IBM System z – GSE Conference 2008 Leipzig

GS17 - Integrating z/VSE into an Identity Management System

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October 27, 2008

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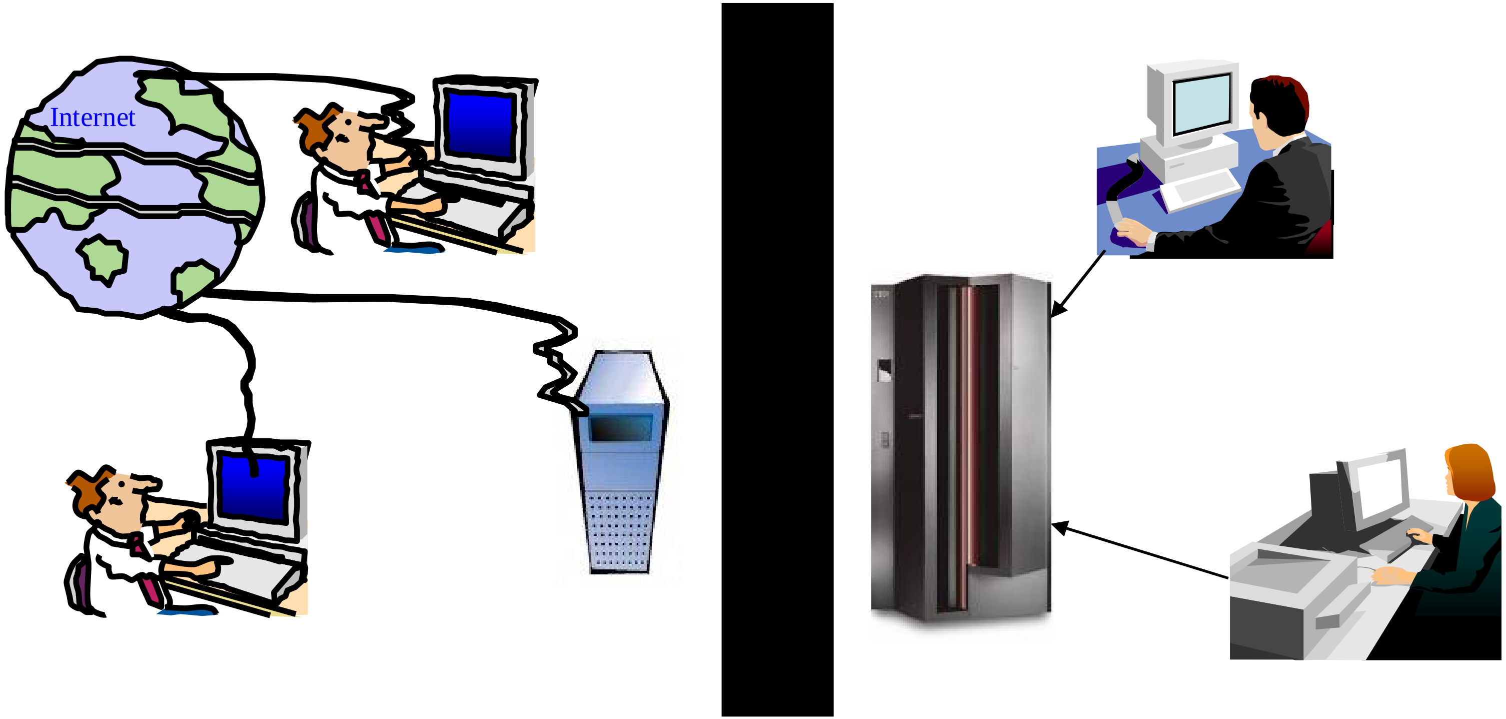
Situation today

- **Separate User-ID Management Systems for z/VSE and the others (Unix, Linux, Windows)**
  - Duplicate User IDs
  - No automatic syncronisation



