Securing Linux using LDAP with z/VM RACF

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Agenda

- What’s the problem?
- How does LDAP help? What is it?
- How LDAP and RACF work together

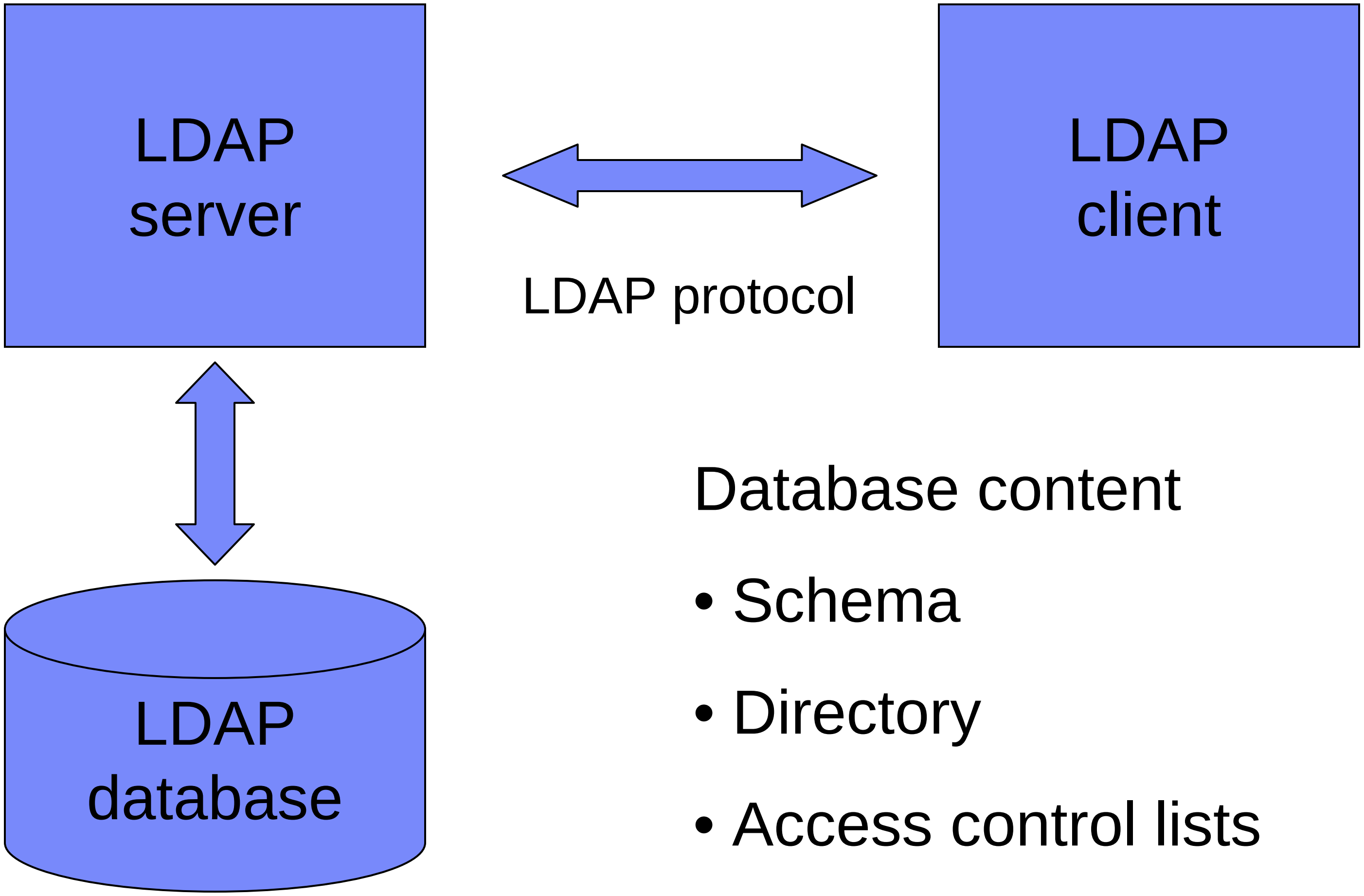
What’s the problem?

