Variable Support for Apple's LDAPv3 Plug-in

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Agenda

- LDAP - Brief Introduction
- Mac OS X Architecture
- Mac OS X LDAP Plug-in
- What my project does
- Demonstration
- Q & A

LDAP - A Brief Introduction

- What is a Directory?
- Derived from X.500 (DAP)
- LDAP basic terms

What is a Directory?

"Fundamentally, what a directory service does is securely manage complex systems of interrelated information, and support the widespread distribution and speedy retrieval of that information--any information" (Sheresh & Shersh, 2001, p. 7).

Qualities of a Directory

- A defined namespace
- An extended search capability
- Authentication and access control
- Scales from small to large networks
- A datastore optimized for reads

(Sheresh & Sheresh, 2001, p.13)

Derived from X.500 (DAP)

- Directory Access Protocol (DAP)
- Originally standardized by ISO and ITU in 1988
- X.500 is an enormous standard
- Utilizes the OSI stack
- Costly to implement

LDAP

- Lightweight Directory Access Protocol
- LDAPv1 published as rfc 1487 in 1993 by the IETF and ISODE at UofMich
- Lower overhead*
- TCP/IP based*
- Widely accepted API*
- Uses the DNS namespace*

* (Sheresh & Sheresh, 2001, p.165)

LDAP Basic Terms

- Schema
- Object Class
- Attributes

Real Quick, What is an OID?

"An OID (Object Identifier) is a globally unique identifier for objects and attributes assigned by various international standards organizations including American National Standards Institute (ANSI) and the Internet Assigned Numbers Authority (IANA)." (Sheresh & Sheresh, 2001, p. 175)

Example: 1.3.6.1.4.1.4203

Schema

- Sometimes compared to a map
- Description of objects and attributes

```
attributetype ( 2.5.4.10 NAME ( 'o' 'organizationName' )
        DESC 'RFC2256: organization this object belongs to'
        SUP name )

attributetype ( 2.5.4.11 NAME ( 'ou' 'organizationalUnitName' )
        DESC 'RFC2256: organizational unit this object belongs to'
        SUP name )
```

Object Class

- Similar to a class in C++ or Java
- Used to describe objects in general terms
- Meta object descriptor

```
objectclass     ( 2.16.840.1.113730.3.2.2
   NAME 'inetOrgPerson'
      DESC 'RFC2798: Internet Organizational Person'
   SUP organizationalPerson
   STRUCTURAL
      MAY (
            audio $ businessCategory $ carLicense $ departmentNumber $
            displayName $ employeeNumber $ employeeType $ givenName $
            homePhone $ homePostalAddress $ initials $ jpegPhoto $
            labeledURI $ mail $ manager $ mobile $ o $ pager $
            photo $ roomNumber $ secretary $ uid $ userCertificate $
            x500uniqueIdentifier $ preferredLanguage $
            userSMIMECertificate $ userPKCS12 )
      )
```