Situation today - Risks

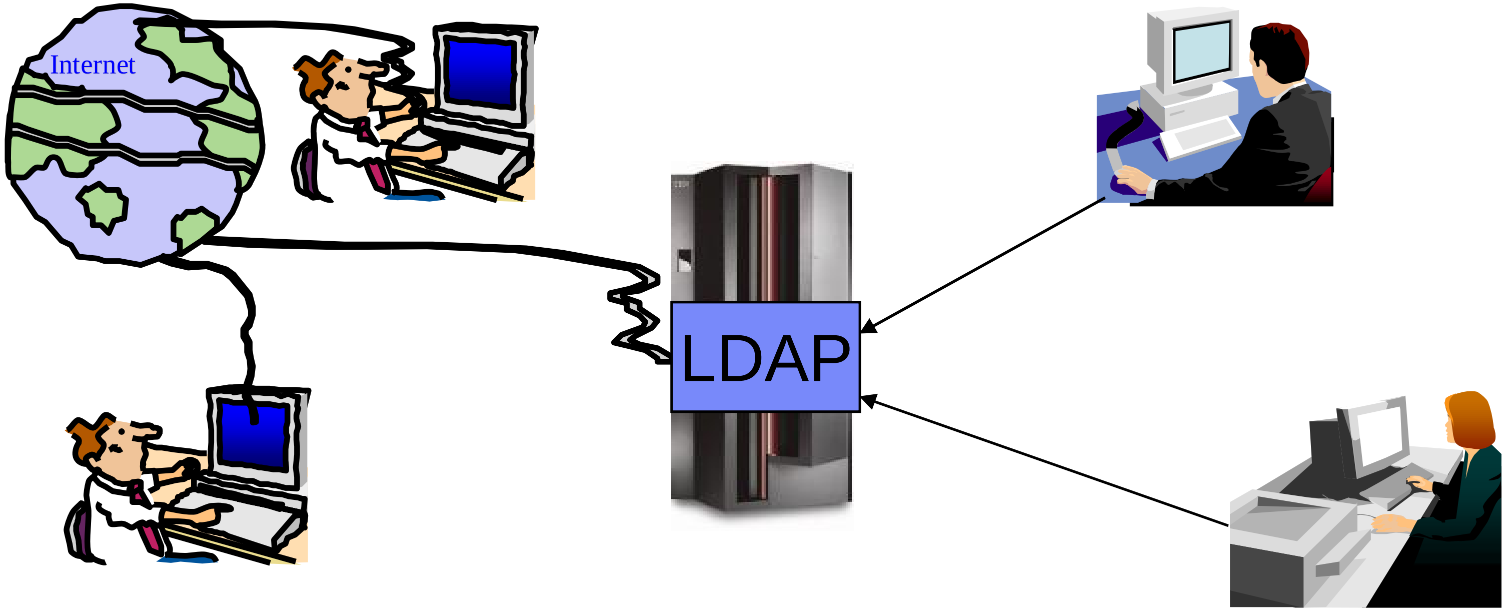
- **User-ID management is very complex if different systems need to be updated**
- **Some User-IDs do not explicitely show who is the owner**
  - e.g. z/VSE 4 Character User-IDs
- **Difficult to enforce corporate policies, like password renewal, auditing, ...**
- **Examples:**
  - If an employee leaves the company
    - Deactive **all** of his User-IDs on **all** systems
  - If an emloyee moves to another department
    - Permissions to access files/programs needs to be adjusted according to his new job on **all** systems
- **If you miss to update one system, the employee (or others) may still have access to confidential data**

Solution: Centralized Identity management

- **Goal:**
  - Only **ONE** place where all Identity related information is stored
    - User-IDs
    - Permissions
    - Groups, Roles
  - All suronding systems access that single Identity Management System
  - Changes to a User-ID (deactivation, modification) automatically affect all systems, without any additional actions
  - Corporate policies can easily be enforced
  - Self servcie Help-Desk can easier be accomplished
    - e.g. Password reset, User-ID unlock, ...

Solution: Centralized Identity management

- **Identity Management Systems typically use a Directory to store ID related information**
  - Protocol to access the directory: **LDAP**



What is LDAP ?

- **The Lightweight Directory Access Protocol (LDAP) is an application protocol for querying and modifying directory services running over TCP/IP**
  - A directory is a set of objects with similar attributes organized in a logical and hierarchical manner.
    - The most common example is the telephone directory, which consists of a series of names (either of persons or organizations) organized alphabetically, with each name having an address and phone number attached.
- **Due to this basic design (among other factors) LDAP is often used by other services for authentication**
- **An LDAP directory tree often reflects various political, geographic, and/or organizational boundaries, depending on the model chosen.**
- **LDAP deployments today tend to use Domain name system (DNS) names for structuring the topmost levels of the hierarchy.**
- **Deeper inside the directory might appear entries representing people, organizational units, printers, documents, groups of people or anything else that represents a given tree entry (or multiple entries).**
- **See: Wikipedia: http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol**

What is LDAP ?

