17. LDAP

logue

Contents

- LDAP?
- Installation
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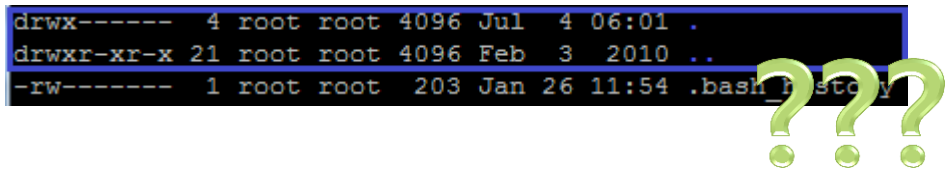
LDAP?

- **Lightweight Directory Access Protocol**
- TCP/IP 위에서 디렉터리를
  조회하고 수정하는 응용 프로토콜

- Directory??

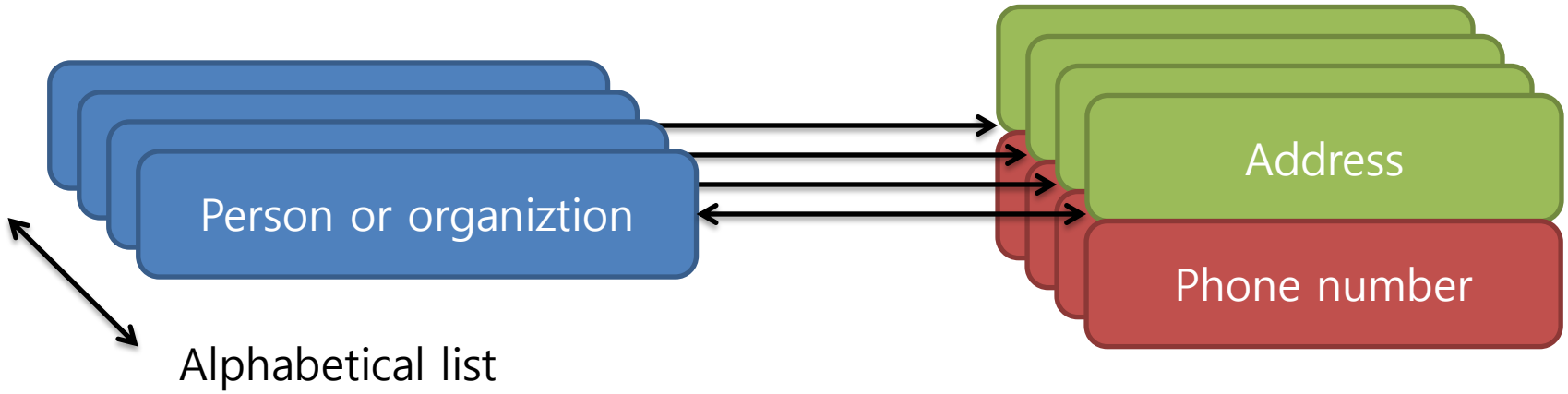


인터넷 프로토콜 스위트

응용 계층	BGP, DHCP, DNS, FTP, HTTP, IMAP, IRC, LDAP, MGCP, NNTP, NTP, POP3, RIP, RTP, RTSP, SDP, SIP, SMTP, SNMP, SOAP, SSH, TELNET, XMPP, ...
전송 계층	TCP, UDP, DCCP, SCTP, RSVP, ...
네트워크 계층	IP(v4/v6), ICMP, IGMP, ARP/RARP, ...
데이터링크 계층	MAC(이더넷, 토큰링, FDDI), PPP, ...
물리적 계층	EIA RS-232, EIA RS-422, EIA RS-449, EIA RS-485, ...

LDAP?