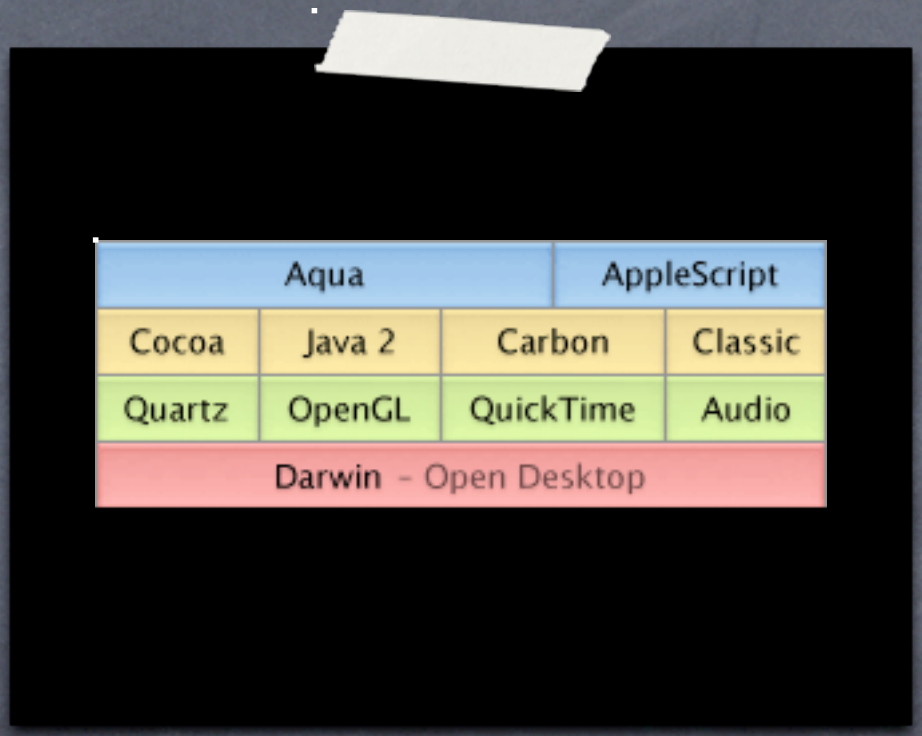
Attribute

- Similar to data members in C++ and Java
- Gives personality to Object Class

```
# employeeNumber
# Numeric or alphanumeric identifier assigned to a person, typically based
# on order of hire or association with an organization.  Single valued.
attributetype ( 2.16.840.1.113730.3.1.3
        NAME 'employeeNumber'
        DESC 'RFC2798: numerically identifies an employee within an organization'
        EQUALITY caseIgnoreMatch
        SUBSTR caseIgnoreSubstringsMatch
        SYNTAX 1.3.6.1.4.1.1466.115.121.1.15
        SINGLE-VALUE )
```

