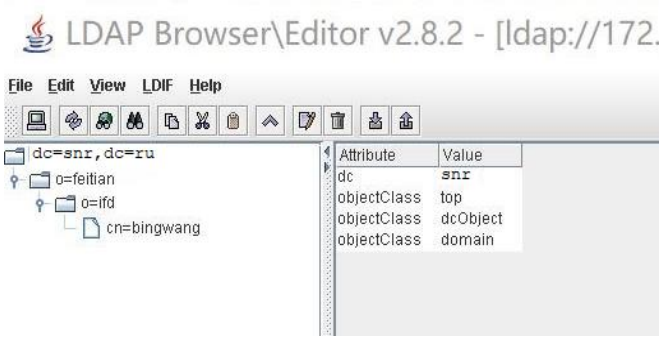


Figure 2-4-3

2.4.4 Adding Directory Attributes

The following takes an LDAP directory with data as an example.

Figures 2-4-4, 2-4-5, and 2-4-6 show how to add attributes for an element.

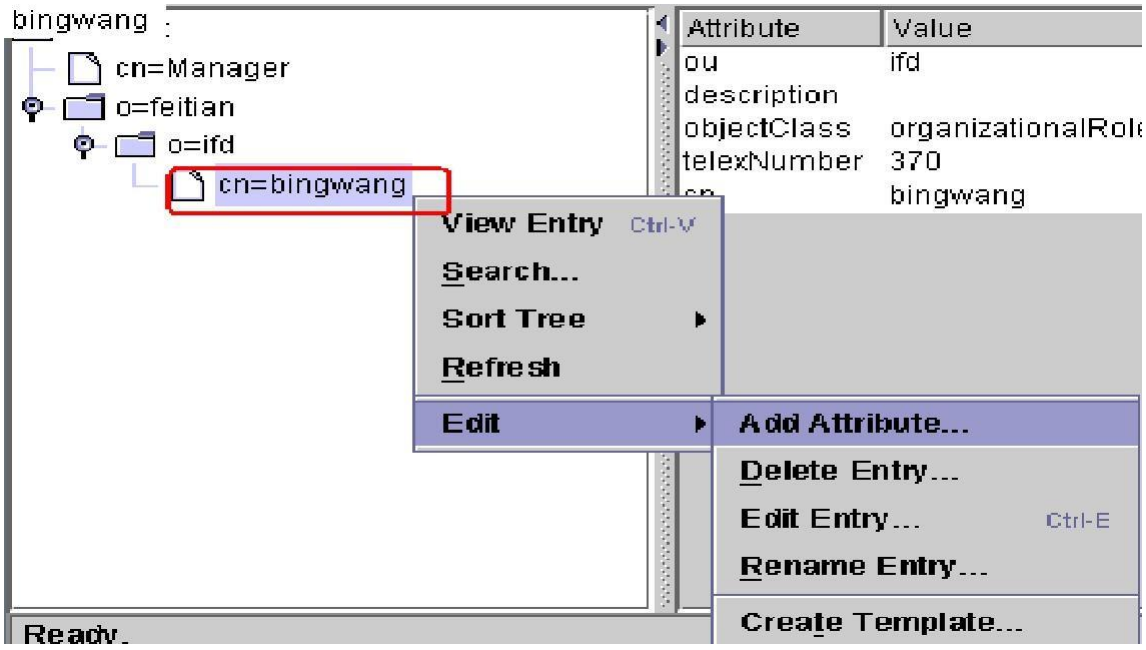


Figure 2-4-4

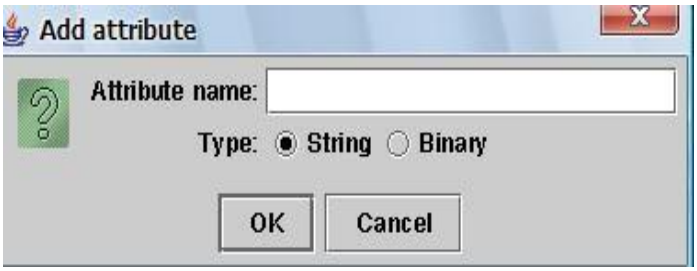


Figure 2-4-5

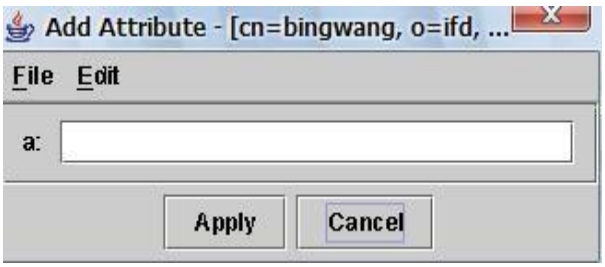


Figure 2-4-6

Click Apply. Added attribute names comply with the LDAP standard or are custom; otherwise, the adding fails. Figure 2-4-6 shows an example of failing to adding attribute a. For details about the default LDAP attribute values, see %openldap_home%\schema\core.schema.

2.4.5 Deleting Directory Attributes

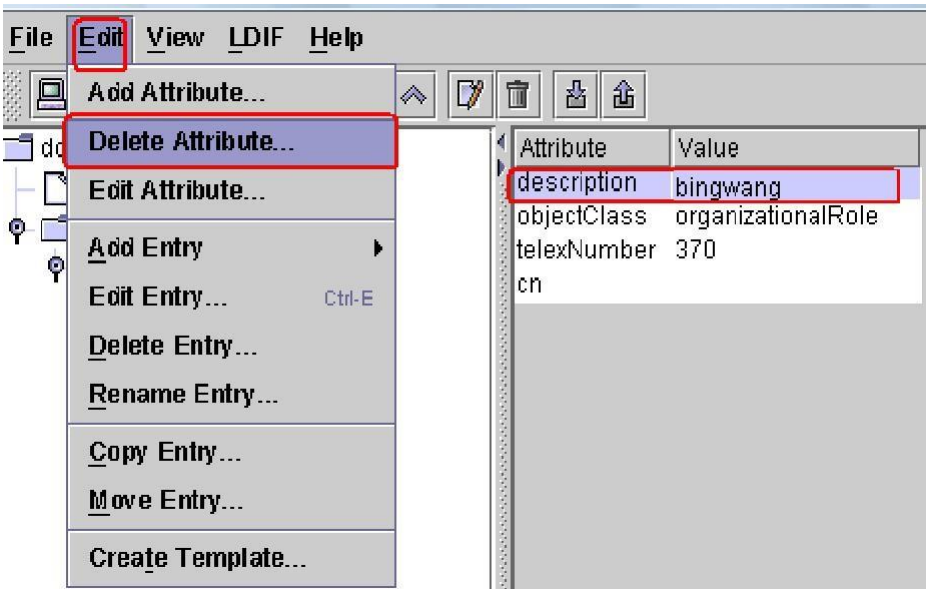


Figure 2-4-7

Select an attribute of an element and delete it, as shown in Figure 2-4-7.

2.4.6 Modifying Directory Attributes

Double-click a directory attribute to open the modification page, enter a new attribute value, and click Apply.

2.4.7 Adding a Directory

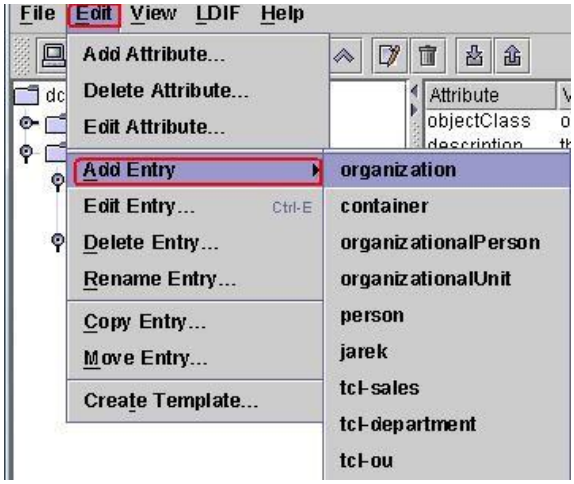


Figure 2-4-8

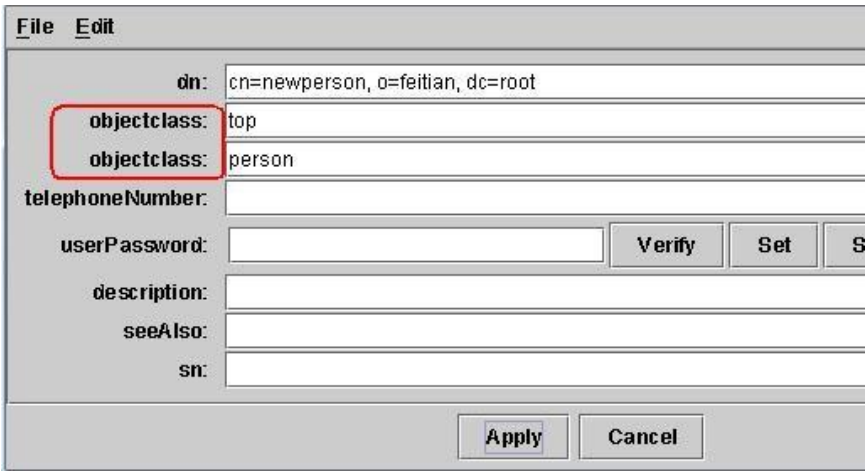


Figure 2-4-9

2.4.8 Modifying a Directory

When a directory is modified, all its attributes are modified. A directory can be modified based on the procedure of modifying directory attributes or the procedure shown in Figure 2.4.10.

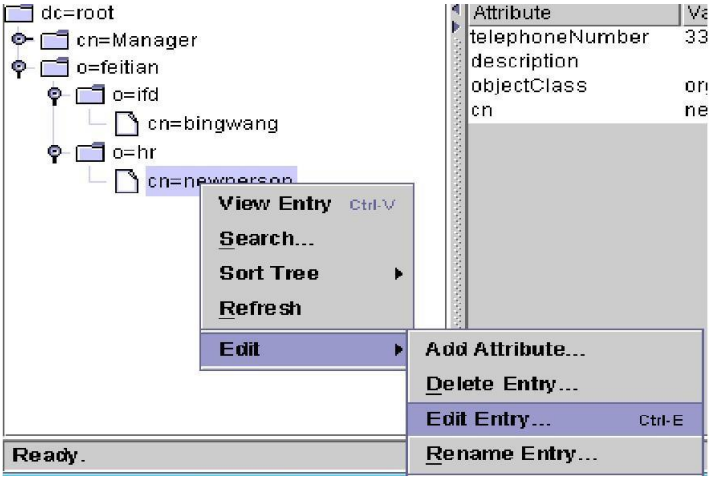


Figure 2-4-10

2.4.9 Deleting a Directory

Select a directory and perform the steps shown in Figure 2-4-11.

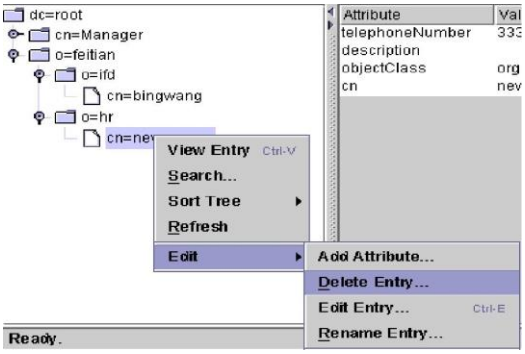


Figure 2-4-11

2.4.10 Example

The following provides an example to help understand the tree structure of LDAP data, as shown in Figure 2-4-12.

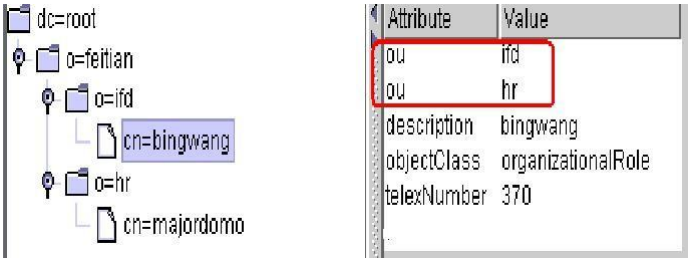


Figure 2-4-12

In Figure 2-4-12, the entity cn=bingwang is at the endmost. What is its complete DN?

dn:cn=bingwang,o=ifd,o=feitian,dc=root

The root node at the topmost is at the last of the expression. In addition to the DN, more attributes may be added for a node. For example, a person in an address book is a node and the address and phone number of the person are attributes. Figure 2-4-12 shows various attributes of user bingwang, including two ou attributes, indicating that the user takes a position in the ifd and hr departments. A node may contain multiple identical attributes with different values. Attributes can be fully utilized to describe various information about a node. The following is the content of the ldif file of node cn=bingwang.

3 Microsoft Active Directory

3.1 Download and install Microsoft Active Directory.

3.1.1 Introduction

Active Directory is a directory service oriented for Windows Standard Server, Windows Enterprise Server, and Windows Datacenter Server.

3.1.2 Installing Microsoft Active Directory on Windows Server 2008 R2

Install Microsoft Active Directory on Windows Server 2008 R2 as follows:

1. Choose Start > Run. Type cmd and press Enter. Then run dcpromo, as shown in Figure 3-1-1.

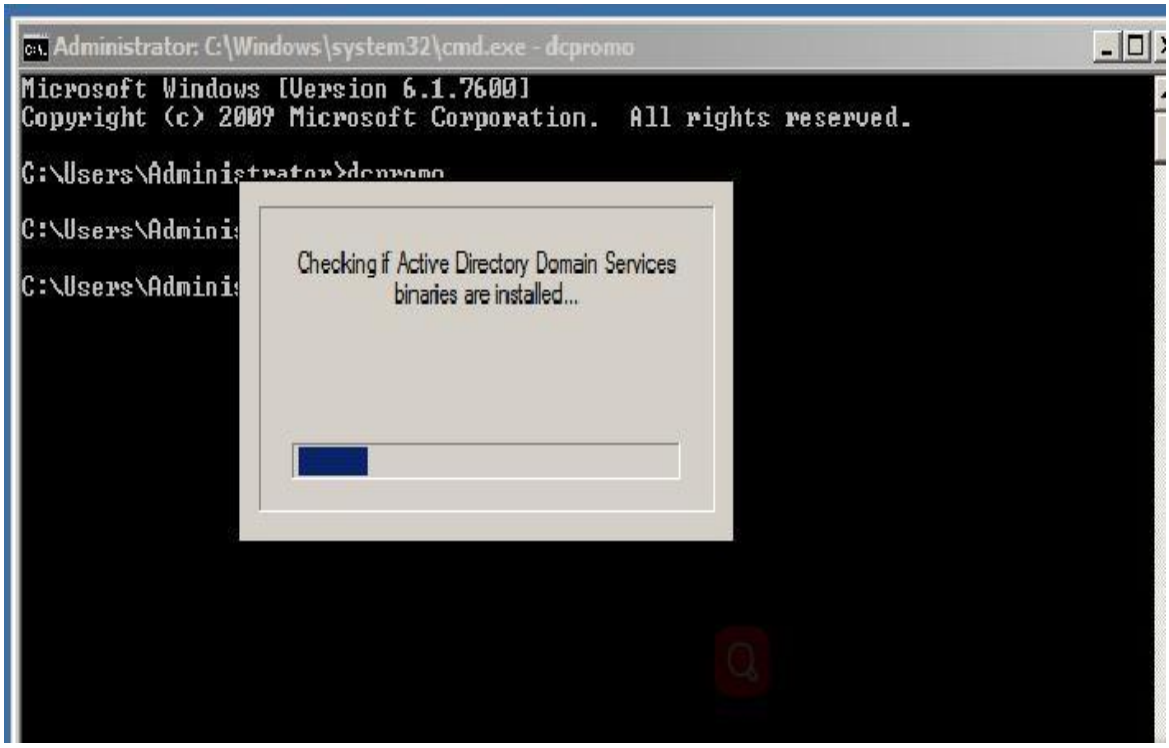


Figure 3-1-1

2. After a period of time, the installation wizard of Active Directory appears. Read the description and click Next, as shown in Figure 3-1-2.