- Directory
  - An organized set of records
  - Ex. Telephone directory

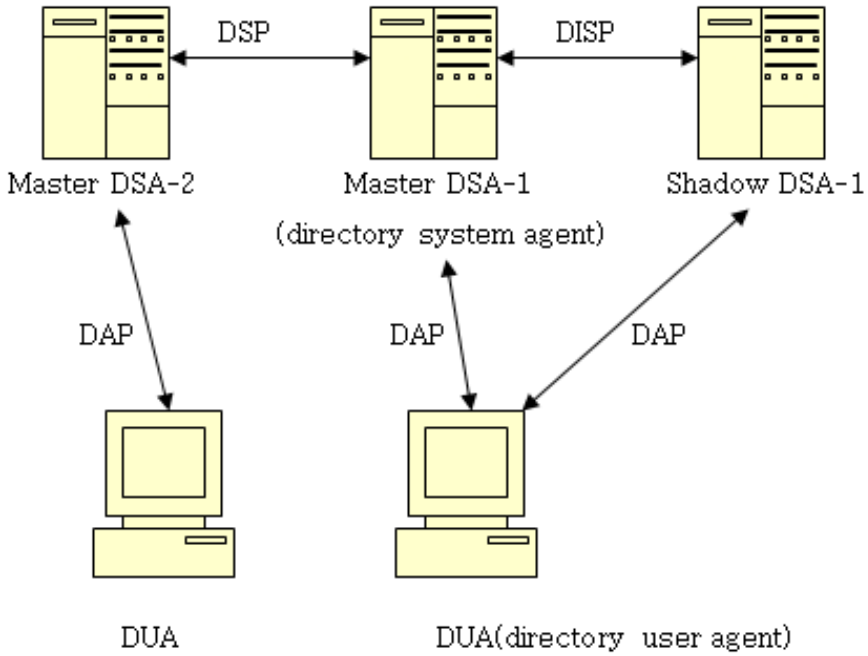


LDAP?

- Directory service
  - 컴퓨터 네트워크의 사용자와
    네트워크 자원에 대한 정보를 저장하고
    조직하는 응용 소프트웨어

LDAP?

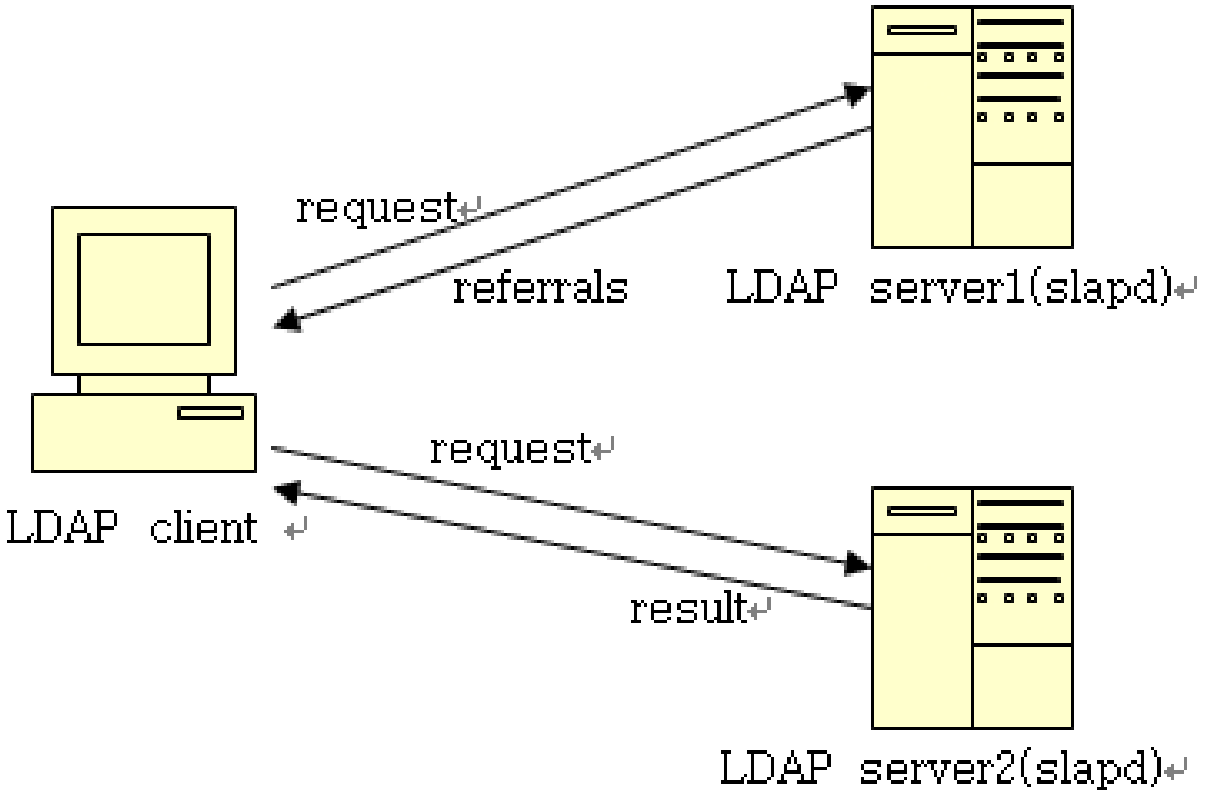
- X.500
  - 전자 디렉토리 서비스를 위한 네트워크 표준
  - 1988년에 처음 등장