LDAP is Industry Standard

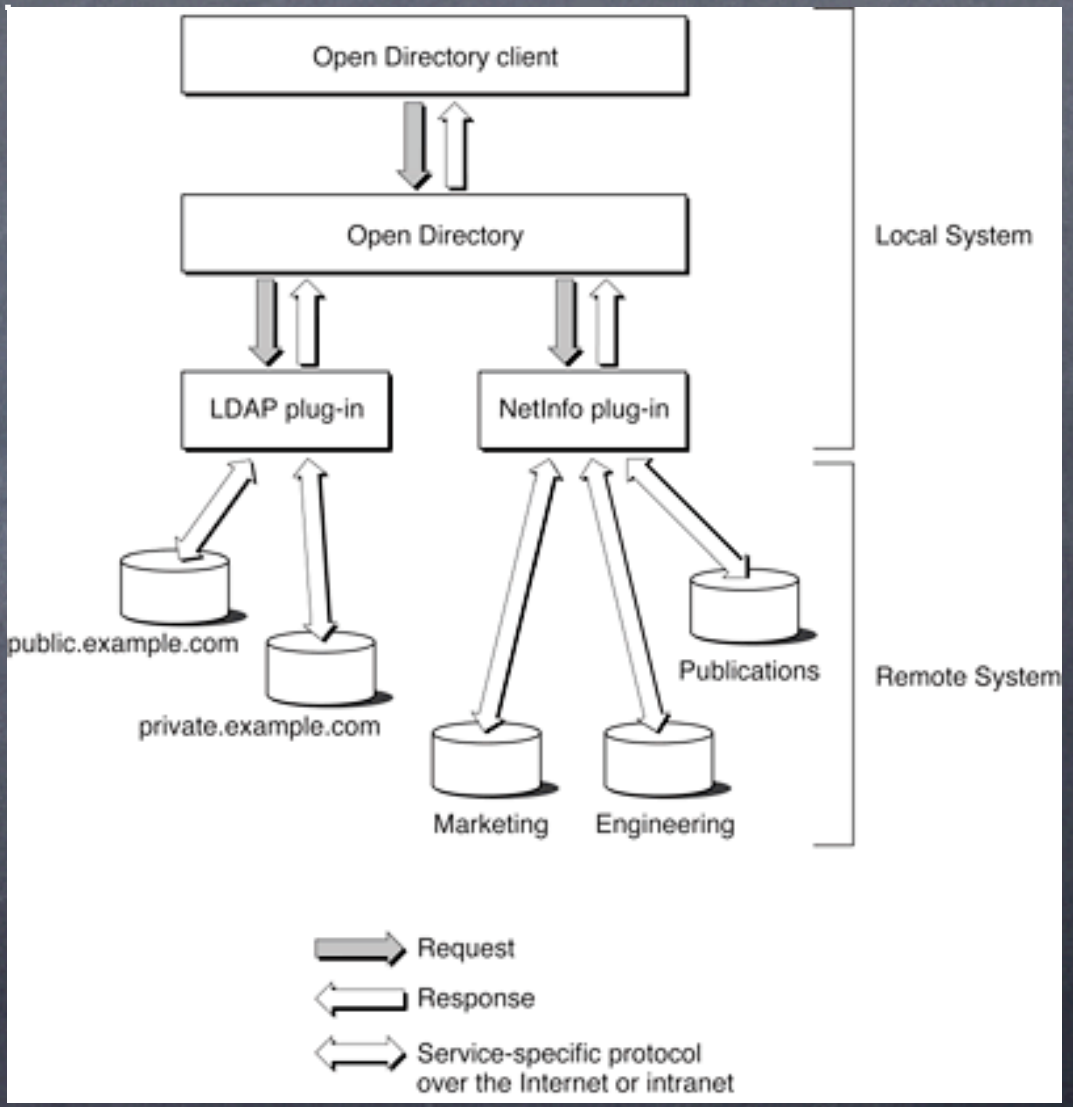
- Sun/Netscape SunONE (formerly iPlanet)
- Novell eDirectory
- Microsoft Active Directory
- OpenLDAP