§ LDAP Terms:

– **Directory**
  - A tree of directory entries.

– **Entry**
  - An entry consists of a set of attributes.
  - Each entry has a unique identifier: its Distinguished Name (DN).

– **Attribute**
  - An attribute has a name (an attribute type or attribute description) and one or more values. The attributes are defined in a schema

– **Schema**
  - The schema defines the attribute types that directory entries can contain.

– **Distinguished Name**
  - Full qualified name in an LDAP directory tree.
  - Consists of its Relative Distinguished Name (RDN) constructed from some attribute(s) in the entry, followed by the parent entry's DN.
  - Think of the DN as a full filename and the RDN as a relative filename in a folder.
  - Using the DN the object can be identified
  - Example: `uid=104903724,c=de,ou=bluepages,o=ibm.com`

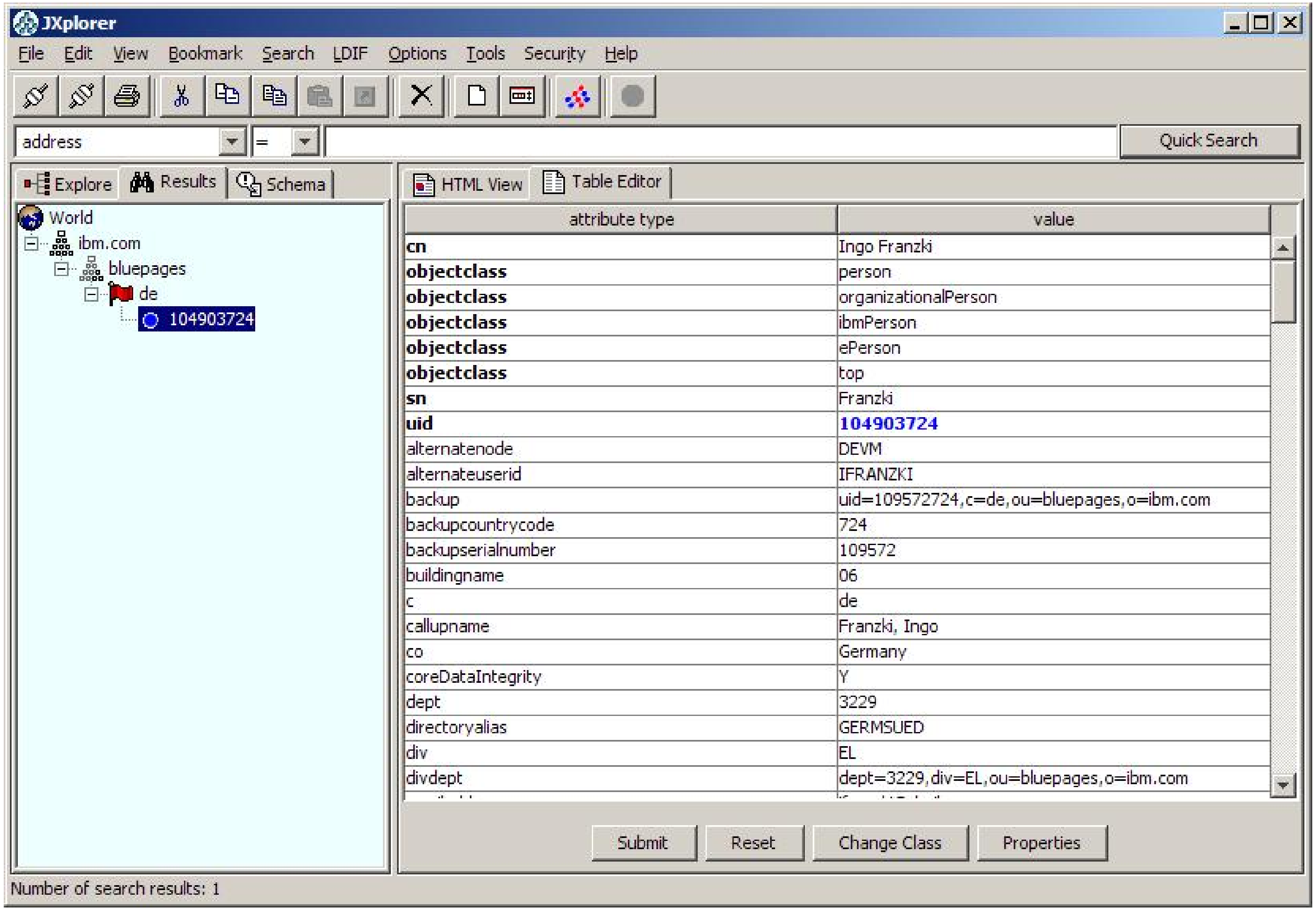
LDAP operations

- **Bind (authenticate)**
  - The Bind operation authenticates the client to the server.
  - Simple Bind can send the user's DN and password in plaintext, so the connection should be protected using Transport Layer Security (TLS).
  - The server typically checks the password against the *userPassword* attribute in the named entry.
  - Anonymous Bind (with empty DN and password) resets the connection to anonymous state.
  - Bind also sets the LDAP protocol version. Normally clients should use LDAPv3, which is the default in the protocol but not always in LDAP libraries

LDAP operations

- **Search**
  - The Search operation is used to both search for and read entries. Its parameters are:
    - **baseObject**
      - The DN (Distinguished Name) of the entry at which to start the search,
    - **scope**
      - BaseObject (search just the named entry, typically used to read one entry), singleLevel (entries immediately below the base DN), or wholeSubtree (the entire subtree starting at the base DN).
    - **filter**
      - How to examine each entry in the scope. E.g. (&(objectClass=person)(|(givenName=John)(mail=john*))) - search for persons who either have given name John or an e-mail address starting with john.
    - **derefAliases**
      - Whether and how to follow alias entries (entries which refer to other entries),
    - **attributes**
      - Which attributes to return in result entries.
    - **sizeLimit, timeLimit**
      - Max number of entries, and max search time.
    - **typesOnly**
      - Return attribute types only, not attribute values.
  - The server returns the matching entries and maybe continuation references (in any order), followed by the final result with the result code.