LDAP?

- X.500
  - DAP(Directory Access Protocol)
  - DSP(Directory System Protocol)
  - DISP(Directory Information Shadowing Protocol)
  - DOP(Directory Operational Bindings Management Protocol)

LDAP?

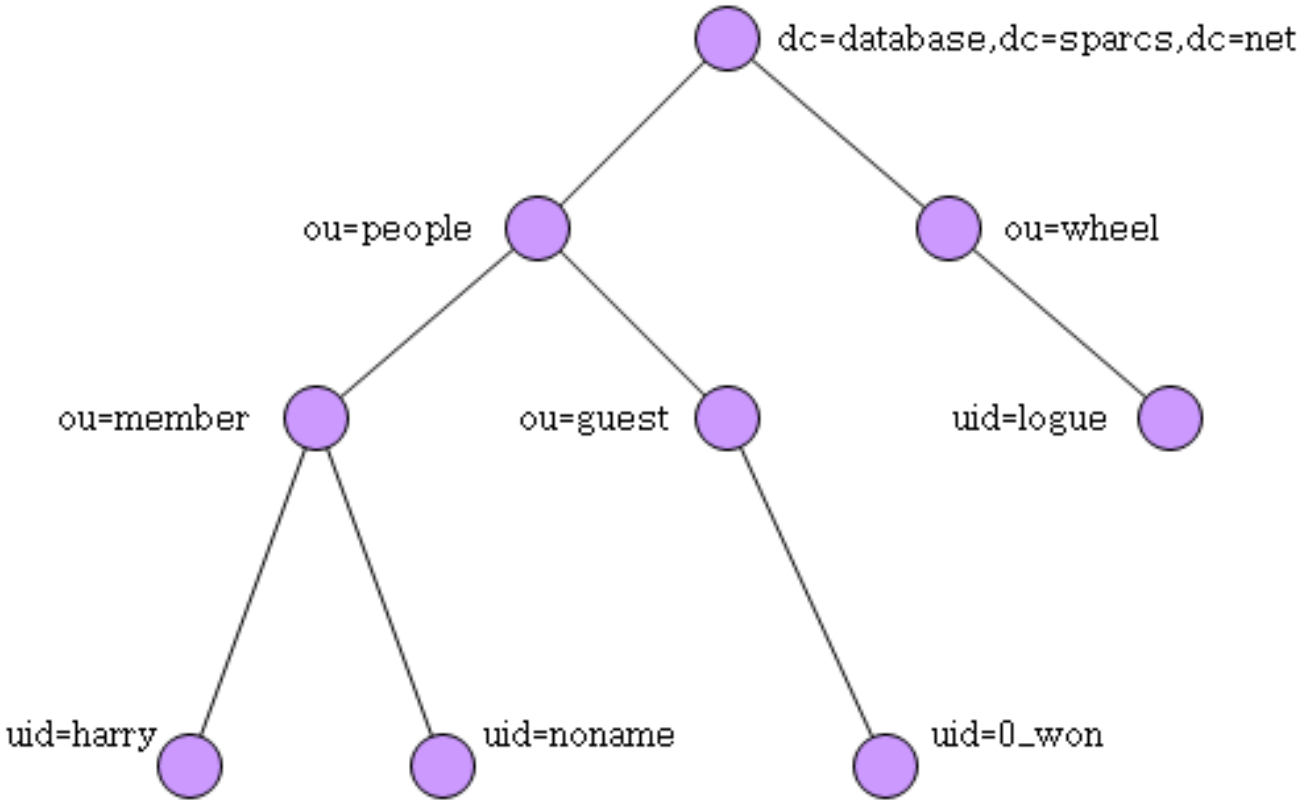

request
referrals
LDAP server1(slapd)
request
LDAP client
result
LDAP server2(slapd)

LDAP?

- Directory Information Tree
  - A directory is a tree of directory entries.
  - An entry consists of a set of attributes.
  - An attribute has a name and one or more values. The attributes are defined in a schema.
  - Each entry has a unique identifier: its Distinguished Name(DN).
    - RDN

LDAP?

- Directory Information Tree



LDAP?

- Entry

dn: cn=Do-Guk Kim, ou=People, dc=sparcs, dc=org
cn: Do-Guk Kim
gidNumber: 200
homeDirectory: /home/logue
loginShell: /bin/bash
objectClass: account
objectClass: posixAccount
objectClass: top
objectClass: shadowAccount
uidNumber: 4002
User Name: logue

LDAP?

- Available backend types
  - Data Storage backends
    - bdb : BerkeleyDB
    - ldif : built on plain text LDIF files
  - Proxy backends
    - ldap : simple proxy to other LDAP servers
    - passwd : uses a passwd and group data
  - Dynamic backends
    - shell : invokes shell scripts for LDAP requests

LDAP?

- Common usage of LDAP
  - Centralization of user and group information
  - Authenticate users locally
  - Authenticate users in a web application
  - Create a shared address directory for mail agents

Installation

$ sudo apt-get install slapd ldap-utils