Mac OS X Architecture

Mac OS X Directory Services

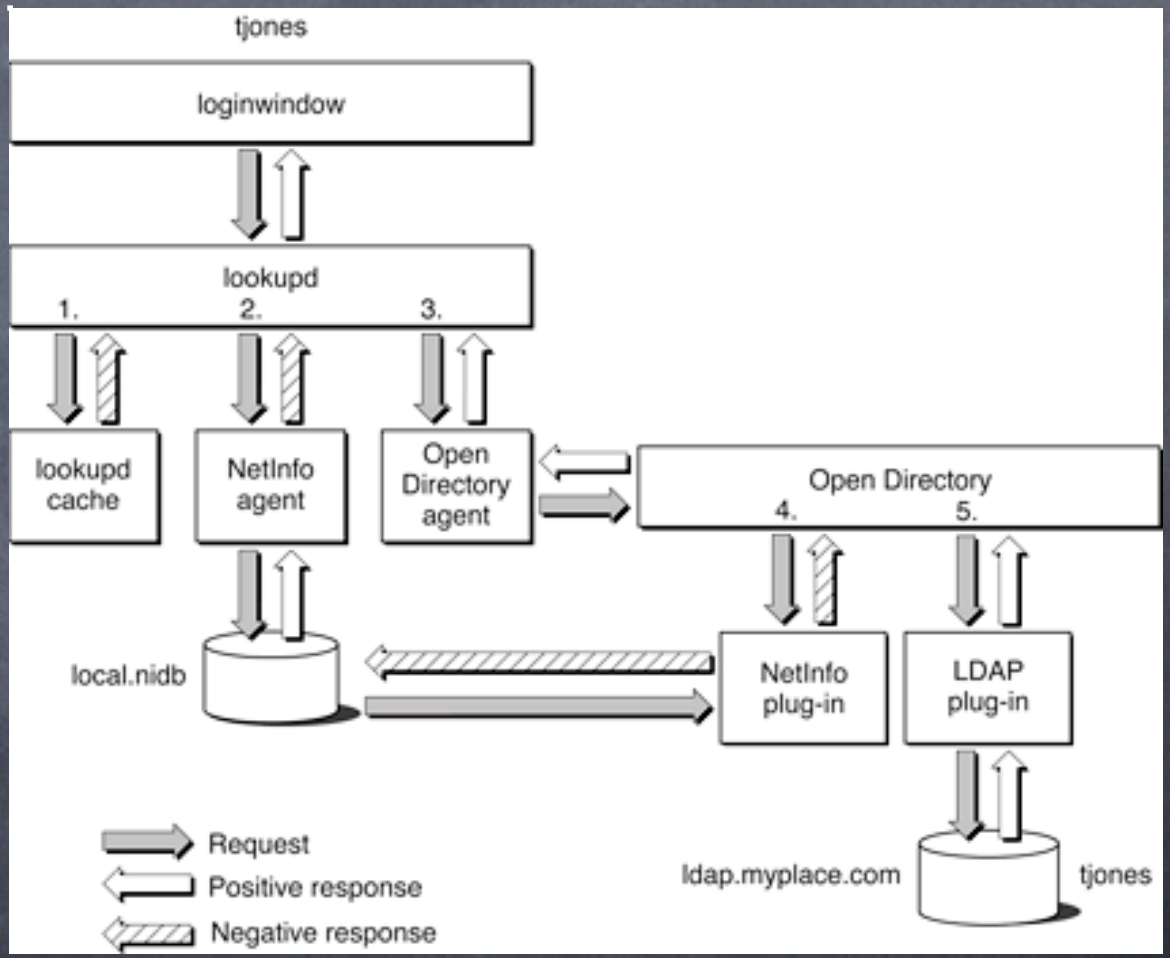
- DirectoryService daemon
- Plug-in structure
- Defines Nodes, Standard Record Types, Standard Attributes



(Apple, 2002)

Directory Services Cont.

- lookupd, used for UNIX compatibility
- NetInfo, legacy directory
- LDAP



(Apple, 2002)