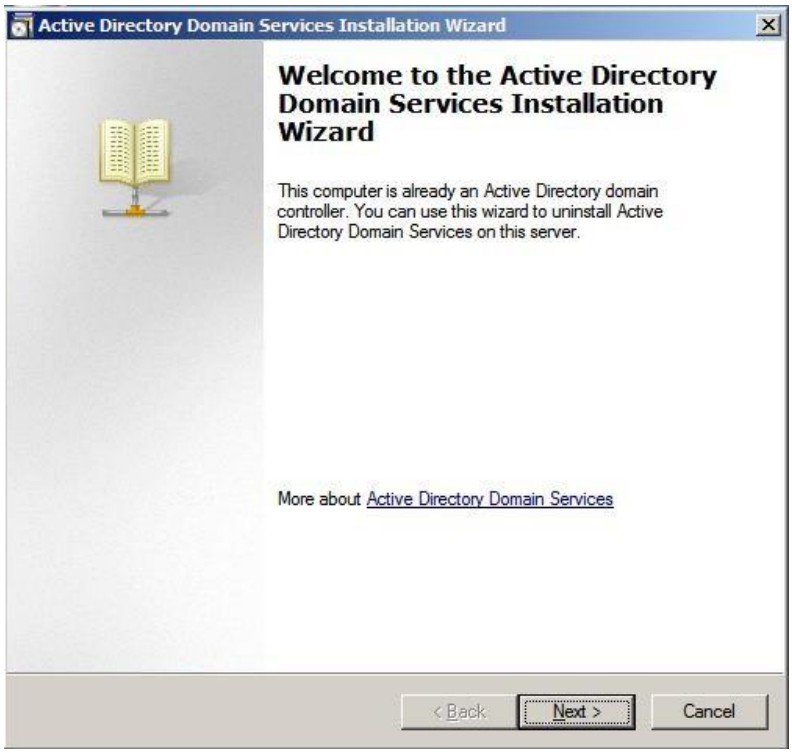


Figure 3-1-2

3. Read the description and click Next, as shown in Figure 3-1-3.

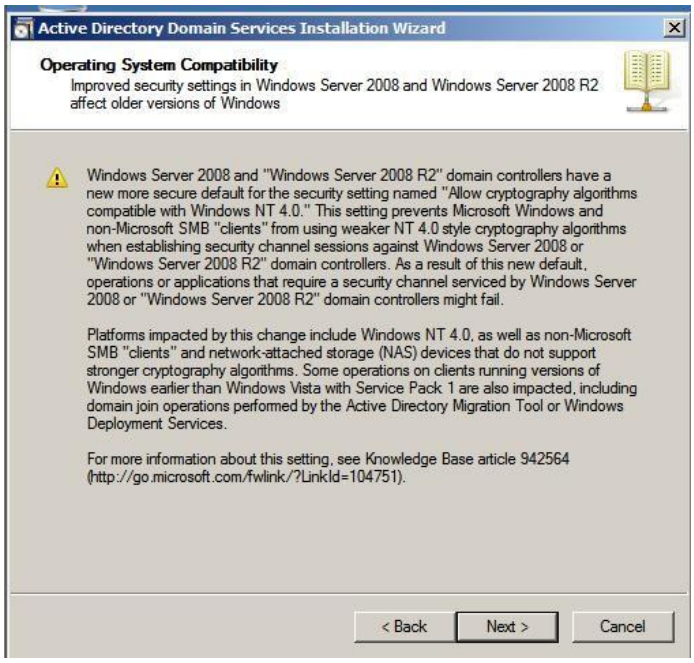


Figure 3-1-3

4. Select Create a new domain in a new forest and click Next, as shown in Figure 3-1-4.

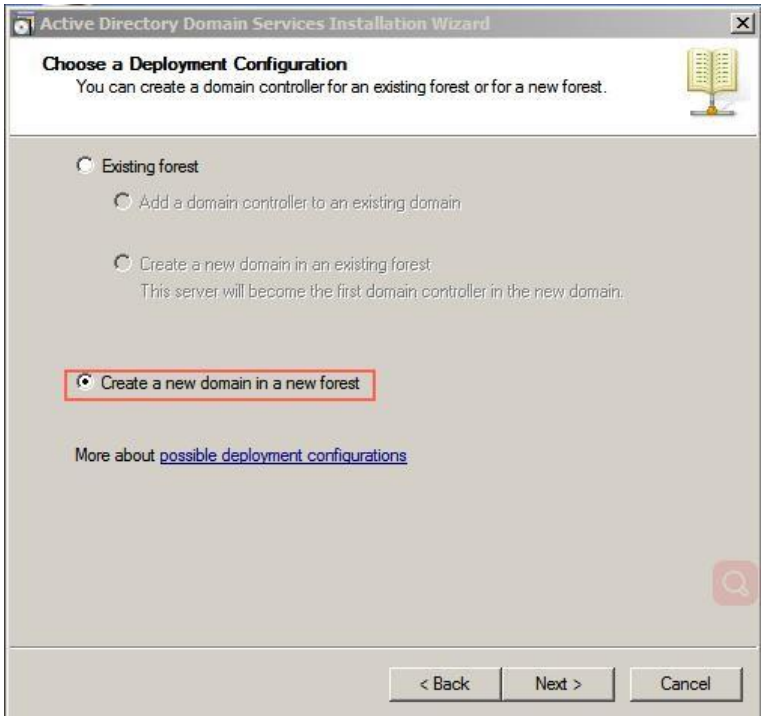


Figure 3-1-4

5. Enter the fully qualified domain name of the new forest root domain name, for example, ldap.snr.ru,

and then click Next, as shown in Figure 3-1-5.

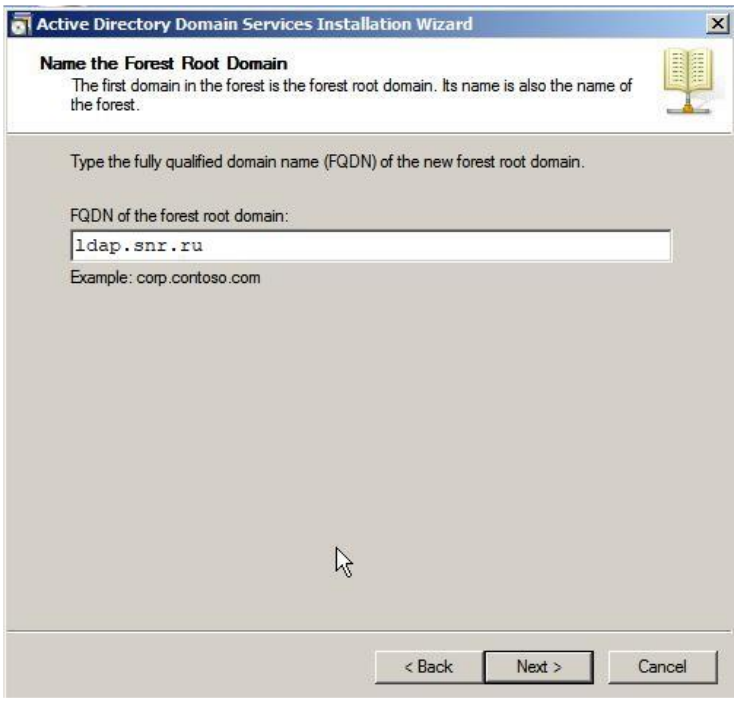


Figure 3-1-5

The installation wizard checks whether this domain name is used in the local network, as shown in Figure 3-1-6.

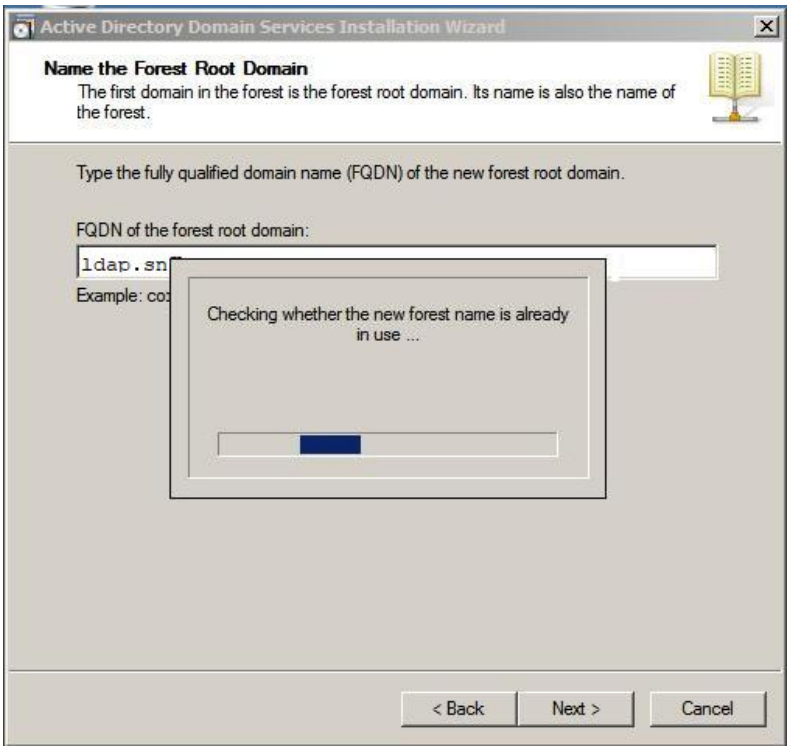


Figure 3-1-6

6. In the Forest functional level drop-down list, select a forest functional level and click Next, as shown in Figure 3-1-7.

For more information, click domain and forest functional levels.

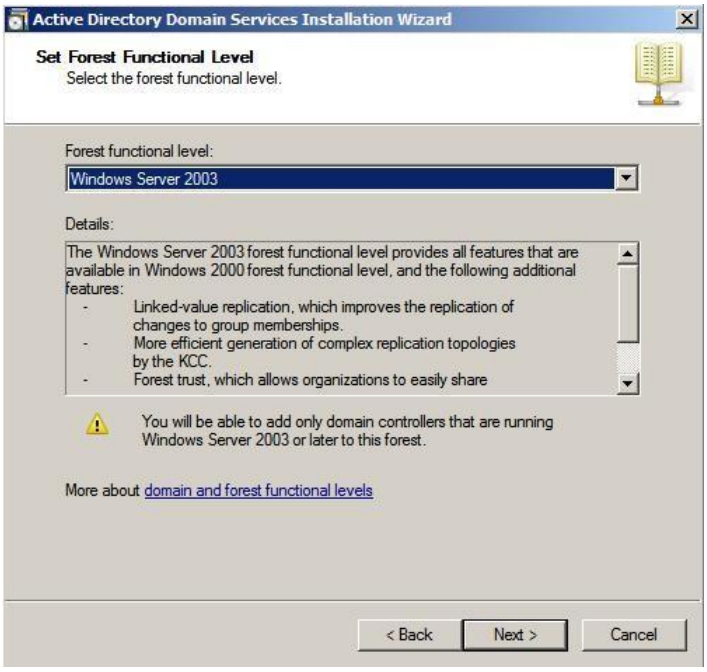


Figure 3-1-7

7. In the Domain functional level drop-down list, select a forest functional level and click Next, as shown in Figure 3-1-8.

For more information, click domain and forest functional levels.

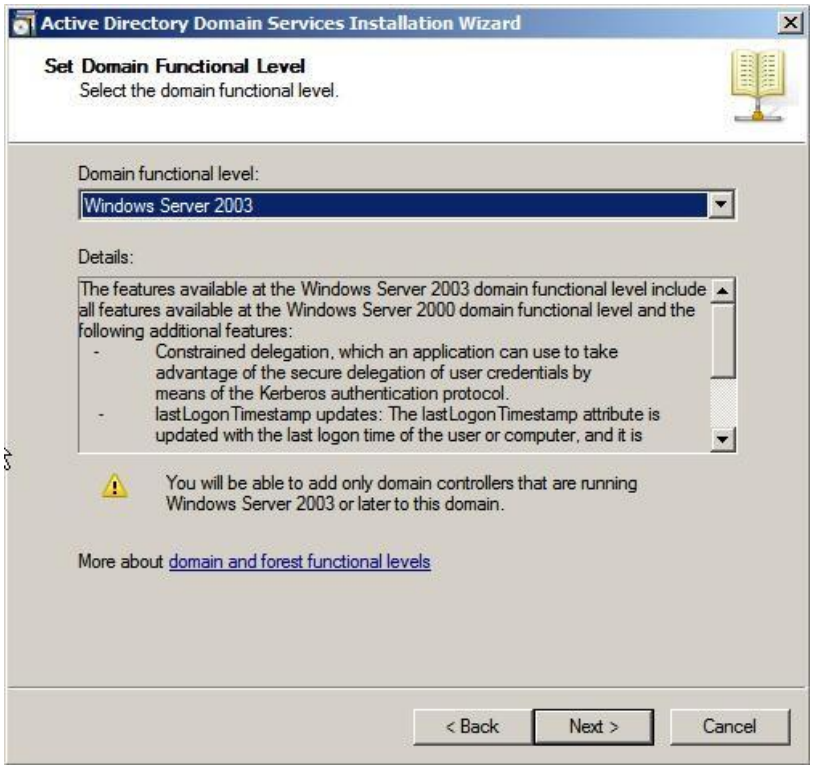


Figure 3-1-8

Note: If you select the Windows Server 2008 R2 forest functional level, you will not be prompted to select a domain functional level.

8. If necessary, select other options for this domain controller and click Next, as shown in Figure 3-1-9.

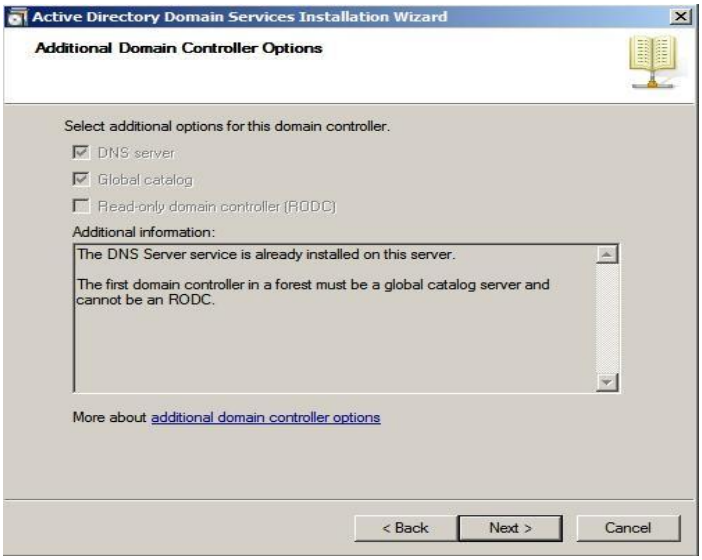


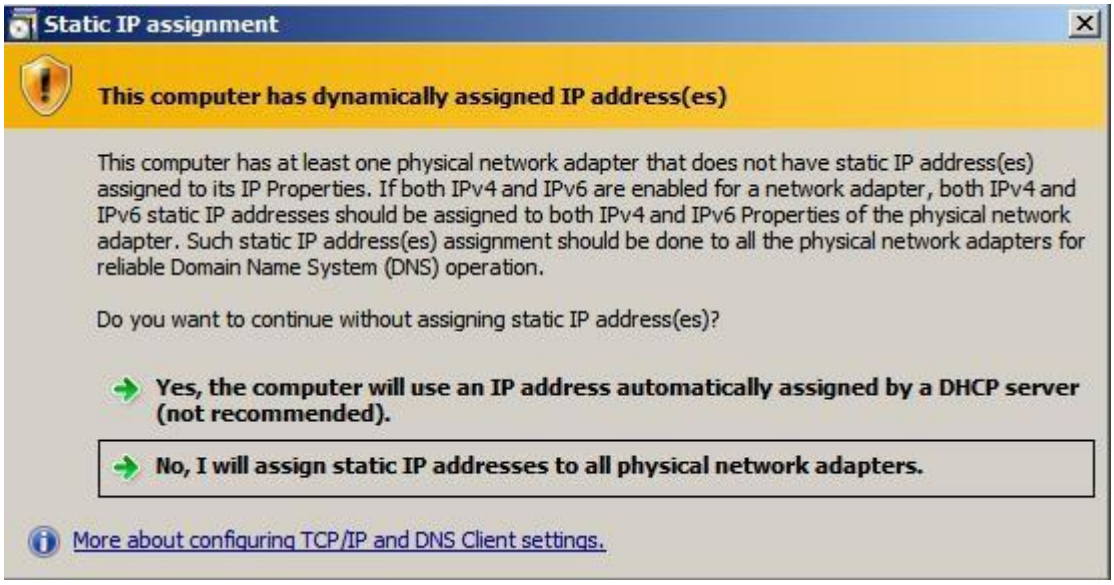
Figure 3-1-9

Note: If no static IP address is assigned to the server, a warning shown in the following figure may be displayed. You are advised to set a static IP address for the server. For any problems, search for related configuration methods on the Internet or contact the network administrator. Here, select No and set a static IP address,

as shown in Figure 3-1-10.