- You’ve got lots of Linux servers
- You have the same users on each
- Those users are same users as you have on z/VM
  - flat name space
- You’d like to have a single, central repository for your z/VM *and* Linux passwords
- You’d like that repository to be RACF on z/VM

LDAP

- Lightweight Directory Access Protocol (RFC 2251)
- Standard way for a client to retrieve data stored in a Directory Information Tree (DIT)
- The *schema* defines how the DIT is structured
- *Distinguished name* (DN) identifies a node in the tree
- X.500 model

Conceptual Components



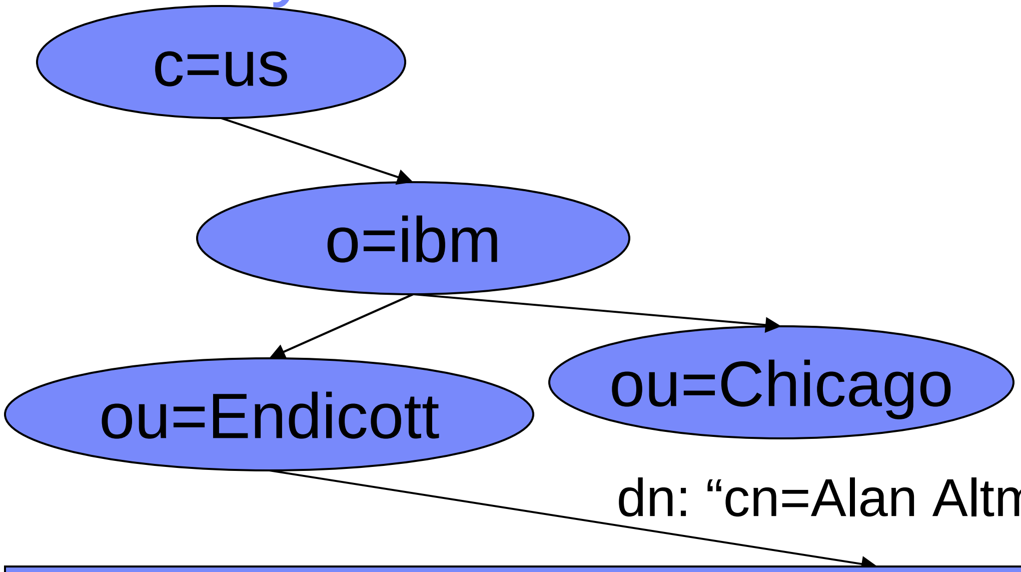
Database content

- Schema
- Directory
- Access control lists

Schema

- A *schema* defines the content of some branch of the Directory Information Tree
  - Object classes
  - Object names
  - Object attributes
    - E.g. data type, instance limit
- The schema can be extended dynamically with the LDAPADD command

Directory


c=us

o=ibm

ou=Endicott

ou=Chicago

c: country

o: organization

ou: organizational unit

cn: common name

dn: distinguished name

dn: “cn=Alan Altmark,ou=Endicott,o=ibm,c=us”

cn: Alan Altmark
phone: 6074293323
addr1: 1701 North Street
city: Endicott
state: NY
zipcode: 13760
empnum: NY123456