By default slapd is configured with minimal options needed to run the slapd daemon.

Configuration

The cn=config DIT is used to dynamically configure the slapd daemon.

$ sudo ldapadd -Y EXTERNAL -H ldapi:/// -f /etc/ldap/schema/cosine.ldif

$ sudo ldapadd -Y EXTERNAL -H ldapi:/// -f /etc/ldap/schema/nis.ldif

$ sudo ldapadd -Y EXTERNAL -H ldapi:/// -f /etc/ldap/schema/inetorgperson.ldif

Configuration

- backend.sparcs.org.ldif

```
# Load dynamic backend modules
dn: cn=module,cn=config
objectClass: olcModuleList
cn: module
olcModulepath: /usr/lib/ldap
olcModuleload: back_hdb

# Database settings
dn: olcDatabase=hdb,cn=config
objectClass: olcDatabaseConfig
objectClass: olcHdbConfig
olcDatabase: {1}hdb
olcSuffix: dc=sparcs,dc=org
olcDbDirectory: /var/lib/ldap
olcRootDN: cn=admin,dc=example,dc=com
```

Configuration

- backend.sparcs.org.ldif

```
root@i-10-1-1-14:~# slappasswd
New password:
Re-enter new password:
{SSHA}otkHcuPvZDGTKFt0EVZV4gNgzSboNY+S
```

Configuration

- backend.sparcs.org.ldif

```
olcRootPW: {SSHA}otkHcuPvZDGTKFt0EVZV4gNgzSboNY+S
olcDbConfig: set_cachesize 0 2097152 0
olcDbConfig: set_lk_max_objects 1500
olcDbConfig: set_lk_max_locks 1500
olcDbConfig: set_lk_max_lockers 1500
olcDbIndex: objectClass eq
olcLastMod: TRUE
olcDbCheckpoint: 512 30
olcAccess: to attrs=userPassword by dn="cn=admin,dc=sparcs,dc=org"
write by anonymous auth by self write by * none
olcAccess: to attrs=shadowLastChange by self write by * read
olcAccess: to dn.base="" by * read
olcAccess: to * by dn="cn=admin,dc=sparcs,dc=org" write by * read
```