Figure 3-1-10

9. The wizard prompts for DNS delegation. As no DNS is configured, ignore this message and click Yes,



as shown in Figure 3-1-11.

Figure 3-1-11

10. Specify paths for the database, log files, and SYSVOL folder and click Next.

For any questions, click placing Active Directory Domain Services files for query, as shown in Figure 3-1-12.

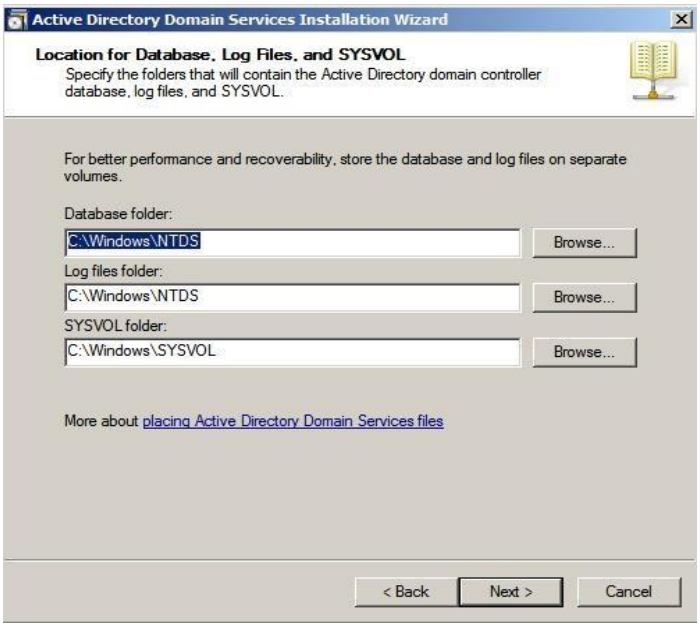


Figure 3-1-12

11. Set a password for Active Directory Restore Mode and click Next. For more information, click Directory Services Restore Mode password.

In the description, a strong password is recommended, that is, one with at least seven characters. For example, if the password set here is Qq123456, you can set a qualified password as desired. Pay attention that the password must be recorded, as shown in Figure 3-1-13.

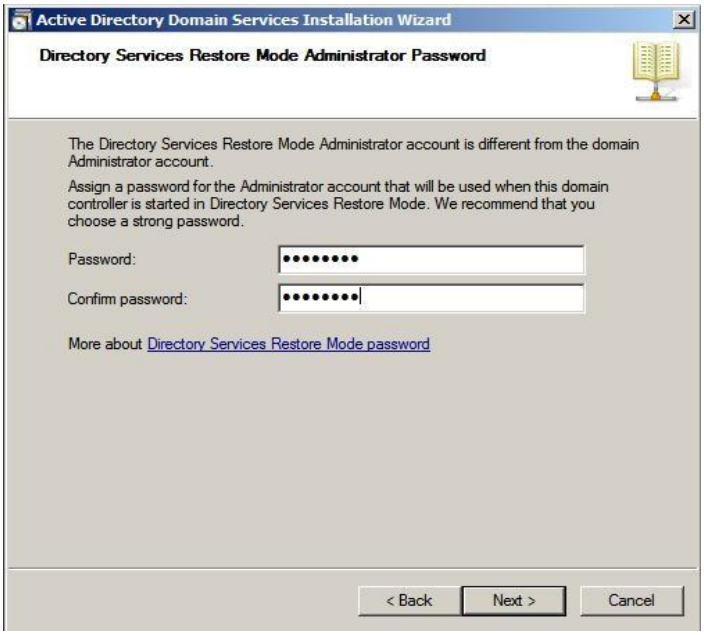


Figure 3-1-13

12. Confirm the configured information and click Next.

If any information is incorrect, click Back and modify the information. For any

problems, click using an answer file, as shown in Figure 3-1-14.

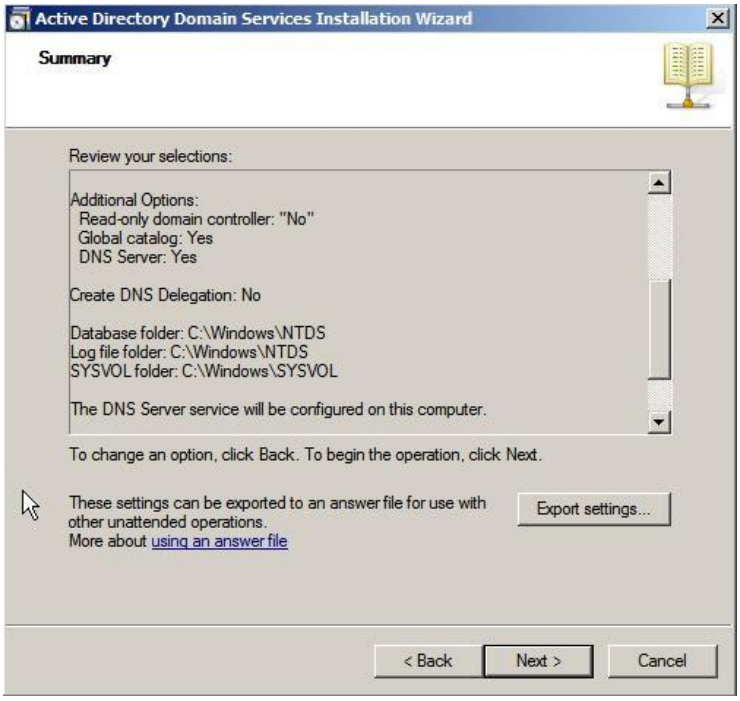


Figure 3-1-14

After the preceding operations are finished, the computer starts creating Active Directory. The required time depends on the hardware performance, as shown in Figure 3-1-15.

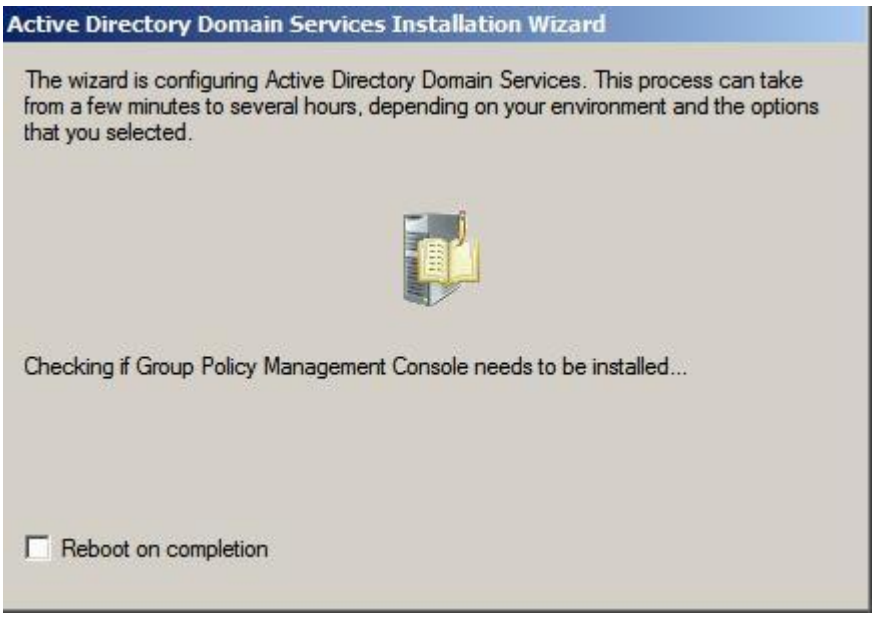


Figure 3-1-15

13. Click Finish, as shown in Figure 3-1-16.

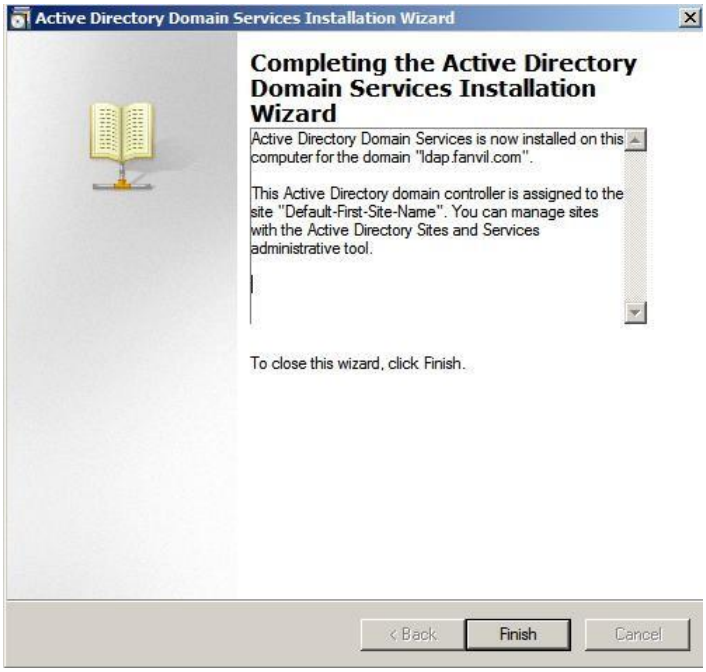


Figure 3-1-16

3.2 Installing Active Directory Lightweight Directory Services Role

3.2.1 Installing Active Directory Lightweight Directory Services Role on Windows Server 2008 R2

1. Choose Start > Management Tools > Server Manager.
2. Right-click Roles and add roles, as shown in Figure 3-2-1.

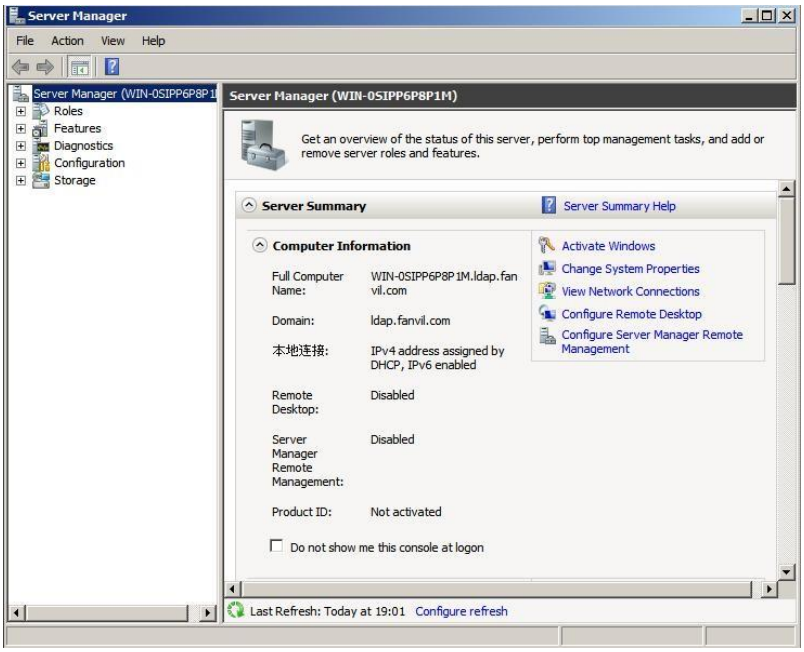


Figure 3-2-1

3. In the displayed dialog box, click Next, as shown in Figure 3-2-2.

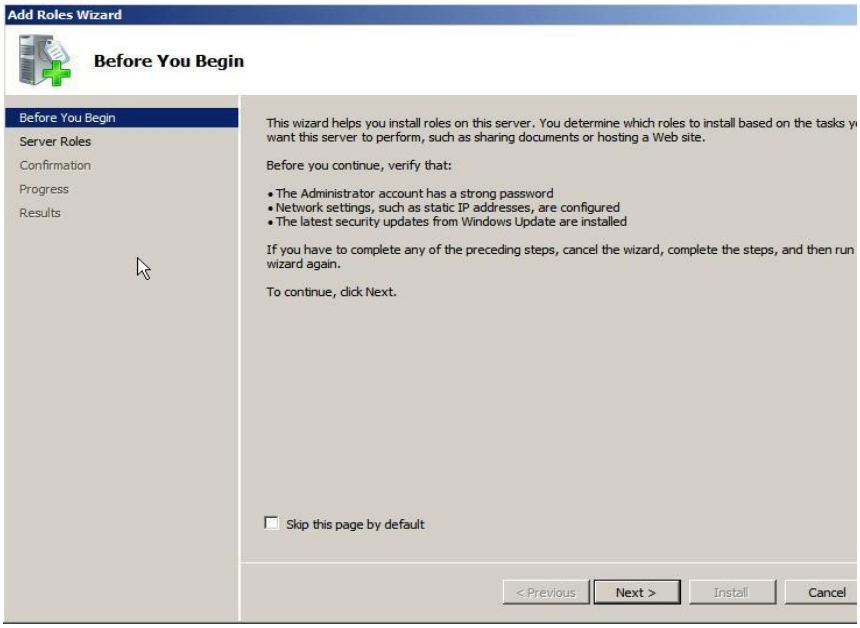
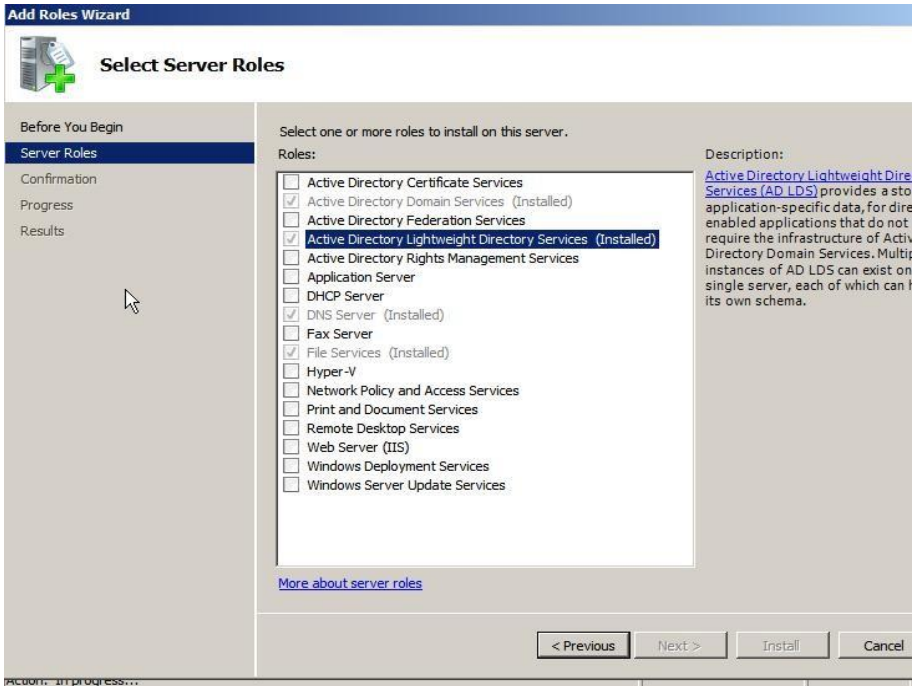


Figure 3-2-2

4. In Server Roles, find Active Directory Lightweight Directory Services, select it, and then click Next, as shown in Figure 3-2-3. For any questions about this role, click Active Directory Lightweight Directory Services (AD LDS) for more information.

Figure 3-2-3



5. Click Next and retain the default settings.

6. When the installation is complete, click Close.

Find Active Directory Lightweight Directory.

Service roles are listed under the role Active Directory Lightweight Directory Services, as shown in Figure 3-2-4.