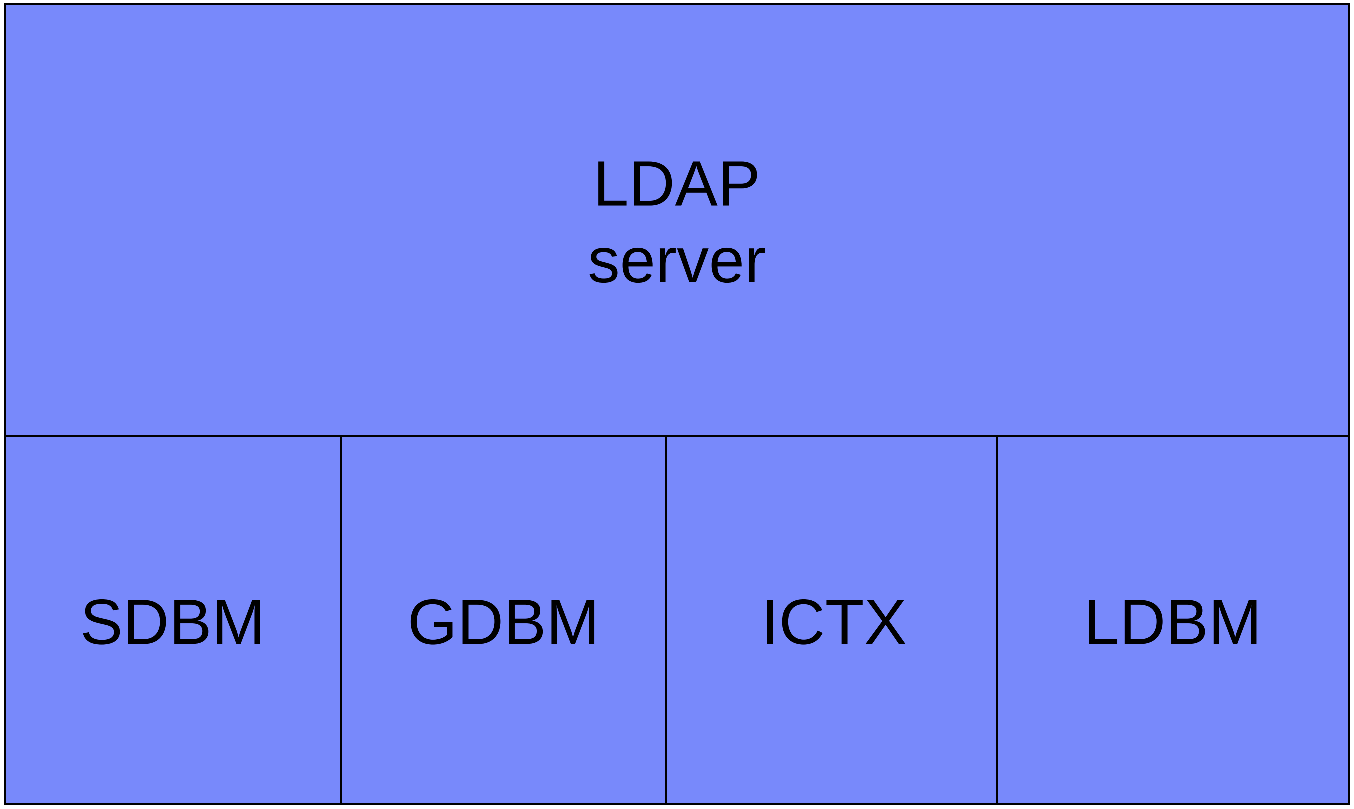
dept: G72G
bldg: 250
floor: 2
office: Y4
uid: aaltmark
ibm-nativeid: ALAN

z/VM LDAP Server

z/VM 5.4

- z/OS 1.10 IBM Tivoli Directory Server (ITDS)
- Each server handles a single Directory Information Tree with a single schema
- Different branches of the tree can be provisioned by different *backends* (database managers)
  - SDBM, LDBM, GDBM, ICTX