Configuration

- ACL(Access Control List)

```
olcAccess: <access directive>
<access directive> ::= to <what>
    [by <who> [<access>] [<control>] ]+
<what> ::= * |
    [dn[.<basic-style>]=<regex> | dn.<scope-style>=<DN>]
    [filter=<ldapfilter>] [attrs=<attrlist>]
<basic-style> ::= regex | exact
<scope-style> ::= base | one | subtree | children
<attrlist> ::= <attr> [val[.<basic-style>]=<regex>] | <attr> , <attrlist>
<attr> ::= <attrname> | entry | children
<who> ::= * | [anonymous | users | self
        | dn[.<basic-style>]=<regex> | dn.<scope-style>=<DN>]
    [dnattr=<attrname>]
    [group[/<objectclass>[/<attrname>][.<basic-style>]]=<regex>]
    [peername[.<basic-style>]=<regex>]
    [sockname[.<basic-style>]=<regex>]
    [domain[.<basic-style>]=<regex>]
    [sockurl[.<basic-style>]=<regex>]
    [set=<setspec>]
    [aci=<attrname>]
<access> ::= [self]{<level>|<priv>}
<level> ::= none | disclose | auth | compare | search | read | write | manage
<priv> ::= {=|+|-}{m|w|r|s|c|x|d|0}+
<control> ::= [stop | continue | break]
```

Configuration

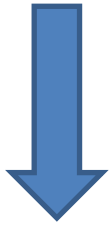
- ACL(Access Control List)
  - olcAccess: to <Entry> | <Attribute>
    by <DN><PERM>
    [by <DN><PERM> …]
  - olcAccess: to *
    by self write
    by anonymous auth
    by * read

Configuration

- ACL(Access Control List)
  - 동일한 액세스 항목을 중복 설정할 수 없다.
  - 넓은 범위에 관한 ACL을 뒤에 놓아야 한다.
  - Comma(,) 앞뒤로 공백이 없어야 한다.
  - ACL이 복잡할수록 검색 속도가 느려진다.

Configuration

$ sudo ldapadd -Y EXTERNAL -H ldapi:///
-f backend.sparcs.org.ldif



```
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
adding new entry "cn=module,cn=config"

adding new entry "olcDatabase=hdb,cn=config"
```

Configuration

- frontend.sparcs.org.ldif

```
# Create top-level object in domain
dn: dc=sparcs,dc=org
objectClass: top
objectClass: dcObject
objectclass: organization
o: SPARCS
dc: sparcs
description: Wheel Seminar LDAP Example

# Admin user.
dn: cn=admin,dc=sparcs,dc=org
objectClass: simpleSecurityObject
objectClass: organizationalRole
cn: admin
description: LDAP administrator
userPassword: {SSHA}otkHcuPvZDGTKFt0EVZV4gNgzSboNY+S
```

Configuration

$ sudo ldapadd -x -D cn=admin,dc=sparcs,dc=org -W -f frontend.sparcs.org.ldif

```
Enter LDAP Password:
adding new entry "dc=sparcs,dc=org"

adding new entry "cn=admin,dc=sparcs,dc=org"
```

Managing

- ldap-utils

  $ <command> -D <DN of the entry> -W –f <ldif file path>

Managing

- ldapadd

  $ ldapadd –D “cn=admin,dc=sparcs,dc=org” –W –f test.ldif

<test.ldif>

```
dn: cn=test,dc=sparcs,dc=org
objectClass: inetOrgPerson
cn: test
sn: Kim
```

```
root@i-10-1-1-14:~# ldapadd -D "cn=admin,dc=sparcs,dc=org" -W -f test.ldif
Enter LDAP Password:
adding new entry "cn=test,dc=sparcs,dc=org"
```

Managing

- ldapsearch

  $ ldapsearch -b *base* [options] *filter* [attributes]