LDAP Example: IBM Bluepages

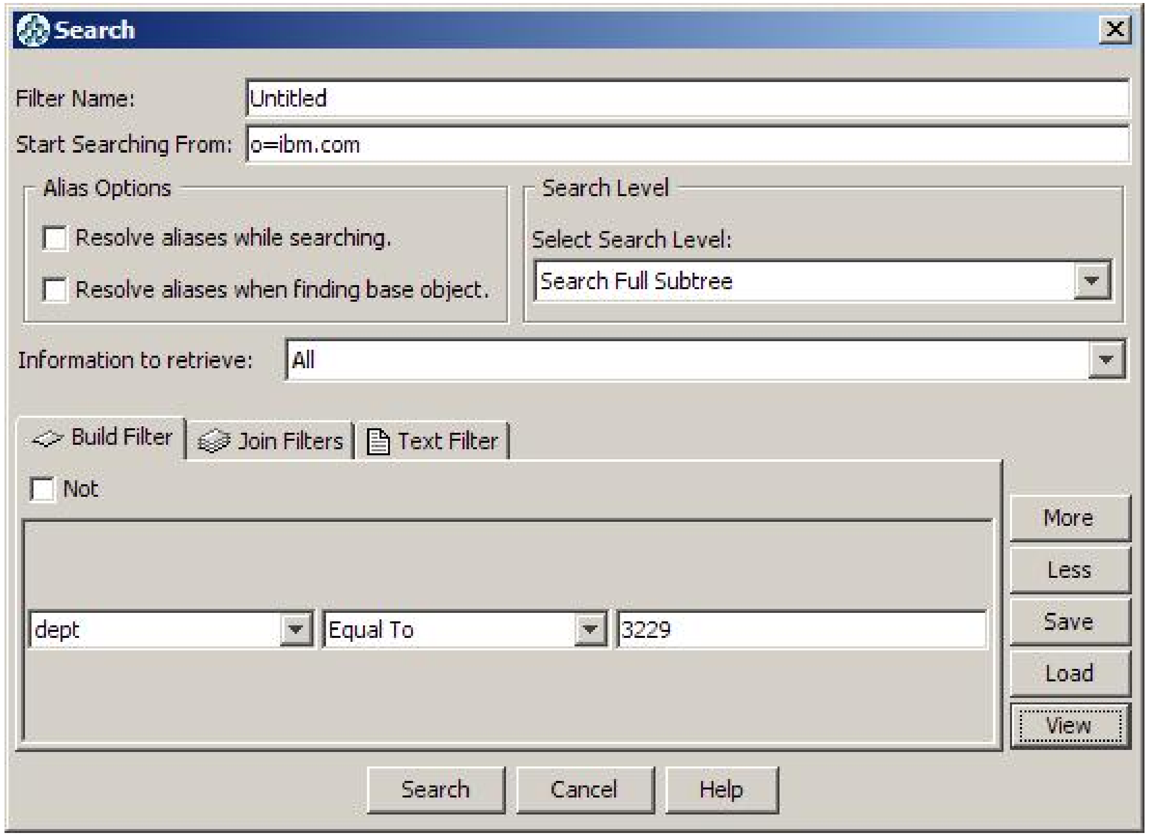


attribute type	value
cn	Ingo Franzki
objectclass	person
objectclass	organizationalPerson
objectclass	ibmPerson
objectclass	ePerson
objectclass	top
sn	Franzki
uid	**104903724**
alternatenode	DEVM
alternateuserid	IFRANZKI
backup	uid=109572724,c=de,ou=bluepages,o=ibm.com
backupcountrycode	724
backupserialnumber	109572
buildingname	06
c	de
callupname	Franzki, Ingo
co	Germany
coreDataIntegrity	Y