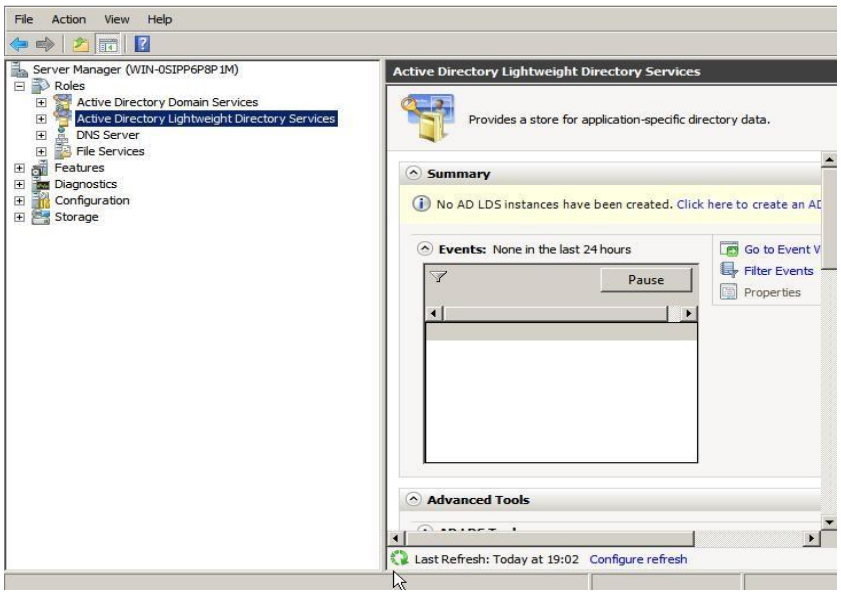


Figure 3-2-4

3.3 Configuring Microsoft Active Directory Server

3.3.1 Configuration Procedure

Entries may be added, modified, or deleted one by one. Entries may also be imported in batches with a tool.

The procedure of adding an entry to Active Directory is as follows:

1. Choose Start > Management Tools > Server Manager.
2. Choose Roles > Active Directory Domain Services > Active Directory Users and Computers.
3. Right-click the newly created domain name and choose New > Organizational Unit, as shown in Figure 3-3-1.

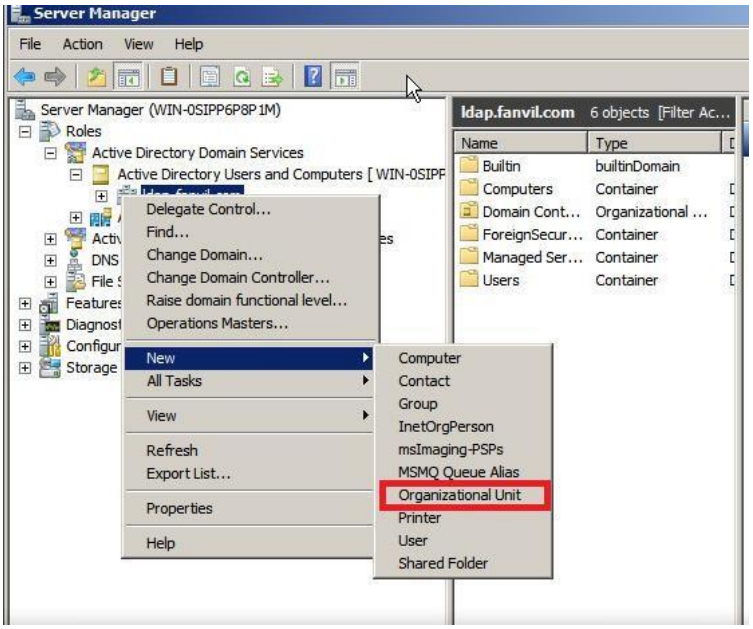


Figure 3-3-1

4. Enter an organizational unit name, for example, snr, as shown in Figure 3-3-2.

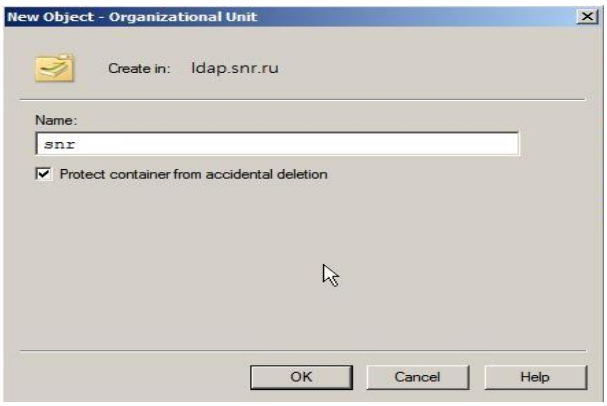


Figure 3-3-2

5. Click OK to save the modification.

6. Right-click the newly created organizational unit and choose New > Contact, as shown in Figure 3-3-3.

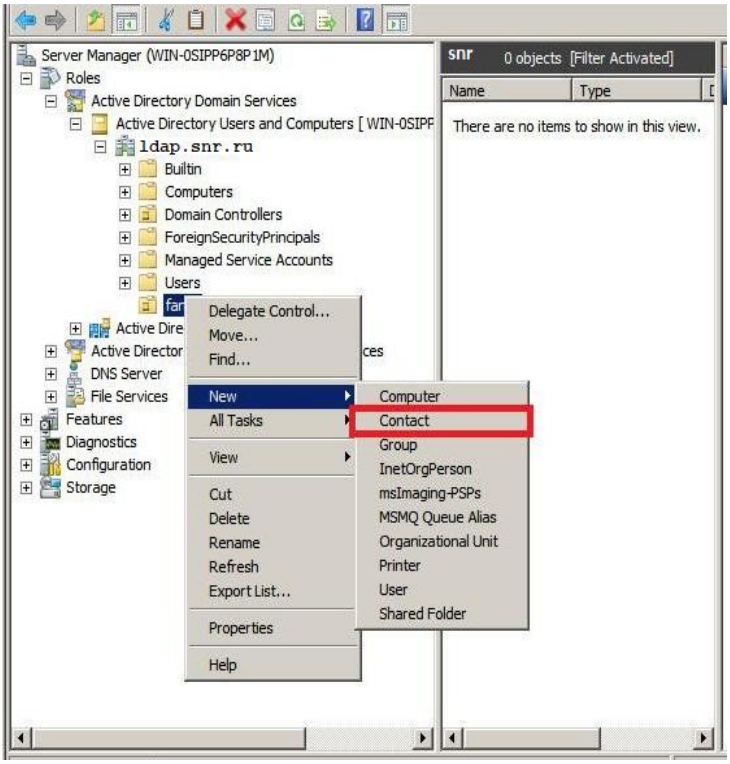


Figure 3-3-3

7. Enter the information in related fields, as shown in Figure 3-3-4.

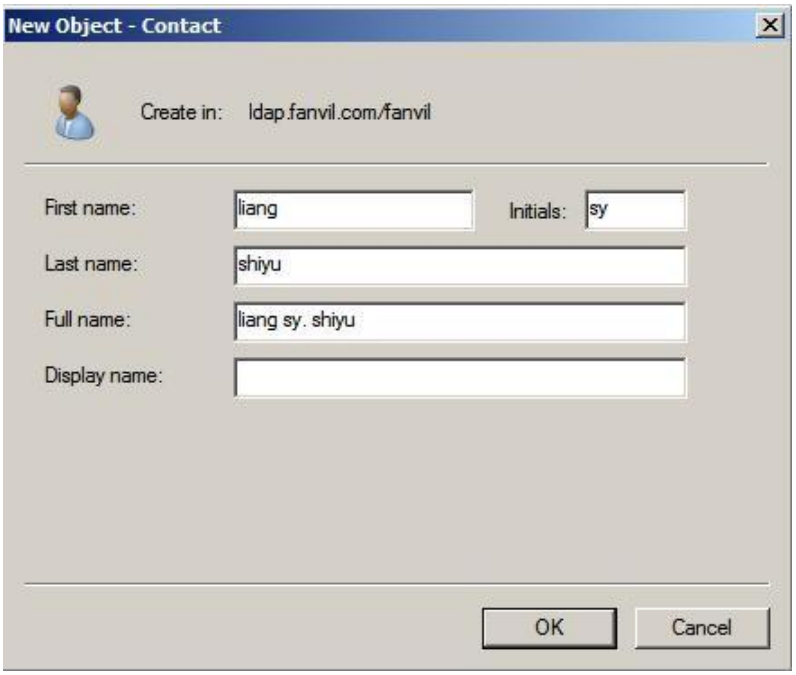


Figure 3-3-4

8. Click OK to save the modification.

9. Double-click the newly added contact and fill in detailed information, as shown in Figure 3-3-5.

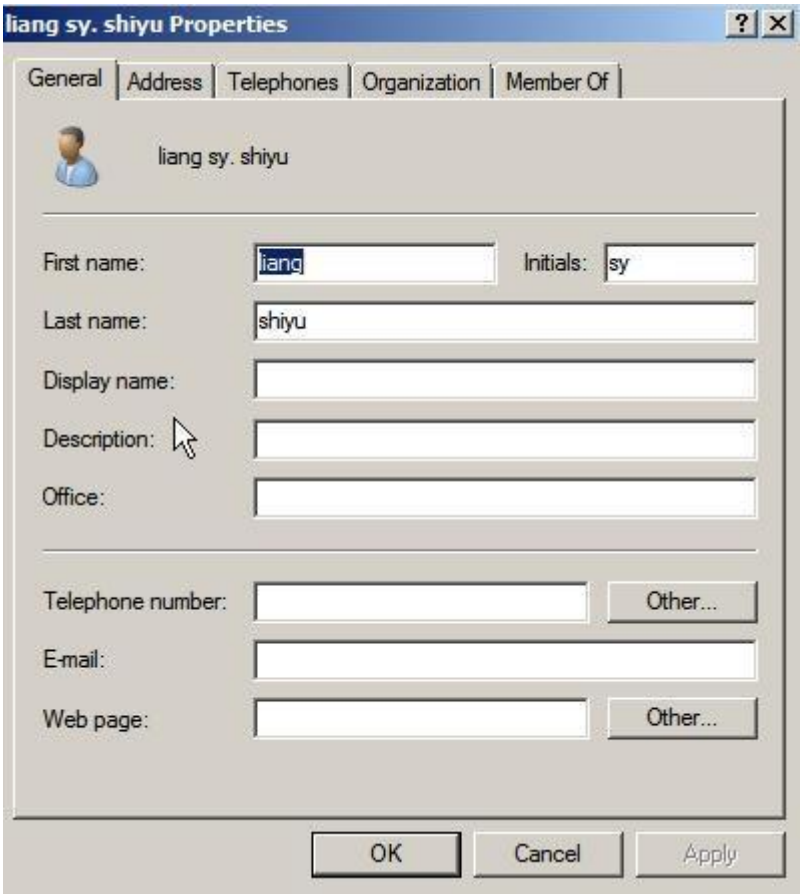


Figure 3-3-5

Click OK to save the modification. A contacts information record is added successfully. You can repeat the preceding steps to modify contacts information.

3.4 Adding an Entry

Sometimes user accounts need to be added to an AD domain in batches. These accounts have identical attributes and also different ones. If they are added on the GUI one by one, the required time and labor will exceed the acceptable range. Generally, if 10 or less user accounts need to be added, the AD user account replication function is used. If more than 10 user accounts need to be added, the CLI needs to be used to import or export objects in batches. By default, Microsoft provides two batch import/export tools: CSVDE (CSV directory exchange) and LDIFDE (LDAP data interchange format directory exchange).

Select a tool based on the task to be performed. To create objects, both tools are applicable. To modify or delete objects, LDIFDE must be used.

3.4.1 Adding Entries to Active Directory with LDIFDE

You can create a file in ldif format to import Active Directory entries in batches. Crate a text document and change the file name extension to ldif. For example, create a file named test.ldif. The following is an example.

```
##Create a new organizational unit##
dn: OU=snr2,DC=ldap,DC=snr,DC=ru
changetype: add
objectClass: top
objectClass: organizationalUnit
ou: snr2
name: snr
##create a new contact##
dn: CN=liang zhang,OU=snr2,DC=ldap,DC=snr,DC=com
changetype: add
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: contact
cn: liang zhang
sn: zhang
givenName: liang
initials: zl
name: liang zhang
ipPhone: 1322
mobile: 3322445566
```

Import the test.ldif file as follows:

1. Choose Start > Run.
2. Enter cmd to access the CLI.
3. Run cd to switch to the directory of the test.ldif file.
4. Run ldifde -i -f test.ldif to import the file. If the file is imported successfully, the screen displays the message "n entries added successfully", as shown in Figure 3-4-1.

```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Administrator.WIN-0SIPP6P8P1M>cd \

C:\>ldifde -i -f test.ldif
Connecting to "WIN-0SIPP6P8P1M.ldap.fanvil.com"
Logging in as current user using SSPI
Importing directory from file "test.ldif"
Loading entries...
2 entries modified successfully.

The command has completed successfully

C:\>_
```

Figure 3-4-1

3.4.2 Adding Entries to Active Directory with CSVDE

In addition to the ldif file, the .csv file can be used to import entries in batches.

Create a table application document (such as an Excel document) and save it.

For example, create an Excel form and change its file name extension to .CSV, that is, test3.csv. Figure 3-4-2 shows the content in the file.

	A	B	C	D	E	F
1	DN	objectClass	ou	cn	sn	ipPhone
2	ou=snr3, dc=ldap, dc=snr, dc=ru	organizationalUnit	snr3			
3	cn=a b, ou=snr2, dc=ldap, dc=snr, dc=ru	contact		a b	a	123

Figure 3-4-2

Import the test3.csv file as follows:

1. Choose Start > Run.
2. Enter cmd to access the CLI.
3. Run cd to switch to the directory of the test3.csv file.
4. Run csvde -i -f test.csv to import the file. If the file is imported successfully, the screen displays the message “n entries modified successfully”, as shown in Figure 3-4-3.

```
C:\>csvde -i -f test3.csv
Connecting to "(null)"
Logging in as current user using SSPI
Importing directory from file "test3.csv"
Loading entries...
2 entries modified successfully.

The command has completed successfully

C:\>_
```

Figure 3-4-3

3.5 Creating a User Account

1. Choose Start > Management Tools > Server Manager.

2.Choose Roles > Active Directory Domain Services > Active Directory Users and Computers.

3. Right-click the newly created domain name and choose New > User, as shown in Figure 3-5-1.

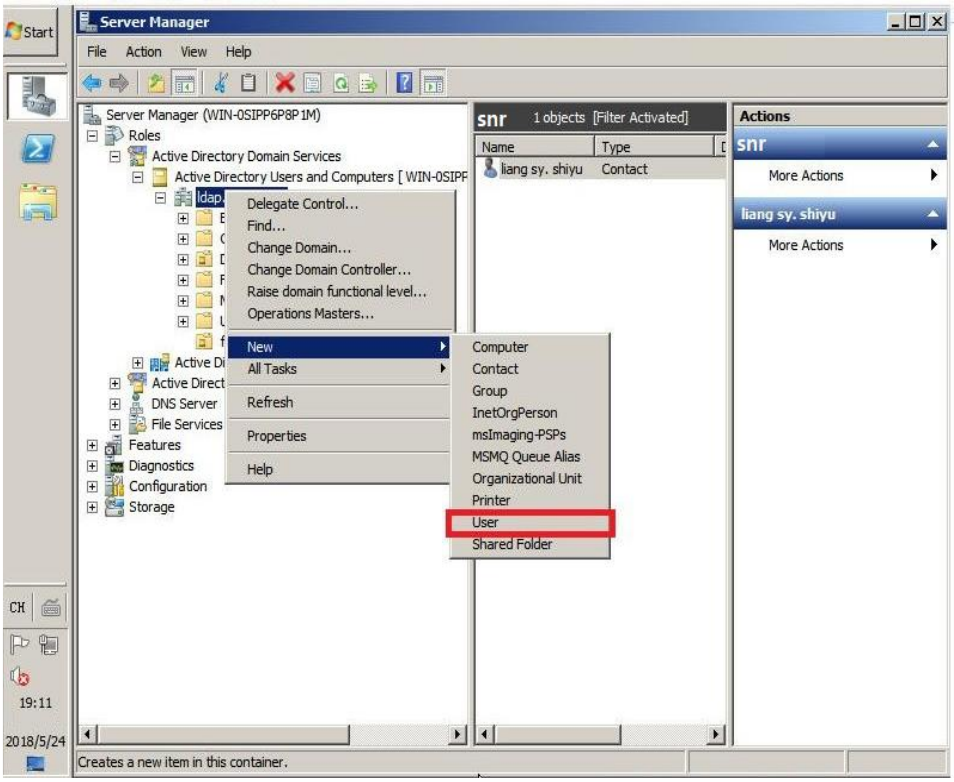


Figure 3-5-1

4. Fill in related information and click Next, as shown in Figure 3-5-2.

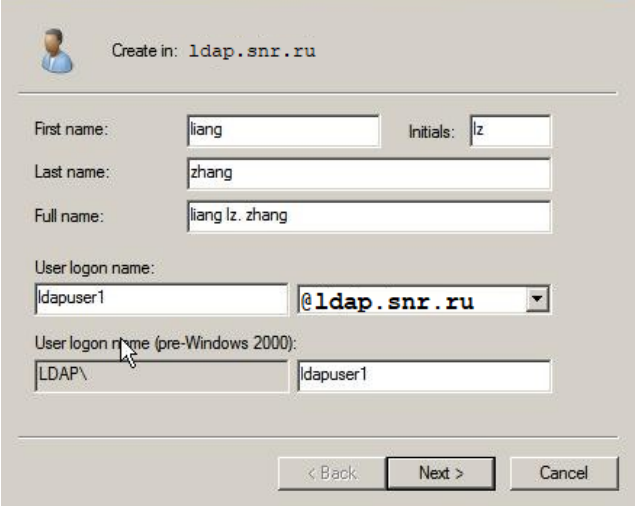


Figure 3-5-2

5. Fill in the password and click Next, as shown in Figure 3-5-3. You can select Password never expires. The administrator can select User cannot change password.