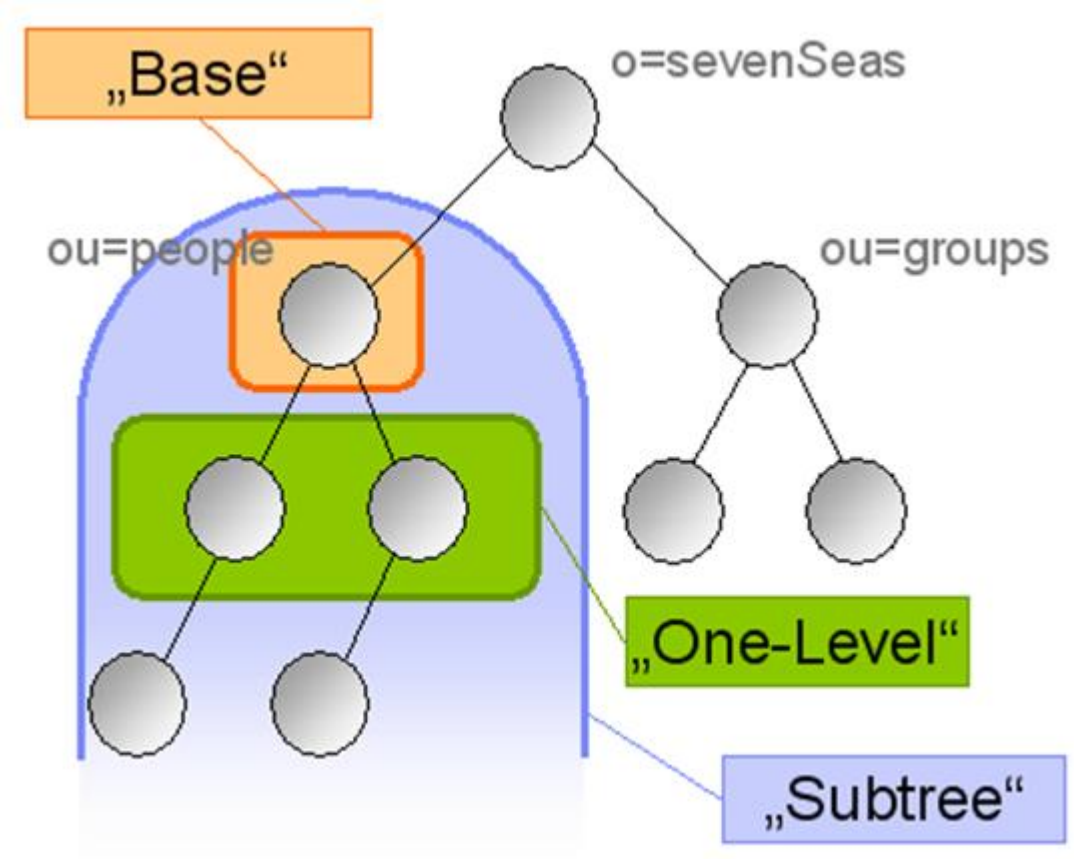
  Some Useful Options!

  -s: scope of the search. [base | one | sub]

  -x: use simple authentication instead of SASL

Managing

- ldapsearch



Managing

- ldapsearch
  - Filter
    - Equality : “uid=logue”
    - Substring: “uid=*gue”
    - Approximate: “uid~=log”
    - Less than, greater then: “uid>=noname”
    - And: “&(uid=logue)(gidNumber=200)”
    - Or: |, Not: !, …

Managing

- ldapsearch
  - Ex) Return all entries

```
root@i-10-1-1-14:~# ldapsearch -x -b "dc=sparcs,dc=org" -s sub "objectclass=*"
# extended LDIF
#
# LDAPv3
# base <dc=sparcs,dc=org> with scope subtree
# filter: objectclass=*
# requesting: ALL
#

# sparcs.org
dn: dc=sparcs,dc=org
objectClass: top
objectClass: dcObject
objectClass: organization
o: SPARCS
dc: sparcs
description:: V2hlZWwgU2VtaW5hciBMREFQIEV4YW1wbGUg
```