z/VM LDAP Server



LDAP
server

SDBM

GDBM

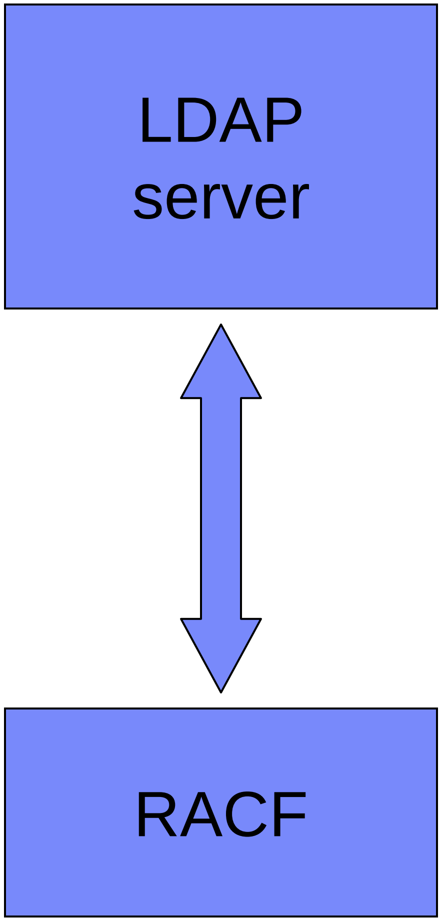
ICTX

LDBM

Server backends

SDBM

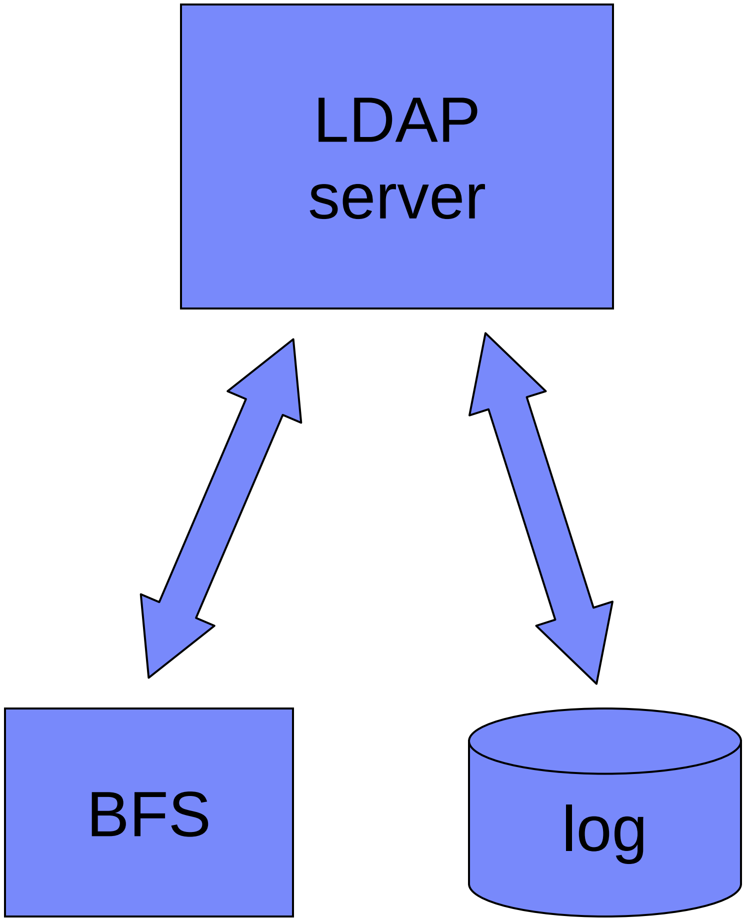
- Uses a RACF-defined schema
- RACF password verification on a bind
- Remote RACF administration
  - Users
  - Groups
  - Connect groups
- RACF only – no other ESMs



GDBM

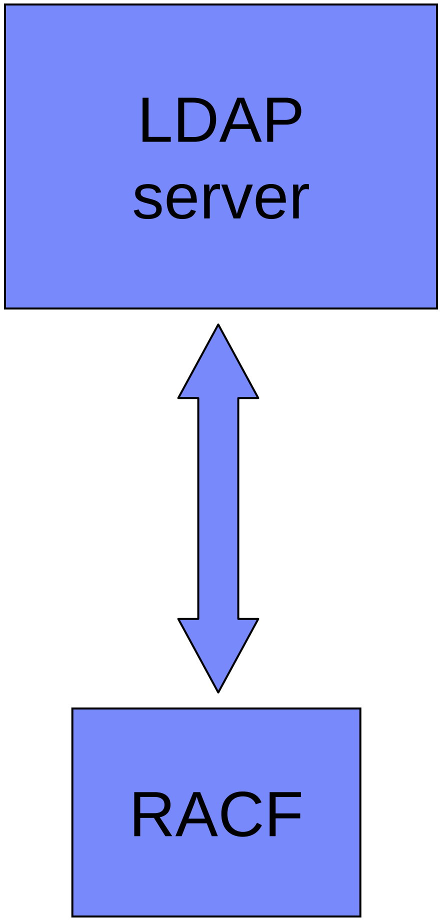
- Logs changes to the LDBM
  - Name of attribute
  - New value of attribute
  - Identity of person who changed it
  - When it was changed

- As of z/VM 5.4, this includes SDBM (RACF).