Figure 3-5-3

6. Confirm the information about the created user and click Finish. If any information is not as expected, click Back and modify the information, as shown in Figure 3-5-4.

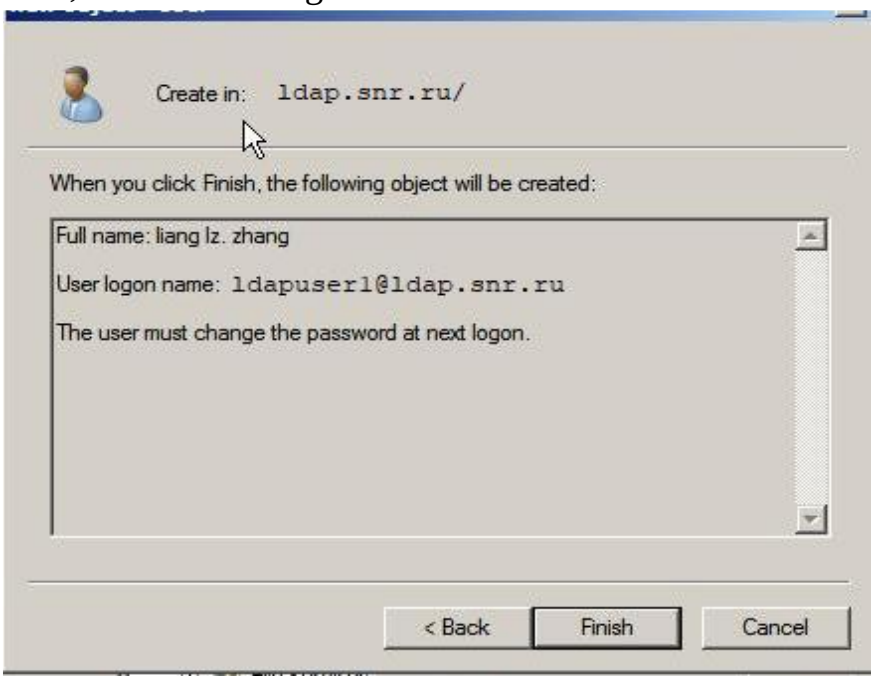


Figure 3-5-4

3.6 About the Telephone Set and Related Configurations

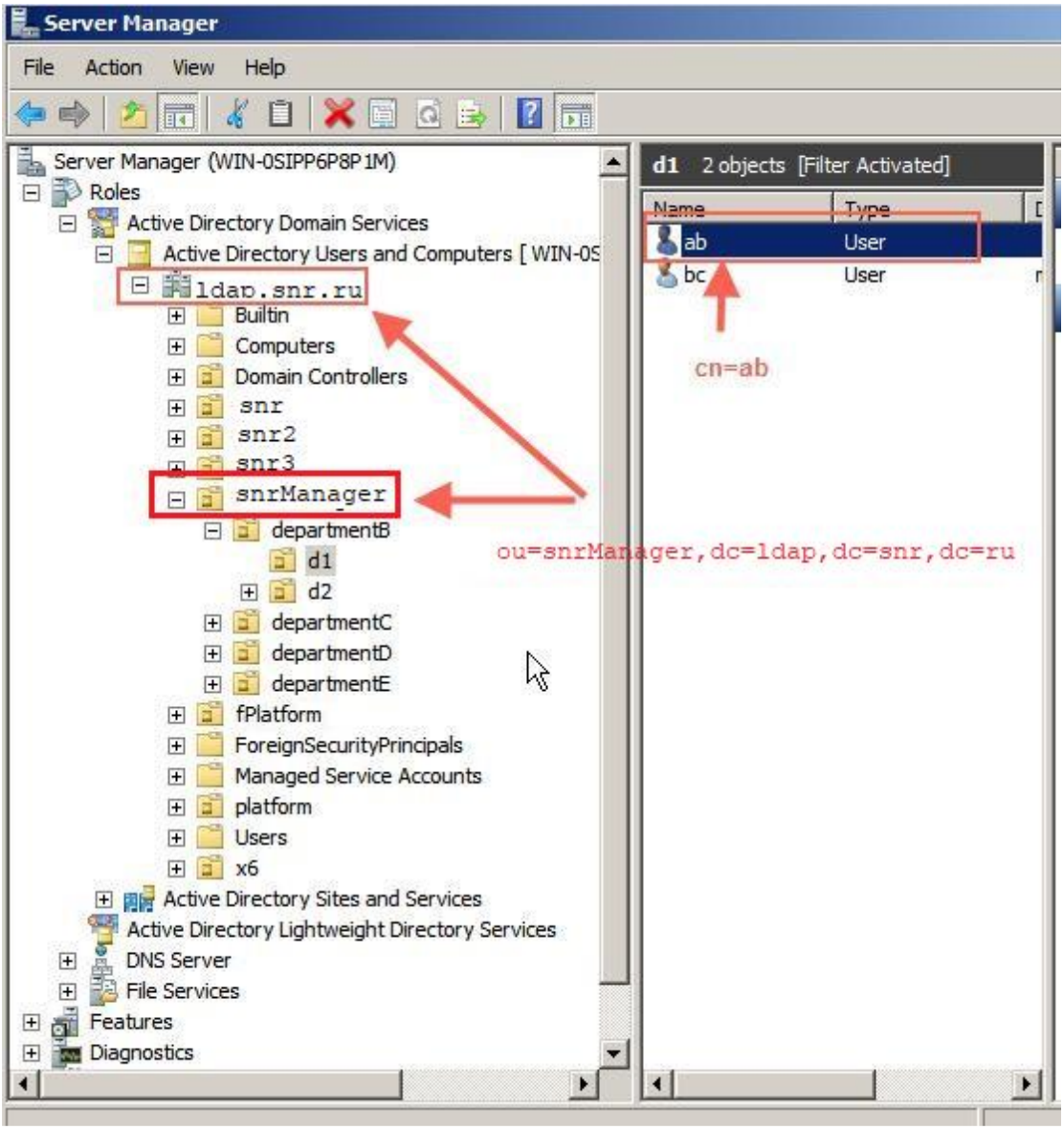


Figure 3-6-1

An organization can be created in the domain ldap.snr.ru to manage the LDAP address book.

In the example shown in the figure, create an organizational unit named snrManager in the domain ldap.snr.ru as the LDAP root node. To facilitate management, create organizational units of various departments under the root node and then add contacts under the organizational units, as shown in Figure 3-6-2.

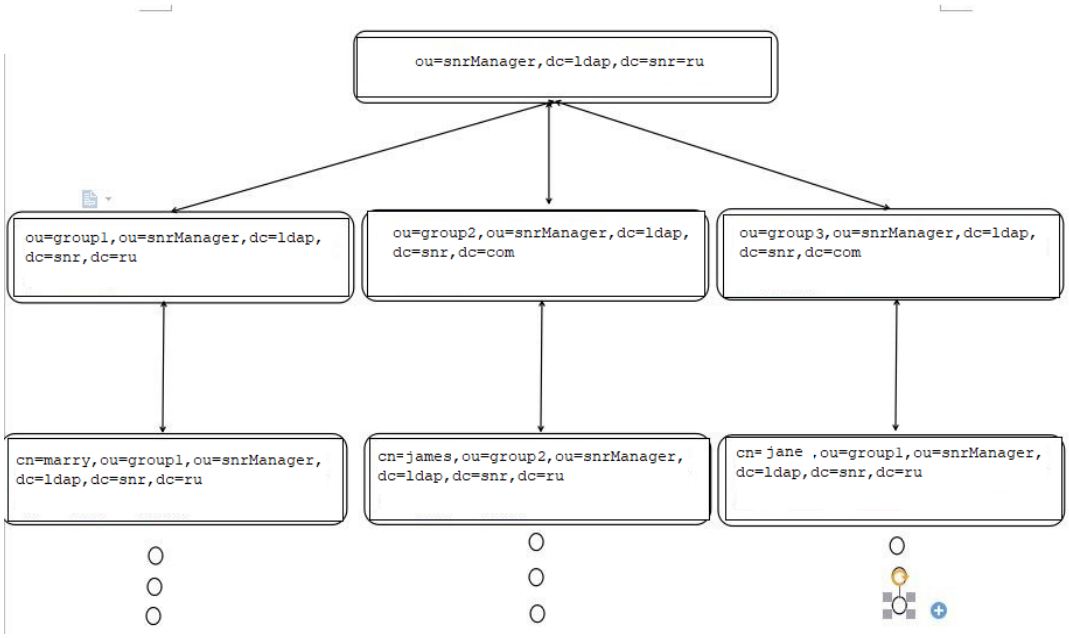


Figure 3-6-2

Then perform configuration on the webpage of the telephone set, as shown in Figure 3-6-3.

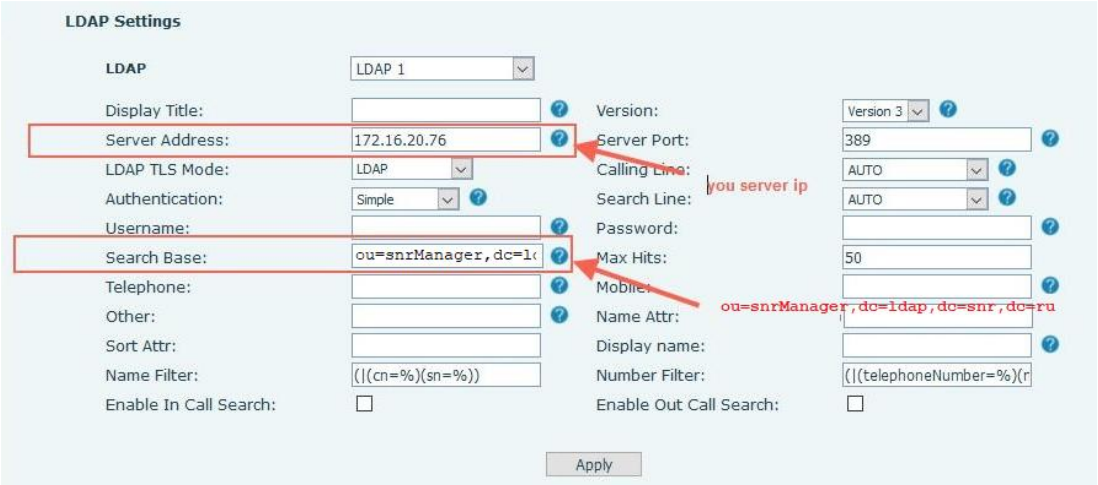


Figure 3-6-3

Active Directory provides options for other configuration items such as office phone number. The following table describes the common attributes.

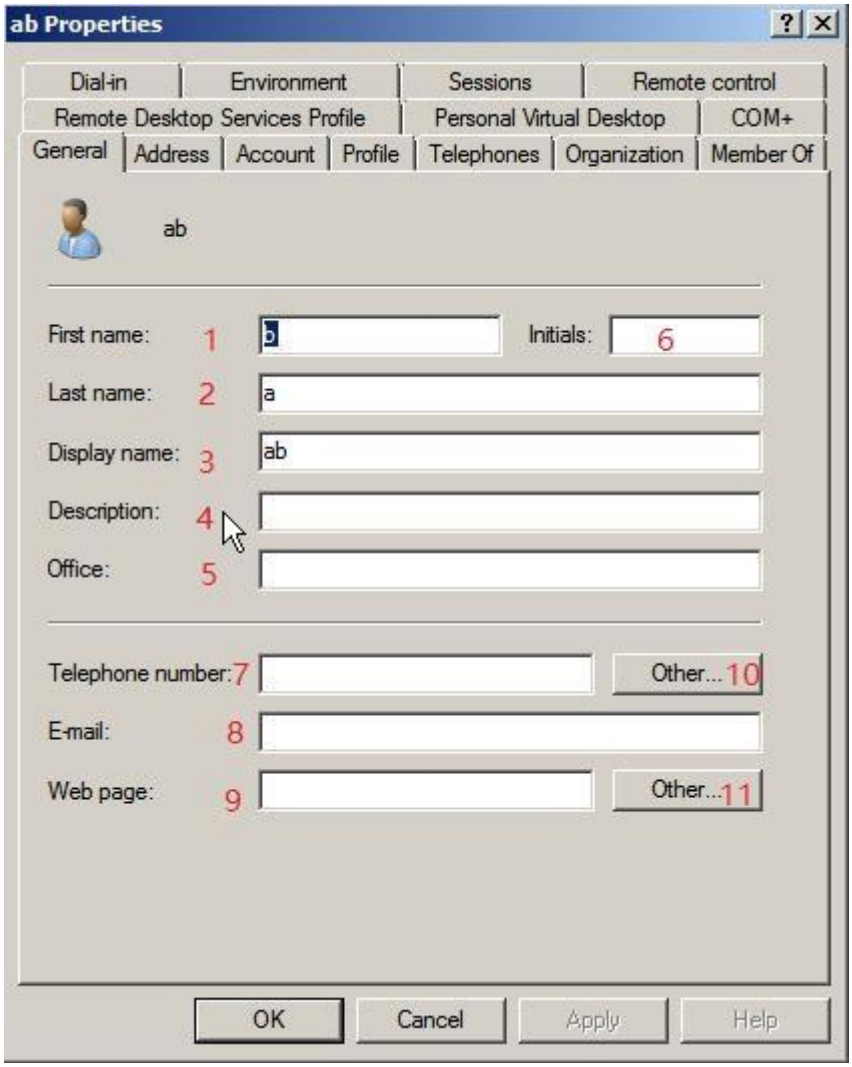


Figure 3-6-4

No.	Field Label	Attribute Name
1	First name	sn:
2	Last name	givenName
3	Display name	displayName
4	Description	description
5	Office	physicalDeliveryOfficeName
6	Initials	initials
7	Telephone number	telephoneNumber
8	E-mail	mail
9	Web page	wWWHomePage
10	Other	otherTelephone
11	Other	url