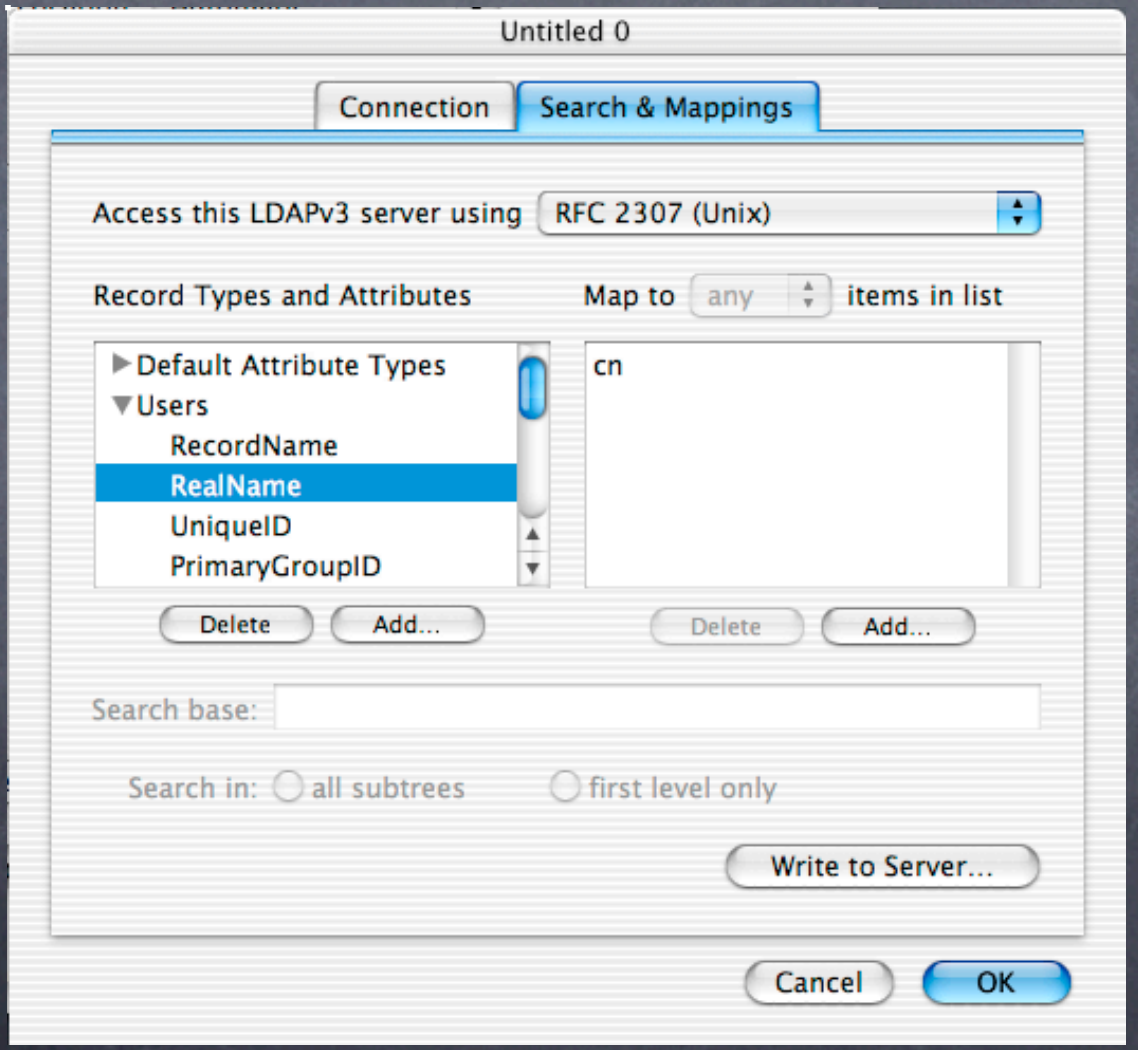
Mac OS X LDAPv3 Plug-in

- Use Mac OS X Directory Services API
- OpenLDAP API (Wrapped in the LDAP Framework)
- Open sourced under the APSL (Apple Public Source License)