Managing

- ldapsearch
  - Ex) Find specific entry

```
root@i-10-1-1-14:~# ldapsearch -x -b "dc=sparcs,dc=org" -s sub "(&(cn=test)(sn=Kim))"
# extended LDIF
#
# LDAPv3
# base <dc=sparcs,dc=org> with scope subtree
# filter: (&(cn=test)(sn=Kim))
# requesting: ALL
#

# test, sparcs.org
dn: cn=test,dc=sparcs,dc=org
objectClass: inetOrgPerson
cn: test
sn: Kim

# search result
search: 2
result: 0 Success

# numResponses: 2
# numEntries: 1
```

Managing

- ldapmodify

  $ ldapmodify –D “cn=admin,dc=sparcs,dc=org” –W –f testmod.ldif

<testmod.ldif>

dn: cn=test,dc=sparcs,dc=org
Changetype: modify
Replace: sn
sn: Lee

```
root@i-10-1-1-14:~# ldapmodify -D "cn=admin,dc=sparcs,dc=org" -W -f testmod.ldif
Enter LDAP Password:
modifying entry "cn=test,dc=sparcs,dc=org"
```

Managing

- ldapdelete

  $ ldapdelete -D "cn=admin,dc=sparcs,dc=org" -W "cn=test,dc=sparcs,dc=org"

Managing

- ldapmodrdn

  $ ldapmodrdn -D "cn=admin,dc=sparcs,dc=org" -W (-r) "cn=test,dc=sparcs,dc=org" "cn=temp"

```
dn: cn=temp,dc=sparcs,dc=org
objectClass: inetOrgPerson
cn: test
cn: temp
sn: Lee
```

Managing

- LDIF(LDAP Data Interchange Format)
  - 디렉토리 엔트리 표현 형식

```
dn: cn=Do-Guk Kim, ou=People, dc=sparcs, dc=org
cn: Do-Guk Kim
gidNumber: 200
homeDirectory: /home/logue
loginShell: /bin/bash
objectClass: account
objectClass: posixAccount
objectClass: top
objectClass: shadowAccount
uidNumber: 4002
User Name:  logue
```

Managing

- LDIF(LDAP Data Interchange Format)
  - 데이터 변경 형식

```
dn: cn=Do-Guk Kim, ou=People, dc=sparcs, dc=org
changetype: modify
replace: cn
cn: Bakwi Jang
```

```
<DN of the entry>
changetype: [modify | add | delete]
(if changetype is modify)[replace | add | delete]: <attribute>
Then enter the value of the attribute if necessary.
```

Managing

- Schema
  - LDAP에서의 schema 파일은 objectClass를 정의한다. 용도에 따라 최적화한 LDAP 서비스를 위해서는 schema 작성에 대해서도 알아야 하지만 흔히 쓰이는 Linux에서의 사용자 인증 목적에서는 새로운 schema 작성이 필요 없으므로 넘어가도록 하겠다.

Practice

- LDAP Authentication
  - 지금까지의 내용들로 LDAP 서버를 구축할 수 있다. 클라이언트는 여러 가지 종류가 있다. 예를 들자면 Linux에서 인증용으로 사용할 수도 있고 trac에도 LDAP 플러그인이 있다. 여기서는 LDAP 서버 구축 및 LDAP을 통한 Linux 로그인을 실습해본다.

Practice

- LDAP Authentication
  - 먼저 Installation과 Configuration 파트에서 설명한 대로 LDAP 서버 기초 설정을 완료한다.