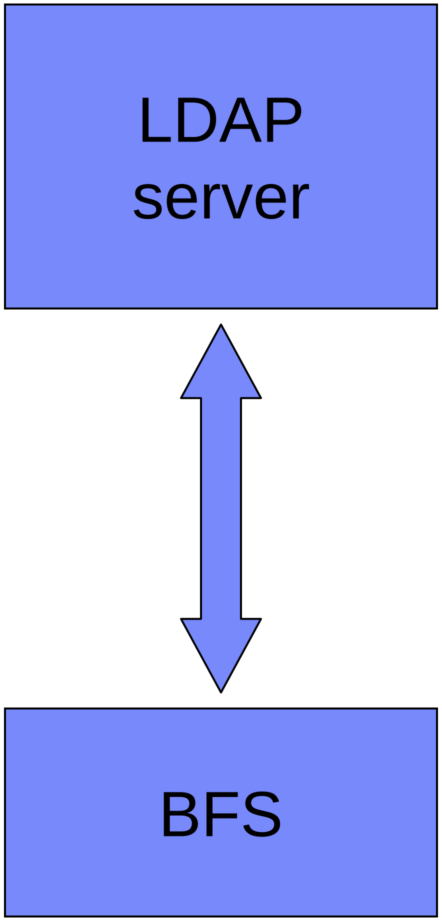
ICTX

- Remote audit and authorization services
  - RACROUTE
- LDAP extended operation (XOP)
- Information in the TCP/IP Programmer's Reference
- Linux audit daemon (auditd) can do this



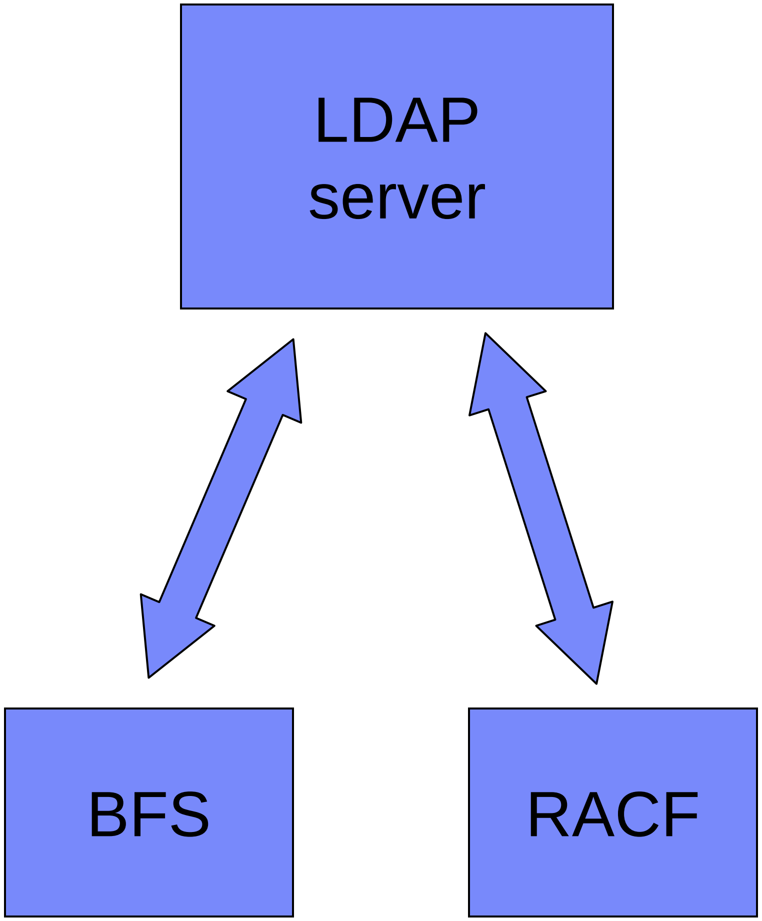
LDBM

- Basic LDAP Database Manager
- Directory is implemented in Byte File System (BFS)
- Full LDAP capability
- Can implement any schema



LDBM with Native Authentication

- LDAP bind authentication performed using RACF
- Full LDAP capability
- uid attribute is used to satisfy LDAP dn search (user lookup)
- RACF user ID is the uid unless ibm-nativeId is present



Logging in from Linux (LDAP-ready PAM)