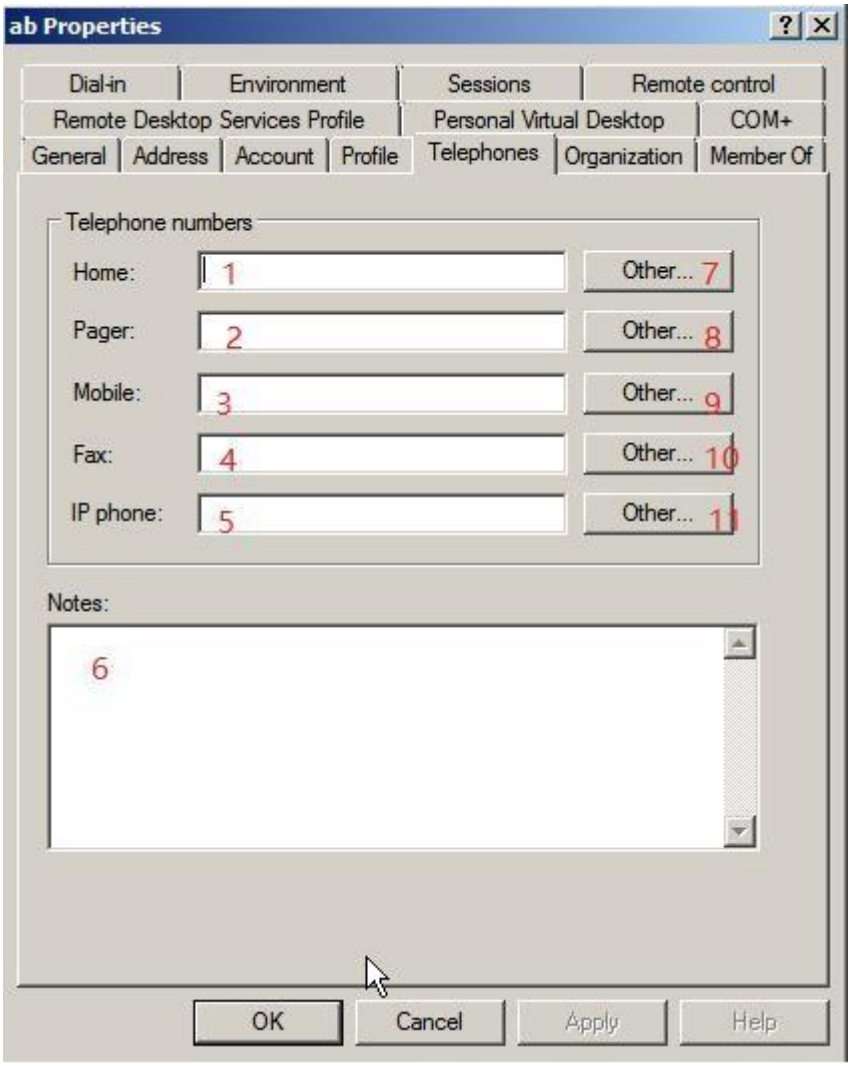


Figure 3-6-5

No.	Field Label	Attribute Name
1	Home	homePhone
2	Pager	pager
3	Mobile	mobile
4	Fax	facsimileTelephoneNumber
5	IP phone	ipPhone
6	Notes	info
7	Other	otherHomePhone
8	Other	otherPager
9	Other	otherMobile
10	Other	otherFacsimileTelephoneNumber
11	Other	otherIpPhone

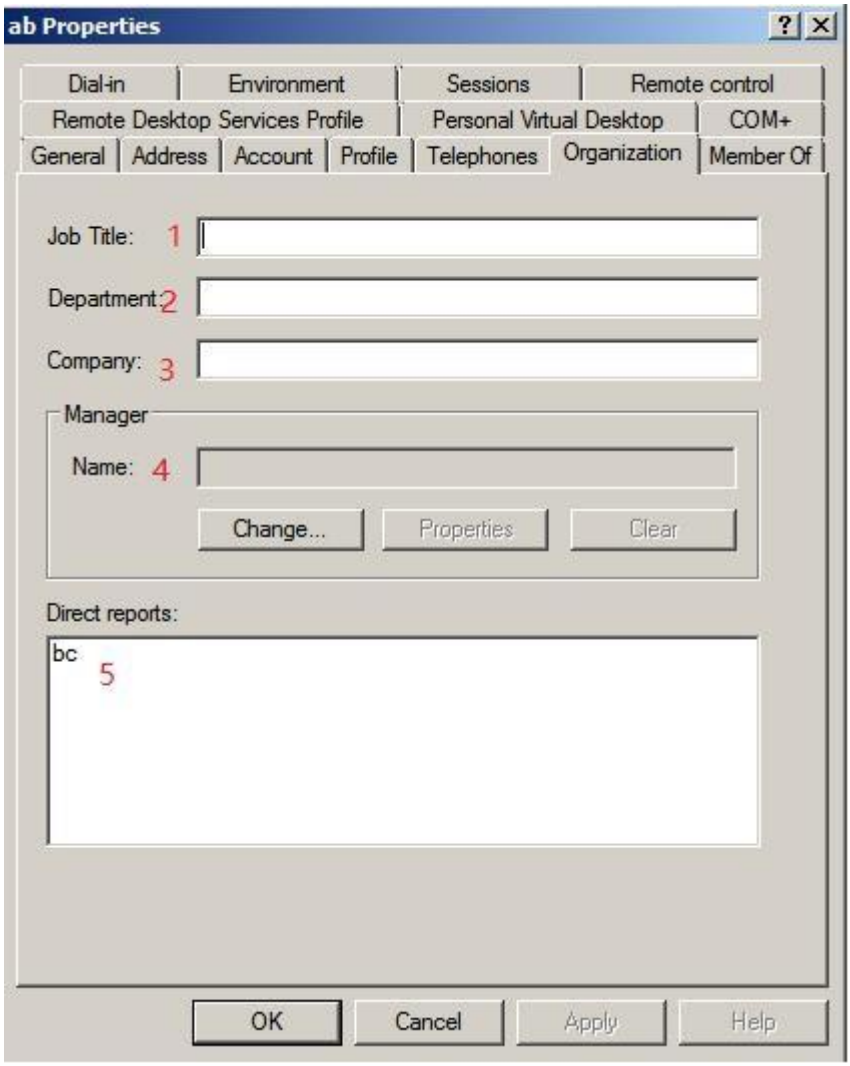


Figure 3-6-6

No.	Field Label	Attribute Name
1	Company	company
2	Department	department
3	Job Title	title
4	Manager-Name	manager
5	Direct reports	directReports

After configuring a user, log in to the address book in a simple way. In the preceding example, the created user name is ldapuser1@ldap.snr.ru and password is Qq123456. Figure 3-6-7 shows the web configuration of the telephone set.

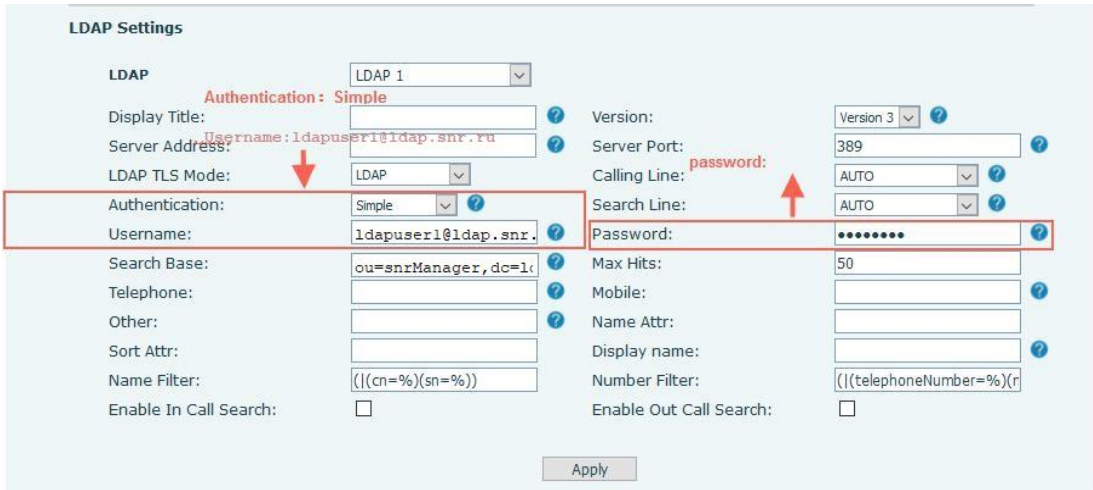


Figure 3-6-7

About the three configuration items Telephone, Mobile, and Other:

You can configure the information as desired. For example:

You can enter a phone number, pager number, home number, or IP phone number in Telephone. Then you can query it once related information is configured on the server. This is the same for Mobile and Other,

as shown in Figure 3-6-8.

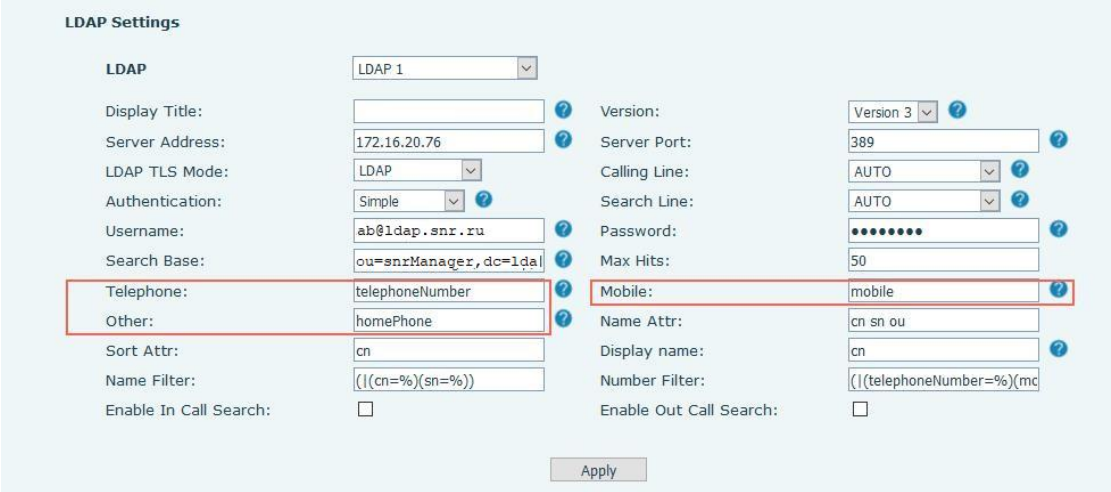


Figure 3-6-8

Based on the preceding attributes, set the office phone fields as follows: telephoneNumber for the telephone number, mobile for the mobile number and homePhone for the home number. In this way, the phone number, mobile number, and home number configured on the server can be viewed on the telephone set. Other configurations will be described in the following sections.

4 Building OpenLDAP in Linux

4.1 Installation Overview

For servers running on Linux, OpenLDAP is used to build the LDAP server. The following describes the required libraries and the precautions.

4.1.1 Berkeley DB

Berkeley DB (acquired by Oracle) is an open-source embedded database management system developed by Sleepycat Software in the US. It provides scalable and high-performance data management services with transaction protection for applications. OpenLDAP requires Berkeley DB to store data. Therefore, install Berkeley DB first.

Note: Before downloading db.tar, confirm the OpenLDAP version to be downloaded. The two are compatible only under certain versions.

For example, OpenLDAP-2.4.44 is compatible only with Oracle Berkeley 4.4-4.8 or 5.0-5.1.

If any error is reported during the installation of OpenLDAP, the reason may be version incompatibility.

Error：BerkeleyDB version incompatible with BDB/HDB backends

4.1.2 Cyrus SASL

SASL is short for Simple Authentication and Security Layer. It is intended for protocol authentication. If a service, such as SMTP or LDAP to be built, uses SASL, SASL-enabled applications will share code.

4.1.3 OpenLDAP

For details about OpenLDAP, see the preceding sections. OpenLDAP is compatible only with certain Berkeley DB versions. Therefore, check the version to be installed in advance.

4.2 Installation

Ubuntu 12.04.1 is used. Run the following command to view the Linux VM version:

```
#cat /etc/issue
```

Perform installation based on the sequence described in this document.

Note: It is recommended that the following installation operations be performed by user root.

4.2.1 Installing Cyrus SASL

Download and install Cyrus SASL. Navigate to the created directory and perform installation.

Here version 2.1.25 is installed.

```
#wget http://ftp.andrew.cmu.edu/pub/cyrus-mail/cyrus-sasl-2.1.25.tar.gz
```

Figure 4-2-1 shows the download screen.

Note: Ensure that the VM can connect to the network properly. If the input r esource is incorrect, the 404 error message will be displayed.

```
Distributor ID: Ubuntu
Description:    Ubuntu 12.04.1 LTS
Release:        12.04
Codename:       precise
linux@ubuntu:~$
linux@ubuntu:~$
linux@ubuntu:~$
linux@ubuntu:~$ wget http://download.fanvil.com/tool/ldap/cyrus-sals-2.1.25.tar.gz
--2018-06-08 23:04:14--  http://download.fanvil.com/tool/ldap/cyrus-sals-2.1.25.tar.gz
Resolving download.fanvil.com (download.fanvil.com)... 23.235.192.36
Connecting to download.fanvil.com (download.fanvil.com)|23.235.192.36|:80... connected.
HTTP request sent, awaiting response... 404 Not Found
2018-06-08 23:04:14 ERROR 404: Not Found.

linux@ubuntu:~$ wget http://ftp.andrew.cmu.edu/pub/cyrus-mail/cyrus-sasl-2.1.25.tar.gz
--2018-06-08 23:07:02--  http://ftp.andrew.cmu.edu/pub/cyrus-mail/cyrus-sasl-2.1.25.tar.gz
Resolving ftp.andrew.cmu.edu (ftp.andrew.cmu.edu)... 128.2.10.106
Connecting to ftp.andrew.cmu.edu (ftp.andrew.cmu.edu)|128.2.10.106|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 5209240 (5.0M) [application/x-tar]
Saving to: `cyrus-sasl-2.1.25.tar.gz'

27% [===============>                                        ] 1,449,984    258K/s  eta 18s
```

Figure 4-2-1

Run the following command to decompress the downloaded package:

```
#tar xzvf cyrus-sasl-2.1.25.tar.gz
```

Figure 4-2-2 shows the decompressed file.

```
cyrus-sasl-2.1.25/saslauthd/auth_ldap.c
cyrus-sasl-2.1.25/saslauthd/auth_rimap.c
cyrus-sasl-2.1.25/saslauthd/auth_shadow.h
cyrus-sasl-2.1.25/saslauthd/saslauthd.8
cyrus-sasl-2.1.25/saslauthd/auth_krb4.h
cyrus-sasl-2.1.25/saslauthd/AUTHORS
cyrus-sasl-2.1.25/saslauthd/krbtf.h
cyrus-sasl-2.1.25/saslauthd/getaddrinfo.c
cyrus-sasl-2.1.25/saslauthd/auth_ldap.h
cyrus-sasl-2.1.25/saslauthd/cache.h
cyrus-sasl-2.1.25/saslauthd/lak.h
cyrus-sasl-2.1.25/saslauthd/configure
cyrus-sasl-2.1.25/saslauthd/mechanisms.c
cyrus-sasl-2.1.25/saslauthd/cfile.c
cyrus-sasl-2.1.25/saslauthd/auth_getpwent.h
cyrus-sasl-2.1.25/saslauthd/COPYING
cyrus-sasl-2.1.25/saslauthd/md5.c
cyrus-sasl-2.1.25/saslauthd/saslcache.c
cyrus-sasl-2.1.25/saslauthd/Makefile.am
cyrus-sasl-2.1.25/saslauthd/NEWS
cyrus-sasl-2.1.25/saslauthd/aclocal.m4
cyrus-sasl-2.1.25/saslauthd/auth_sia.h
cyrus-sasl-2.1.25/saslauthd/saslauthd-main.h
cyrus-sasl-2.1.25/saslauthd/README
cyrus-sasl-2.1.25/saslauthd/LDAP_SASLAUTHD
cyrus-sasl-2.1.25/saslauthd/auth_dce.h
cyrus-sasl-2.1.25/saslauthd/auth_sasldb.c
cyrus-sasl-2.1.25/saslauthd/Makefile.in
cyrus-sasl-2.1.25/saslauthd/auth_dce.c
cyrus-sasl-2.1.25/README
cyrus-sasl-2.1.25/Makefile.in
linux@ubuntu:~/openLdap$
```

Figure 4-2-2

Open the decompressed file and run the following commands for configuratio n, as shown in Figure 4-2-3.

```
#cd cyrus-sasl-2.1.25
#./configure –prefix=/usr/local/sasl2 –with-dblib=no –without-des –with-openssl=
/usr/local/ssl
```

```
linux@ubuntu:~/openLdap/cyrus-sasl-2.1.25$ ./configure --prefix=/usr/local/sasl2 --with-db
--with-dblib   --with-dbpath
linux@ubuntu:~/openLdap/cyrus-sasl-2.1.25$ ./configure --prefix=/usr/local/sasl2 --with-db
--with-dblib   --with-dbpath
linux@ubuntu:~/openLdap/cyrus-sasl-2.1.25$ ./configure --prefix=/usr/local/sasl2 --with-dblib=no --with
out-des --with-openssl=/usr/local/ssl
```

Figure 4-2-3

After configuration, you are prompted to input make. Then input make, as shown in Figure 4-2-4.

```
#make
```

```
checking whether you have sa_len in struct sockaddr...
checking for socklen_t... (cached) yes
configure: updating cache .././config.cache
configure: creating ./config.status
config.status: creating Makefile
config.status: creating saslauthd.h
config.status: executing depfiles commands
Configuration Complete. Type 'make' to build.
linux@ubuntu:~/openLdap/cyrus-sasl-2.1.25$
```

Figure 4-2-4

Input make install as prompted, as shown in Figure 4-2-5.

```
_sasldb.o lak.o auth_ldap.o cache.o cfile.o krbtf.o utils.o ipc_unix.o ipc_doors
.o saslauthd-main.o md5.o -lcrypt  -lresolv
gcc -DHAVE_CONFIG_H -DSASLAUTHD_CONF_FILE_DEFAULT=\"/usr/local/sasl2/etc/saslaut
hd.conf\" -I. -I. -I.. -I. -I./include -I./include -I./../include    -g -O2 -MT
testsaslauthd.o -MD -MP -MF .deps/testsaslauthd.Tpo -c -o testsaslauthd.o testsa
slauthd.c
In file included from globals.h:43,
                 from testsaslauthd.c:60:
mechanisms.h:29:2: warning: #ident is a deprecated GCC extension
mv -f .deps/testsaslauthd.Tpo .deps/testsaslauthd.Po
gcc  -g -O2   -o testsaslauthd testsaslauthd.o utils.o  -lresolv
make[3]: Leaving directory `/home/fanvil/Downloads/cyrus-sasl-2.1.25/saslauthd'
make[2]: Leaving directory `/home/fanvil/Downloads/cyrus-sasl-2.1.25/saslauthd'
make[2]: Entering directory `/home/fanvil/Downloads/cyrus-sasl-2.1.25'
make[2]: Leaving directory `/home/fanvil/Downloads/cyrus-sasl-2.1.25'
make[1]: Leaving directory `/home/fanvil/Downloads/cyrus-sasl-2.1.25'
root@ubuntu:/home/fanvil/Downloads/cyrus-sasl-2.1.25# make install
```

Figure 4-2-5

Configure a library file search path. If this path is not configured, path search may fail when an executable file is executed. The error message is as follo ws:

Error while loading shared libraries

If this error message is displayed, see reference document 2 for a solution.