dept	3229
directoryalias	GERMSUED
div	EL
divdept	dept=3229,div=EL,ou=bluepages,o=ibm.com

Number of search results: 1

LDAP Example: IBM Bluepages

- **Search for all Entries with „dept=3229“**



Search

Filter Name: Untitled

Start Searching From: o=ibm.com

Alias Options

□ Resolve aliases while searching.

□ Resolve aliases when finding base object.

Search Level

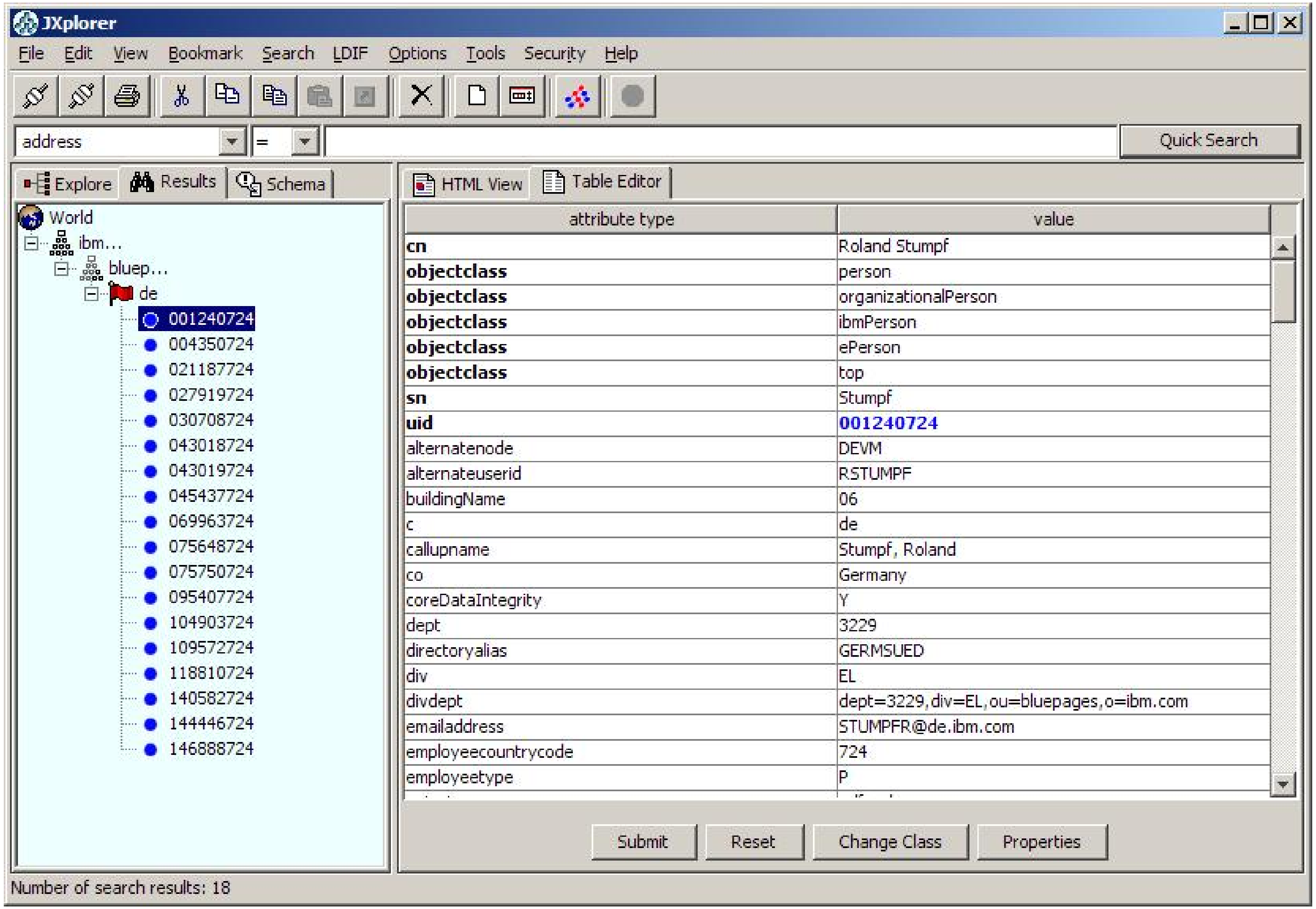
Select Search Level: Search Full Subtree