Practice

- LDAP Authentication
  - $ sudo apt-get install migrationtools
  - $ mv /usr/share/perl5/migrate_common.ph /usr/share/migrationtools/

Practice

- LDAP Authentication
  - <migrate_common.ph>
    $DEFAULT_MAIL_DOMAIN = "sparcs.org";
    $DEFAULT_BASE = "dc=sparcs,dc=org";

  - # cd /usr/share/migrationtools/
    # ./migrate_group.pl /etc/group ~/group.ldif
    # ./migrate_passwd.pl /etc/passwd
    ~/passwd.ldif

Practice

- LDAP Authentication
  - # vi ~/people_group.ldif

```
dn: ou=People, dc=sparcs, dc=org
ou: People
objectclass: organizationalUnit

dn: ou=Group, dc=sparcs dc=org
ou: Group
objectclass: organizationalUnit
```

Practice

- LDAP Authentication
  - # cd
    # ldapadd -D “cn=admin,dc=sparcs,dc=org“
    -W -f ~/people_group.ldif
    # ldapadd –D “cn=admin,dc=sparcs,dc=org”
    -W -f ~/group.ldif
    # ldapadd –D “cn=admin,dc=sparcs,dc=org”
    -W -f ~/passwd.ldif

Practice

- LDAP Authentication
  - $ apt-get install libnss-ldap libpam-ldap nss-updatedb nscd ldap-auth-client

Should debconf manage LDAP configuration? Yes
LDAP server Uniform Resource Identifier: ldapi:///127.0.0.1
Distinguished name of the search base: dc=sparcs,dc=org
LDAP Version to use: 3
Make local root Database admin: Yes
Does the LDAP database require login? No
LDAP account for root: cn=admin,dc=sparcs,dc=org
LDAP root account password: <LDAP 비밀번호>

Practice

- LDAP Authentication
  - </etc/ldap.conf>

    host 127.0.0.1
    nss_base_passwd ou=People,dc=sparcs,dc=org
    nss_base_shadow ou=People,dc=sparcs,dc=org
    nss_base_group ou=Group,dc=sparcs,dc=org

Practice

- LDAP Authentication
  - </etc/auth-client-config/profile.d/ldap-auth-config>

```
pam_auth=auth       sufficient   pam_ldap.so
        auth       required     pam_unix.so nullok_secure use_first_pass
pam_account=account    sufficient   pam_ldap.so
        account    required     pam_unix.so
pam_password=password   sufficient   pam_ldap.so
        password   required     pam_unix.so nullok obscure min=4 max=8 md5
pam_session=session    required     pam_unix.so
        session    required     pam_mkhomedir.so skel=/etc/skel/
        session    optional     pam_ldap.so
        session    optional     pam_foreground.so
```

command auth-client-config –a –p lac_ldap

Practice

- LDAP Authentication
  - 이제 설정이 끝났다. 서버와 클라이언트가 연동되었고 인증 또한 잘 될 것이다.
    현재 서버의 passwd 정보와 LDAP의 정보가 같아 확인이 어려우니 한번 passwd로 비밀번호를 바꿔보자. 비밀번호를 바꾼 후 LDAP password information changed 구문이 뜨는 것을 보면 LDAP으로 인증을 하고 있다는 사실을 알 수 있다.

은 훼이크…

Practice

- LDAP Authentication
  - LDAP을 사용한 인증을 할 경우 adduser로 사용자를 추가할 경우 자동으로 추가되지 않기 때문에 추가적으로 사용자 정보를 디렉토리에 추가해줘야 제대로 작동한다.

Practice

- LDAP Authentication
  - # adduser <아이디>
  - adduser를 한 후 로그인을 시도해보자. 분명 서버의 passwd파일에는 사용자가 추가되었겠지만 LDAP에는 추가가 되지 않았으므로 접속이 안될 것이다.
  - migrate_passwd.pl 을 이용해 새로 추가된 사용자의 정보만을 담은 ldif 파일을 생성한 후 ldapadd를 해주면 된다.

Practice

- LDAP Authentication
  - 사용자가 비밀번호를 바꾸었을 때도 LDAP에 갱신을 해줘야 새 비밀번호로 다른 곳에서도 접속할 수가 있다.
  - <test.ldif>

```
dn: uid=elaborate,ou=People,dc=sparcs,dc=org
changetype: modify
replace: userpassword
userPassword: {crypt}$1$cSAAS32$4BY2TsdfASDuvSO7yNxhasyddau0
```

ldapmodify –W –D
"cn=admin,dc=sparcs,dc=org" –f ~/test.ldif

진짜 꽃

수고하셨습니다

Reference

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