Run the following commands to configure a library file search path:

```
#echo "/usr/local/sasl2/lib" >> /etc/ld.so.conf
#echo "/usr/local/sasl2/lib/sasl2" >> /etc/ld.so.conf
#ldconfig  -v
```

Replace the original SASL file.

```
# cd /usr/lib
# mv libsasl2.so libsasl2.so.OFF
# mv libsasl2.so.2.0.23 libsasl2.so.2.0.23.OFF
# mv lIbsasl2.so.2 libsasl2.so.2.OFF
# ln -s /usr/local/sasl2/lib/* /usr/lib
# ln -s /usr/local/sasl2/lib/sasl2 /usr/lib/sasl2
# ln -s /usr/local/sasl2/lib/libsasl2.so.2.0.23 /usr/lib/libsasl2.so.2
#  ln  -s /usr/local/sasl2/lib/libsasl2.so  /usr/lib/libsasl2.so
```

4.2.2 Installing Berkeley DB

Here version 4.6.21 is installed.

After downloading the installation package, run the following command to decompress the package. Then navigate to the build_unix folder, as shown in Figure 4-2-6.

```
#tar xzvf db-4.6.21.tar.gz
#cd db-4.6.21/build_unix
```

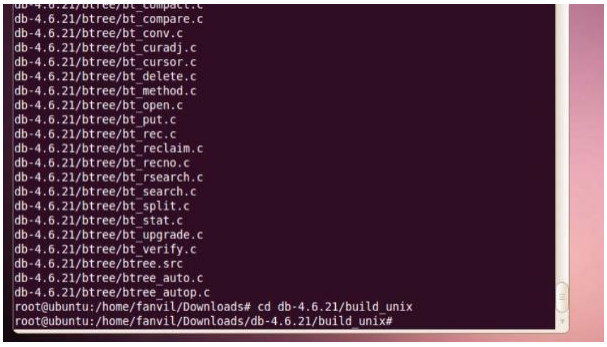


Figure 4-2-6

Configure a dependence environment, as shown in Figure 4-2-7.

```
#../dist/configure  –prefix=/usr/local/BerkeleyDB
```

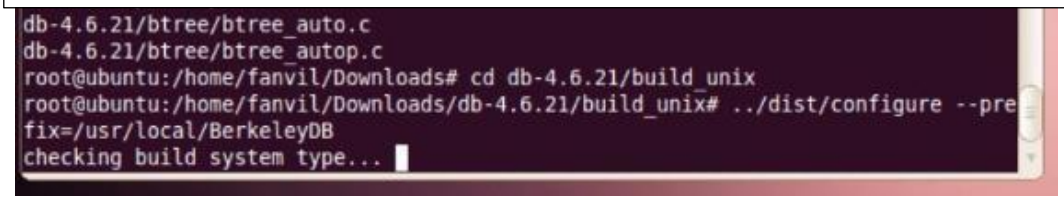


Figure 4-2-7

Figure 4-2-8 shows the configuration result.

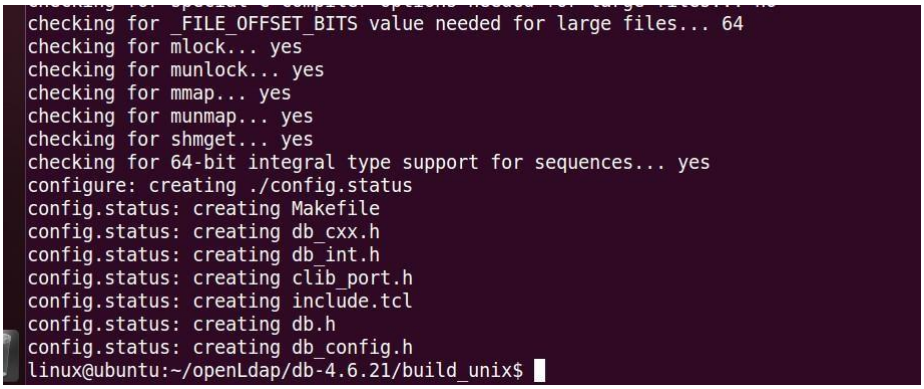


Figure 4-2-8

Input make.

```
#make
```

If the message shown in Figure 4-2-9 is displayed, input make install.

```
erify.c  -fPIC -DPIC -o .libs/db_verify.o
 cc -c -I. -I../dist/.. -D_GNU_SOURCE -D_REENTRANT -O3 ../dist/../db_verify/db_v
erify.c -o db_verify.o >/dev/null 2>&1
/bin/sh ./libtool --mode=link cc -O3  -o db_verify  \
            db_verify.lo util_cache.lo util_sig.lo libdb-4.6.la -lpthread
cc -O3 -o .libs/db_verify .libs/db_verify.o .libs/util_cache.o .libs/util_sig.o
 ./.libs/libdb-4.6.so -lpthread  -Wl,--rpath -Wl,/usr/local/BerkeleyDB/lib
creating db_verify
/bin/sh ./libtool --mode=execute true db_verify
root@ubuntu:/home/fanvil/Downloads/db-4.6.21/build_unix# make install
```

Figure 4-2-9

```
#make install
```

If information shown shown in Figure 4-2-10 is displayed, Berkeley DB is in stalled successfully.

```
----------------------------------------------------------------------
Installing DB utilities: /usr/local/BerkeleyDB/bin ...
cp -p .libs/db_archive /usr/local/BerkeleyDB/bin/db_archive
cp -p .libs/db_checkpoint /usr/local/BerkeleyDB/bin/db_checkpoint
cp -p .libs/db_codegen /usr/local/BerkeleyDB/bin/db_codegen
cp -p .libs/db_deadlock /usr/local/BerkeleyDB/bin/db_deadlock
cp -p .libs/db_dump /usr/local/BerkeleyDB/bin/db_dump
cp -p .libs/db_hotbackup /usr/local/BerkeleyDB/bin/db_hotbackup
cp -p .libs/db_load /usr/local/BerkeleyDB/bin/db_load
cp -p .libs/db_printlog /usr/local/BerkeleyDB/bin/db_printlog
cp -p .libs/db_recover /usr/local/BerkeleyDB/bin/db_recover
cp -p .libs/db_stat /usr/local/BerkeleyDB/bin/db_stat
cp -p .libs/db_upgrade /usr/local/BerkeleyDB/bin/db_upgrade
cp -p .libs/db_verify /usr/local/BerkeleyDB/bin/db_verify
Installing documentation: /usr/local/BerkeleyDB/docs ...
linux@ubuntu:~/openLdap/db-4.6.21/build_unix$
```

Figure 4-2-10

Configure a library file search path by running the following commands:

```
#echo "/usr/local/BerkeleyDB/lib" >> /etc/ld.so.conf
#ldconfig -v
```

4.2.3 Installing OpenLDAP

Download OpenLDAP. Here version 2.4.40 is installed. Run the following commands to decompress the installation package:

```
#tar xzvf openldap-2.4.40.tgz
#cd openldap-2.4.40
```

To avoid an installation failure caused by the incompatibility between OpenLDAP and Berkeley DB, run the following commands first:

```
#exprot LD_LIBRARY_PATH="usr/local/BerkeleyDB/lib"
# export LD_LIBRARY_PATH="xxx/db-4.6.21/build_unix/.libs/"
xxx indicates the decompression path of the DB.
```

Configure the environment.

```
# env CPPFLAGS="-I/usr/local/BerkeleyDB/include" LDFLAGS="-L/usr/local/B
erkeleyDB/lib" ./configure --prefix=/usr/local/openldap --enable-ldbm
```

If an incompatibility problem occurs, a message shown in Figure 4-2-11 is di splayed.

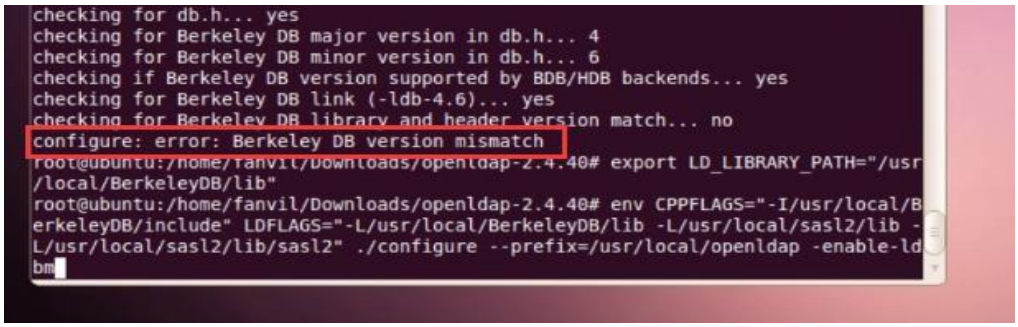


Figure 4-2-11

Error message:

configure: error: BDB/HDB: BerkeleyDB not available

The solution is as follows:

```
#export CPPFLAGS="-I/usr/local/BerkeleyDB/include"
#export LDFLAGS="-L/usr/local/BerkeleyDB/lib"
```

When the message prompting you to enter the make depend command, enter make depend, as shown in Figure 4-2-12.

```
#make depend
```

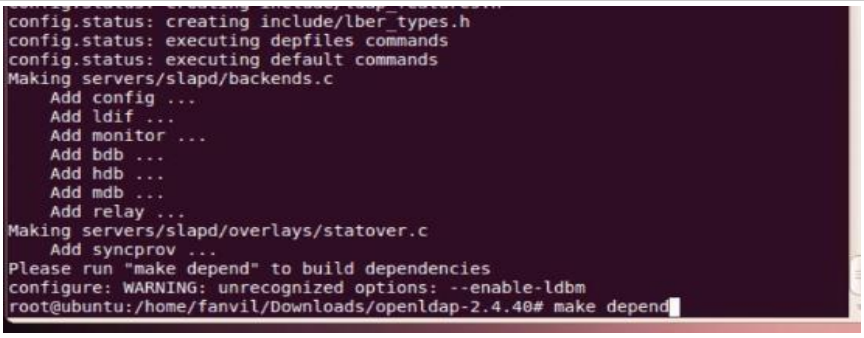


Figure 4-2-12

When the message prompting you to enter the make command, enter make, as shown in Figure 4-2-13.

```
#make
```

Figure 4-2-13

If the message shown in Figure 4-2-14 is displayed, the compilation is successful. Enter make test to perform a test. The test is not mandatory but can help find

problems. The test takes a long time.

```
                        -e 's%MODULEDIR%/usr/local/openldap/libexec/openldap%' \
                        -e 's%RELEASEDATE%2014/09/20%' \
                                ./$page \
                        | (cd .; soelim -) > $page.tmp; \
        done
make[3]: Leaving directory `/home/fanvil/Downloads/openldap-2.4.40/doc/man/man8'

make[2]: Leaving directory `/home/fanvil/Downloads/openldap-2.4.40/doc/man'

make[1]: Leaving directory `/home/fanvil/Downloads/openldap-2.4.40/doc'

root@ubuntu:/home/fanvil/Downloads/openldap-2.4.40# make test
```

Figure 4-2-14

```
#make test
```

If no error message is reported during the test, enter make install to start installation, as shown in Figure 4-2-15.

```
>>>>> Starting test063-delta-multimaster for mdb...
running defines.sh
Accesslog overlay not available, test skipped
>>>>> test063-delta-multimaster completed OK for mdb.

>>>>> Starting test064-constraint for mdb...
running defines.sh
Constraint overlay not available, test skipped
>>>>> test064-constraint completed OK for mdb.

0 tests for mdb were skipped.
make[2]: Leaving directory `/home/fanvil/Downloads/openldap-2.4.40/tests'
make[1]: Leaving directory `/home/fanvil/Downloads/openldap-2.4.40/tests'
root@ubuntu:/home/fanvil/Downloads/openldap-2.4.40# make install
```

Figure 4-2-15

```
#make install
```

If no error is reported, building the server is complete.

4.3 Configuration

The main configuration file of OpenLDAP is:
/usr/local/openldap/etc/openldap/slapd.conf
Each time the configuration file is modified, the OpenLDAP service must be restarted for the configuration to take effect.
After OpenLDAP is installed in Linux, create the test.ldif file to import entries as described earlier.

```
# cd /usr/local/openldap/etc/openldap
```

Choose an editing tool based on the system. gedit can be used for a GUI.

```
# gedit slapd.conf
```

Find the following statement:

```
include /usr/local/openldap/etc/openldap/schema/core.schema
```

Add the following statements behind the found statement:

```
include /usr/local/openldap/etc/openldap/schema/corba.schema
include /usr/local/openldap/etc/openldap/schema/cosine.schema
include /usr/local/openldap/etc/openldap/schema/dyngroup.schema
include /usr/local/openldap/etc/openldap/schema/inetorgperson.schema
include /usr/local/openldap/etc/openldap/schema/java.schema
include /usr/local/openldap/etc/openldap/schema/misc.schema
include /usr/local/openldap/etc/openldap/schema/nis.schema
include /usr/local/openldap/etc/openldap/schema/openldap.schema
```

Figure 4-3-1 shows the effect.