Features of LDAPv3 Plug-in

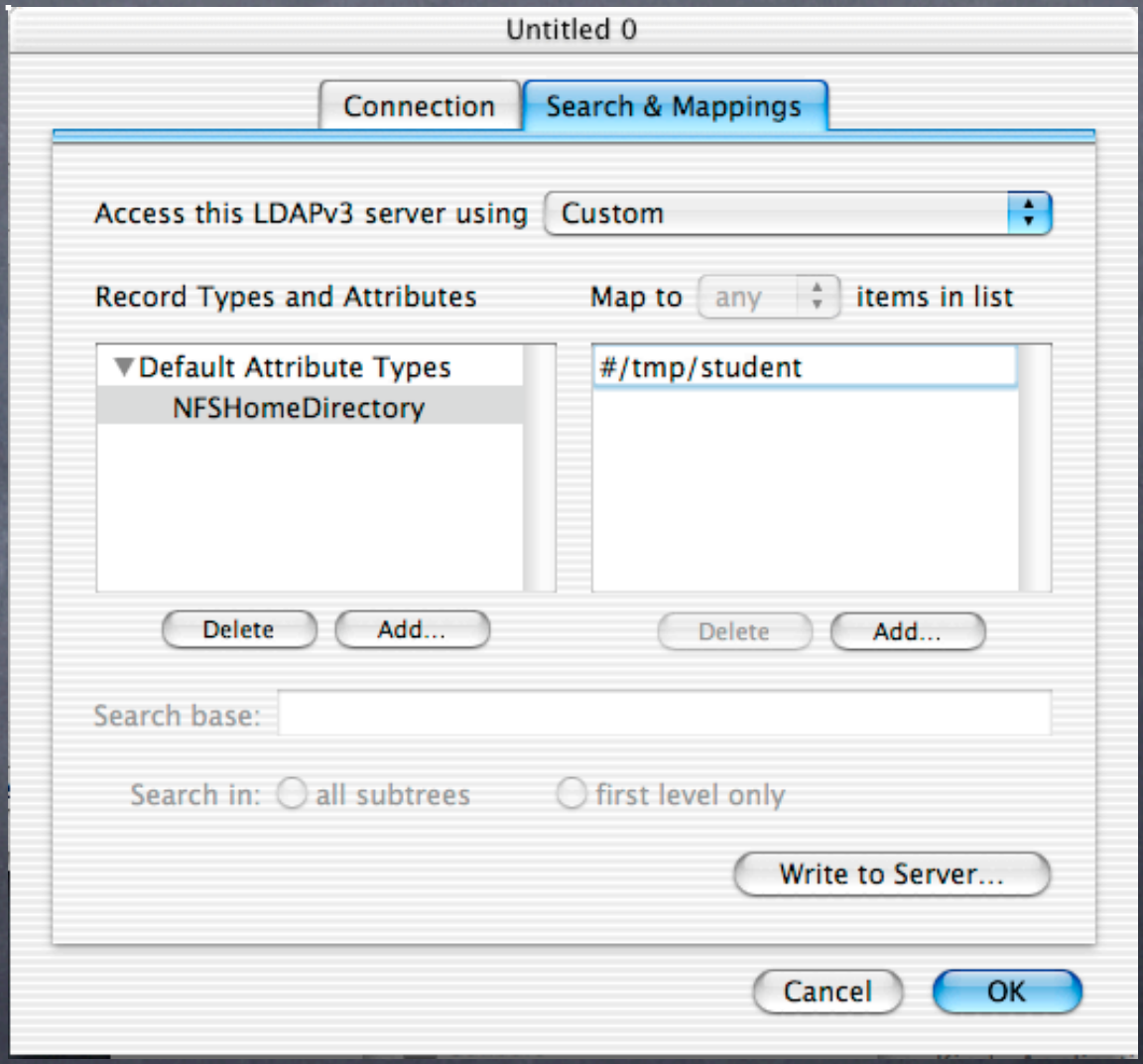
- Map LDAP objects and attributes to local objects and attributes
- Static assign values of attributes

Map LDAP to Local



Static Mappings

- "#" signifies that the value is a static mapping.
- The standard plug-in applies the same value to all users that login.