Information to retrieve: All

□ Not

dept | Equal To | 3229

LDAP Example: IBM Bluepages



- World
  - ibm...
    - bluep...
      - de
        - 001240724
        - 004350724
        - 021187724
        - 027919724
        - 030708724
        - 043018724
        - 043019724
        - 045437724
        - 069963724
        - 075648724
        - 075750724
        - 095407724
        - 104903724
        - 109572724
        - 118810724
        - 140582724
        - 144446724
        - 146888724

attribute type	value
cn	Roland Stumpf
objectclass	person
objectclass	organizationalPerson
objectclass	ibmPerson
objectclass	ePerson
objectclass	top
sn	Stumpf
uid	**001240724**
alternatenode	DEVM
alternateuserid	RSTUMPF
buildingName	06
c	de
callupname	Stumpf, Roland
co	Germany
coreDataIntegrity	Y
dept	3229
directoryalias	GERMSUED
div	EL
divdept	dept=3229,div=EL,ou=bluepages,o=ibm.com
emailaddress	STUMPFR@de.ibm.com
employeecountrycode	724
employeetype	P

Number of search results: 18

LDAP Servers (incomplete list)

- IBM Tivoli Directory Server
- z/VM LDAP Server
- Microsoft Active Directory
- OpenLDAP
- Apache Directory Server
- Apple Open Directory
- CA Directory from CA, Inc. (formerly eTrust Directory)
- Fedora Directory Server (Red Hat Directory Server)
- MXMS, from Atos Origin
- M-Vault, from Isode Limited
- Novell eDirectory
- OneLDAP
- OpenDS
- Oracle Internet Directory
- Penrose - a Java-based Virtual Directory Server.
- Siemens DirX
- SIDVault
- Sun Java System Directory Server
- ....
- (And many more)

z/VSE V4.2 LDAP Signon Support

- **LDAP Signon Support sits on top of any existing Security Manager**
  - It can be used with the Basic Security Manager (BSM)
  - As well as an External Security Manager (ESM)