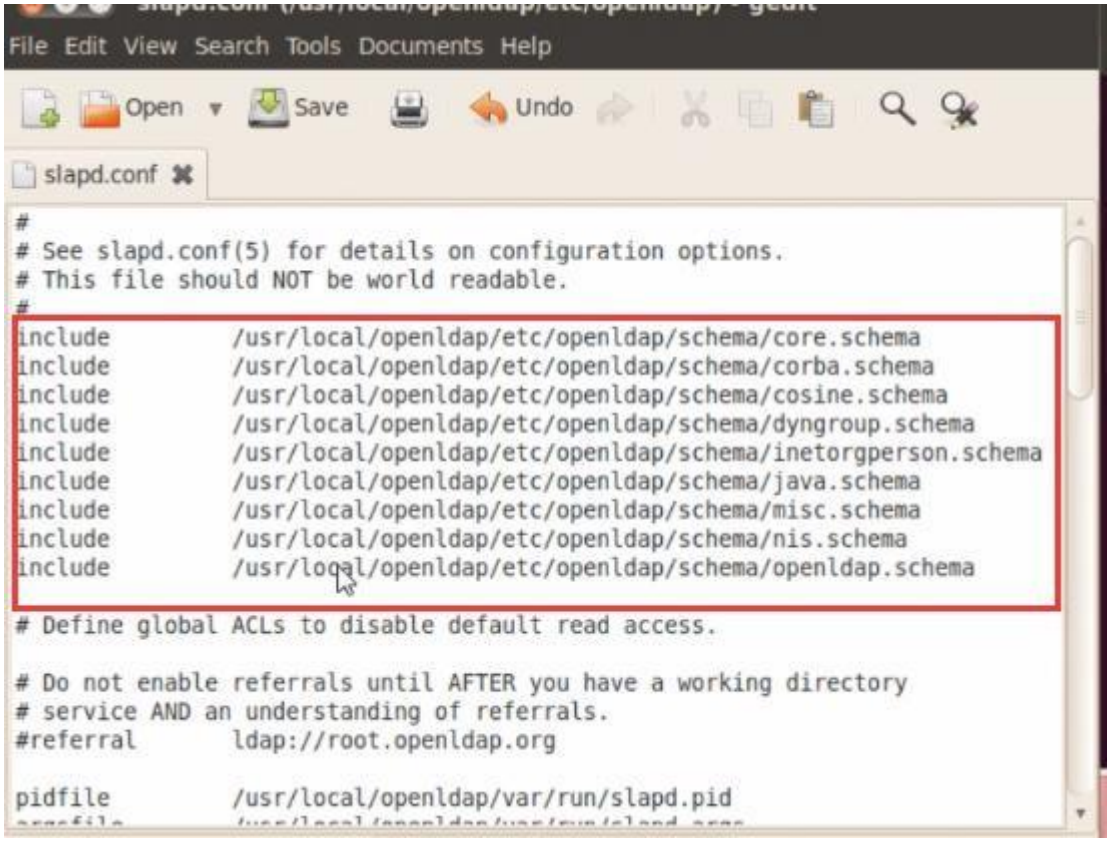


Figure 4-3-1

Set the directory tree.

suffix "dc=my-domain,dc=com"

Change it as follows:

suffix "dc=wings,dc=com"

Note: Here dc=xxx,dc=com can be customized, corresponding to query base in the telephone set settings.

Set the DN of the administrator.

rootdn "cn=Manager,dc=my-domain,dc=com"

Change it as follows:

rootdn "cn=admin,dc= wings,dc=com"

Note: Here cn=xxx,dc=xxx,dc=com can be customized and the latter part must be the same as the suffix.

Set the password of the administrator.

rootpw secret

Change it as follows:

root pw {SSHA}e7BBqjes5EF1grsupjvUfNkNdmZD+F6u

The result is the ciphertext of miracle after being encrypted using the SSHA algorithm. The ciphertext can be obtained as follows:

miracle@miracle-desktop:~$ sudo /usr/local/openldap/sbin/slappasswd

[sudo] password for miracle:

New password:

(Enter your password)

Re-enter new password:

(Enter your password again)

An encrypted key is generated: {SSHA}e7BBqjes5EF1grsupjvUfNkNdmZD+F6u

{SSHA}wZ4AzwiU850mH1F95KwvBh+Dv2S2lDtn

Note: The administrator DN and password are the user name and password for accessing LDAP.

Start the server and enter the following command:

```
#/usr/local/openldap/libexec/slapd
```

LDAP contacts are imported in text format. The file is an .ldif file in UTF-8. The import command is as follows:

/usr/local/openldap/bin/ldapadd -x -D "cn=admin,dc=miracle,dc=com" -W -f test.ldif

Note: In the preceding command, test.ldif is the file to be imported. The command is under the test.ldif folder.

After building OpenLDAP, import the root node.

File format at initial import:

```
dn: dc=wings,dc=com
dc: wings
objectclass: top
objectclass: domain
```

Note: The file is used to define the root node dc=wings,dc=com. Subsequent directories and contacts are added under this root node.

After the file is imported successfully, edit the file and add directories or contacts based on the actual situation.

```
dn: ou=snrShenZhen,dc=wings,dc=com
objectclass: organizationalUnit
ou: snrShenZhen

dn: ou=snrBeijing,dc=wings,dc=com
objectclass: organizationalUnit
ou: snrBeijing

dn: uid=use1,ou= snrBeijing, dc=wings,dc=com
objectClass: inetOrgPerson
objectClass: uidObject
cn: user1
sn: user1
telephoneNumber: 112123
mobile: 1234
```

Import the file again.

Note: When editing a file repeatedly, the previously imported content should be deleted when the file is edited again; otherwise, an error will be reported.

4.4 Graphic Management Tool

Users are added by manually editing the .ldif file.

The open source organization provides software for GUI management of OpenLDAP. Currently, a series of open source management tools are available, including phpLDAPadmin, LDAP Account Manager, Apache Directory Studio, and LDAP Admin. See reference material 3 for more information. Here a graphic management tool is used to manage LDAP built on Linux.

5 Using LDAP Phone Book on SNR Telephone Sets

5.1 Overview

The functions of an LDAP phone book are described as follows:

- A maximum of four LDAP phone books can be configured.
- The entire directory can be accessed.
- Search for the peer phone number and display the name on the screen in dialing and answering calls.
- Attributes of the phone book may be customized, including the name, phone book, mobile number, and other numbers.
- Multiple authentication modes are supported, including authentication exemption, simple authentication, and CRAM-Digest authentication.

5.2 Configuration Description

LDAP Settings	
LDAP	
Description	It is represented as LDAP 1 to LDAP4 in configuration. A maximum of four LDAP phone books are supported. Configure different LDAP phone books through this item.
Display Title	
Parameter	LDAPN Title
Description	Current LDAP title displayed on the screen of the telephone set.
Version	
Parameter	LDAPN Version
Description	The value options include 2 and 3. It specifies the version of the LDAP server. The default value is 3.
Server Address	
Parameter	LDAPN Server
Description	It specifies the LDAP domain name or IP address.
Server Port	
Parameter	LDAPN port
Description	It specifies the LDAP port number, which is 389 by default.
LDAP TLS Mode	
Parameter	LDAPN Use SSL

Description	The value options include 0, 1, and 2. 0: LDAP. An unencrypted connection with the LDAP server is configured by default. 1: LDAPS. A TLS/SSL connection (default port number 636) with the LDAP server is established. 2: LDAP TLS Start. A TLS/SSL connection (default port number 389) with the LDAP server is established.
Authentication	
Parameter	LDAPN Authenticate
Description	The value options include 0, 1, 2, and 3. 0: None 1: DIGEST, MD5 2: CRAM, MD5 3: Simple, default configuration
Calling Line	
Parameter	LDAPN Calling Line
Description	AUTO: -1 SIP Line 1 to 6: 1 to 6 It specifies a dialing line. When a call is initiated from the specified line, contacts information is searched in the LDAP phone book of the corresponding line. If no contacts information is found, contacts information is searched in LDAP phone books configured as AUTO.
Search Line	
Parameter	LDAPN Bind Line
Description	AUTO: -1 SIP Line 1 to 6: 1 to 6 It specifies an answer line. When a call is received from the specified line, contacts information is searched in the LDAP phone book of the corresponding line. If no contacts information is found, contacts information is searched in LDAP phone books configured as AUTO.
Username	
Parameter	LDAPN Username
Description	Administrator user name (optional when the authentication mode is set to NONE)
Password	
Parameter	LDAPN Password

Description	Password (optional when the authentication mode is set to NONE)
Search Base	
Parameter	LDAPN Base
Description	It specifies the search start position of the server.
Max Hits	
Parameter	LDAPN Max Hits
Description	Maximum sample quantity
Telephone	
Parameter	LDAPN Tel Attr
Description	Search for telephone number based on the configured attribute.
Mobile	
Parameter	LDAPN Mobile Attr
Description	Search for mobile number based on the configured attribute.
Other	
Parameter	LDAPN Other Attr
Description	Search for Other based on the configured attribute.
Name Attr	
Parameter	LDAPN Name Attr
Description	Search for Name based on the configured attribute (multiple attributes may be configured).
Sort Attr	
Parameter	LDAPN Sort Attr
Description	It specifies the mode of sorting the query results.
Display name	
Parameter	LDAPN Displayname
Description	Display the name based on the configured attribute.
Name Filter	
Parameter	LDAPN Name Filter
Description	Scope of searching for name attributes. For example, set this item to (|(cn=%)(sn=%)) and enter letter a during search. All CN or SN attributes beginning with letter a are searched. For example, set this item to (&(cn=%)(sn=%)) and enter letter a during search. All CN and SN attributes beginning with letter a are searched.
Number Filter	
Parameter	LDAPN Number Filter

Description	Scope of searching for number attributes. For example, set this item to (|(telephoneNumber=%)(mobile=%)(other=%)) and enter number 1 during search. All telephone numbers, mobile numbers, or other numbers beginning with number 1 are searched. For example, set this item to (&(telephoneNumber=%)(mobile=%)(other=%)) and enter number 1 during search. All telephone numbers, mobile numbers, and other numbers beginning with number 1 are searched.
Enable In Call Search	
Parameter	LDAPN In Call Search
Description	The value options include 0 and 1. 0: Disable incoming call search. 1: Enable incoming call search.
Enable Out Call Search	
Parameter	LDAPN Out Call Search
Description	The value options include 0 and 1. 0: Disable outgoing call search. 1: Enable outgoing call search.

Figure 5-2-1 shows a configuration example.

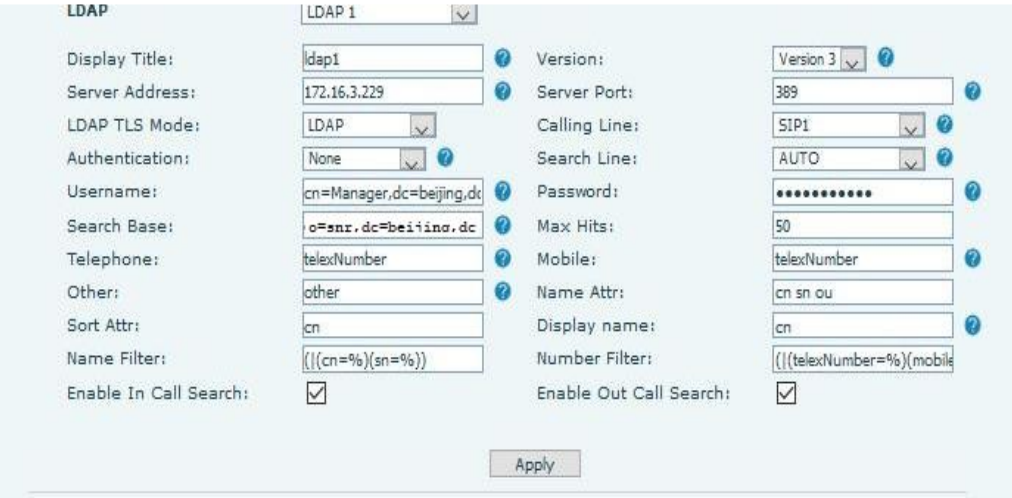


Figure 5-2-1

After configuring the preceding query conditions and submit them, you can choose Menu > Phone Book > LDAP on the telephone set and download data meeting the query conditions from the LDAP server. Downloaded address book information can

be displayed on the telephone set. You can make calls, send SMS messages, query contacts, and add contacts locally or to the blacklist.

5.3 Using LDAP on Telephone Sets

After configuration on the webpage, choose Menu> Phone Book > LDAP.

On the screen shown in Figure 5-3-1, ldap1 is the display title configured on the webpage.

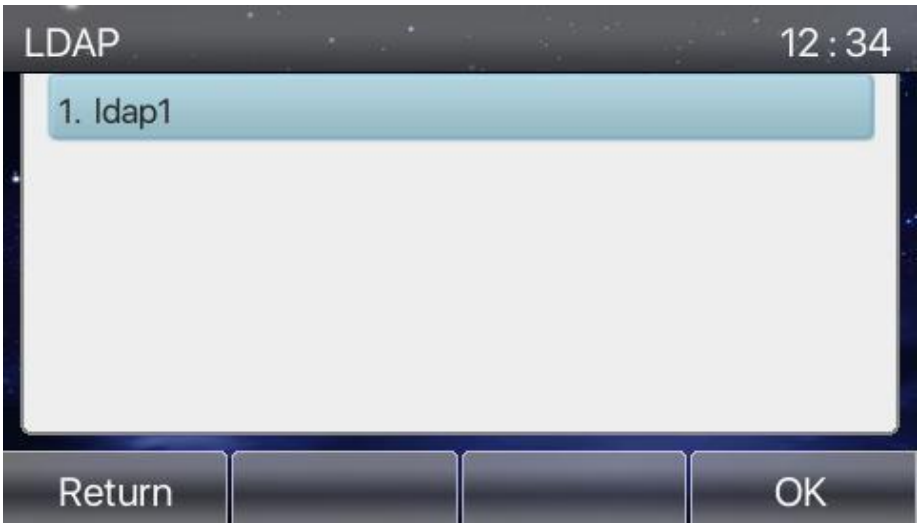


Figure 5-3-1

On the screen shown in Figure 5-3-2, snr is related to the configured query base.

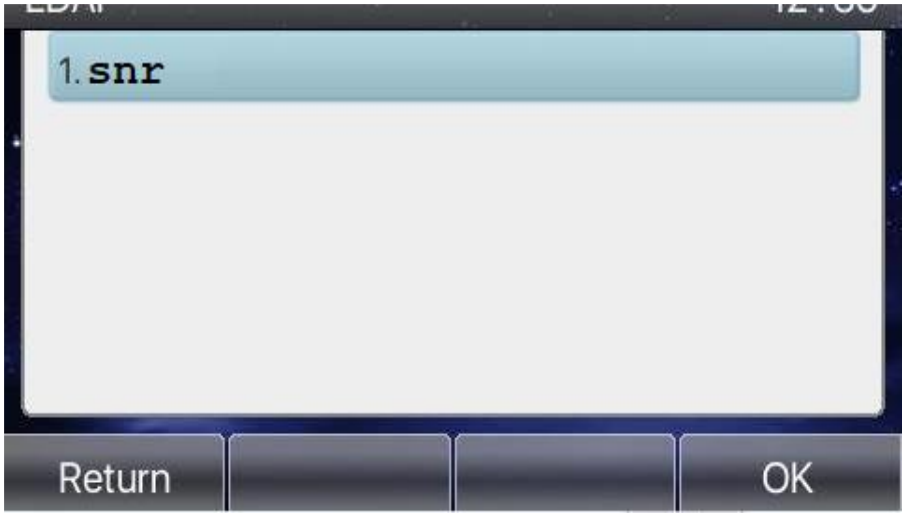


Figure 5-3-2

Click OK. Then the contacts information in the LDAP phone book can be viewed. Here the displayed contacts information depends on the configured Name Attr. You can click Dial to make calls. If the information about a contact contains both an office number and a mobile number, a dialog box will be displayed, asking you to choose a number to be dialed, as shown in Figure 5-3-3.

Figure 5-3-3

Select a contact and click Option. Then the details about the contact are displayed. Here the office number and mobile number depend on the configured ones, as shown in Figure 5-3-4.

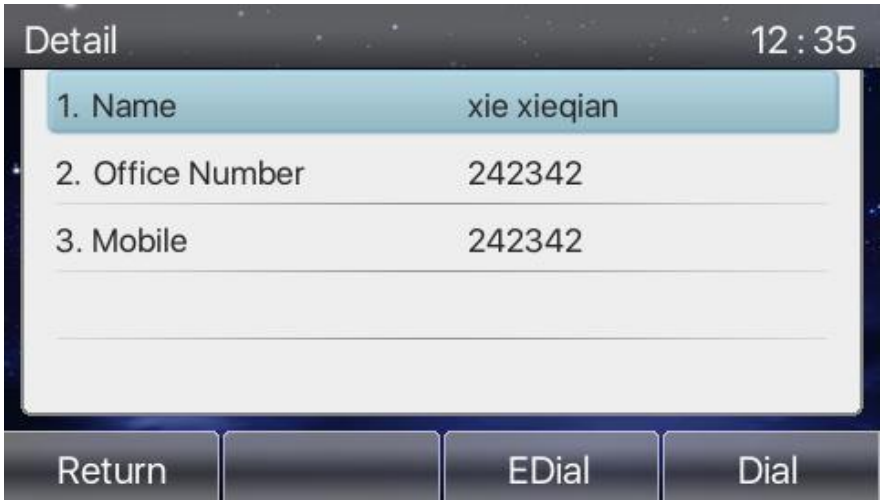


Figure 5-3-4