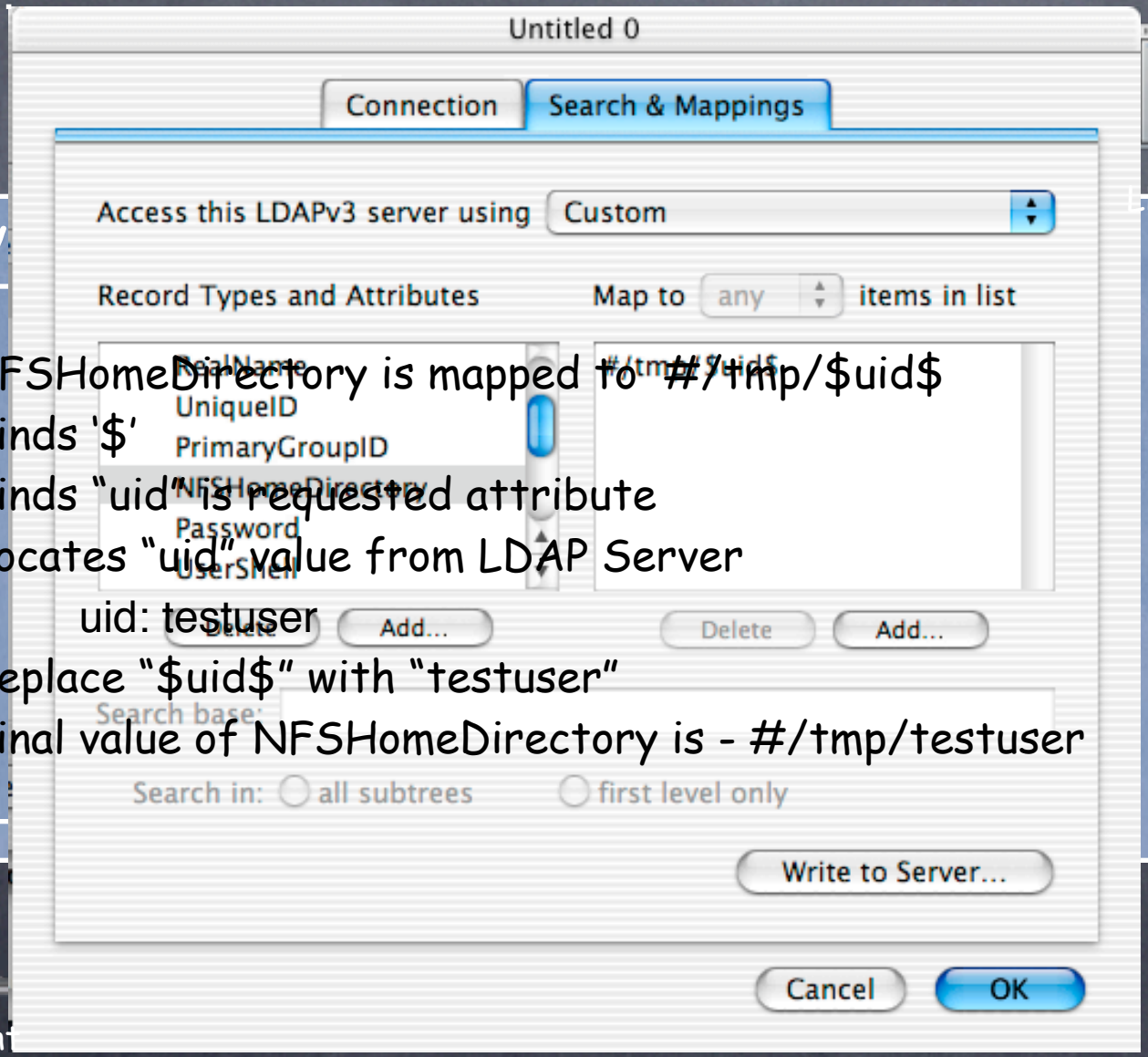


What My Project Does.

Adding Variable Support to the Static Mappings

- Administrators can customize the static mappings on a per user basis
- Allows the use of the directory as-is, modifications are not required
- Tokens use LDAP attribute names encased by '$' Example: uid The user would then be looking for the value of the "uid" attribute on the LDAP Server

How it works



LDAP Server

Mac OS X Client

1. NFSHomeDirectory is mapped to "#/tmp/uid
2. Finds '$'
3. Finds "uid" is requested attribute
4. Locates "uid" value from LDAP Server

   uid: testuser
5. Replace "uid" with "testuser"
6. Final value of NFSHomeDirectory is - #/tmp/testuser

Q & A

Demonstration

References

- Sheresh R. & Sheresh B. (2002) *Understanding Directory Services* Indianapolis: SAMS
- Apple (2002 September). Open Directory. Retrieved January 31, 2002, from http://developer.apple.com/techpubs/macosx/Networking/Open_Directory/index.html