1. Linux binds to the LDAP server
2. Linux does an LDAP search for *uid* = username
3. LDAP returns a dn (cn=,ou=,o=,c=)
4. Linux does an LDAP bind, handing the LDAP server the dn and the entered password
5. The LDAP server locates the dn and extracts the uid or ibm-nativeid
6. The extracted value and the entered password are given to RACF for verification
7. The LDAP server responds to Linux with an answer of “yes” or “no”

A word about LDAP binds…

- If you do not specify binddn and bindpw in ldap.conf, bind for search will be done anonymously
  - `allowAnonymousBinds on` is required in DS CONF
  - All accesses are as cn=anybody

- Do not use adminDN as bindDN
  - Too much power

- May wish to restrict the data that binddn or cn=anybody can search

LDAP Server Configuration

- DS CONF
  - Everything goes here
- Samples on TCPMAINT 591
  - Excellent commentary
  - LDAP-DS SCONFIG
  - LDAP-DS SAMPENVR
- Production on TCPMAINT 198

DS CONF

`adminDN cn=ldapadm,o=ibm,c=us`	LDAP admin id
`database LDBM GLDBLD31`	Enable LDBM
`suffix o=ibm,c=us`	Default suffix
`useNativeAuth ALL`	Force RACF lookup
`nativeUpdateAllowed YES`	Password change ok
`#useNativeAuth SELECTED`	
`#nativeAuthSubtree ou=Raleigh,o=ibm,c=us`	RACF lookup only
`#nativeAuthSubtree ou=Endicott,o=ibm,c=us`	…on these subtrees

Defining a user to LDAP

- Create an LDIF file that contains the user definition
- Use LDAPADD to store the LDIF data in the LDAP server

LDIF Example

```
dn:  “cn=Alan Altmark,ou=Endicott,o=ibm,c=us”
objectclass: top
objectclass: person
objectclass: organizationalPerson
objectclass: ibm-nativeAuthentication
cn: “Alan Altmark”                         Common name
sn: Altmark                                Surname
uid: aaltmark                              Linux user name
ibm-nativeid: ALTMARKA                     RACF user ID
```

LDIF Example (Referrals)

In corporate LDAP server

```
dn: ou=endicott,o=ibm,c=us
objectclass: referral
objectclass: extensibleObject
ref: ldap://ldap.endicott.ibm.com/ou=endicott,o=ibm,c=us
```

In local Endicott server

```
referral ldap://ldap.ibm.com
adminDN cn=ldapadm,ou=endicott,o=ibm,c=us
database ldbm GLDBLD31
suffix ou=endicott,o=ibm,c=us
```

LDIF Example

- Issue LDAPADD command from CMS

- ldapadd –h loopback –D “cn=ldapadm”
  –w *password* –f //filename.filetype

Name Information Service (NIS)

- Enables retrieval of user configuration data from remote LDAP server using Name Service Switch (NSS)

- RFC 2307

- No entry in etc/passwd, etc/shadow, or etc/groups

- Download NIS schema from ftp://www.redbooks.ibm.com/redbooks/REDP0221
  - It adds the POSIX information to a user's LDAP entry

- Details in *Security on z/VM* from IBM Redbooks

Secure LDAP connections

- SSL/TLS may be optionally used by both the z/VM LDAP clients and server
  - All secure binds should be encrypted
- For the clients, certificate management is provided by an SSL/TLS stack (“CMS System SSL”) that runs in the user virtual machine
  - Does not use the SSL server
- The LDAP server can use the SSL server or can use CMS System SSL directly

System SSL

- A set of utilities to manage the X.509 certificates that can be used by the LDAP client utilities and server for authentication and encryption
- CMS, not Linux
  - This is the basis for the z/VM 5.4 SSL server
- Uses BFS and the POSIX shell
- gskkyman
  - command line interface
  - menu

Certificate Mangement

- Handles certificate renewals
- Export and import of certificate and private key
  - Enables easy sharing of certificates
- Be your own Certificate Authority (CA)

References

- Redbooks
  - Understanding LDAP: Design and Implementation, SG24-4986
  - Securing Linux on zSeries with a Central z/OS LDAP Server, REDP-0221
  - Advanced LDAP User Authentication, REDP-3863
  - Security on z/VM, SG24-7471

- z/VM TCP/IP Planning and Customization
  - SC24-6124

- z/VM TCP/IP LDAP Administration Guide
  - SC24-6140

Thanks for listening!

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