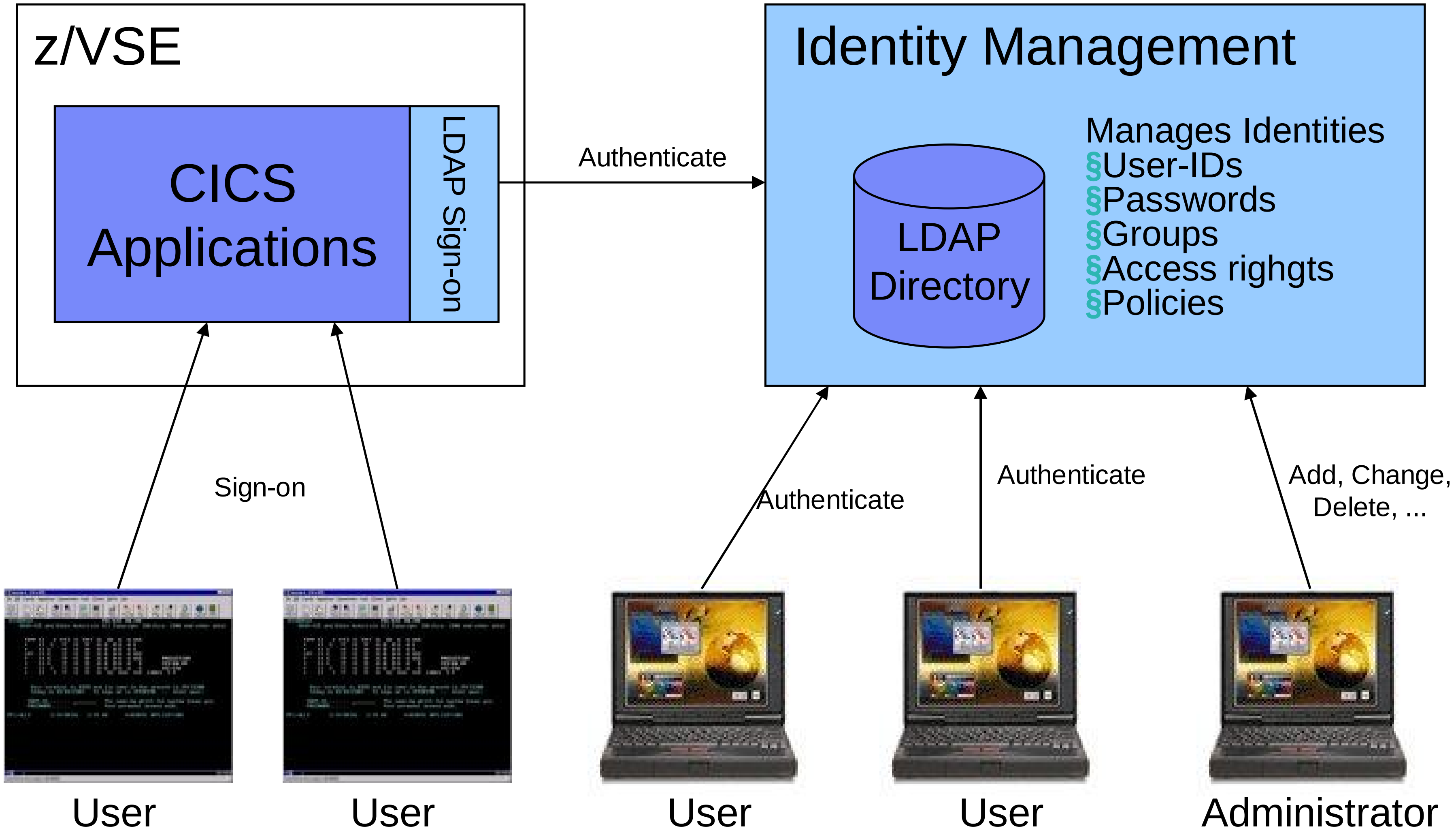
- **Signon process (simplified)**
  1. It first authenticates an user against a remote LDAP server
     - Via LDAP Bind and Search operations
  2. Then it maps the LDAP user to a short VSE user
     - Using a LDAP User Mapping File
  3. Finally passes the short VSE user and password to the existing signon process (BSM or ESM)

- **Currently only available for CICS signon**

z/VSE V4.2 LDAP Signon Support

- **Enables users to sign on z/VSE using a single, comprehensive, corporate-wide 'Identity Management' systems (i.e. IBM Tivoli Identity Manager, etc.)**
- **LDAP user-IDs and passwords can be up to 64 characters. Helps overcome VSE internal limits**
  - 4 character VSE/ICCF user-IDs
  - 4 and 8 character CICS user-IDs
  - up to 8 character Passwords
- **LDAP sign on sits on top of existing z/VSE security manager (i.e. BSM, ESM, etc.)**
- **z/VSE LDAP client can work with common LDAP servers**
  - IBM Tivoli Directory server
  - z/VM LDAP server (with optional RACF repository)
  - OpenLDAP, Apache Directory server, Novell eDirectory, and many others.
- **Potential benefits include improved protection, consistent access rules, ease of use for end-users**

The big picture



z/VSE

CICS Applications

LDAP Sign-on

Authenticate

Identity Management

LDAP Directory

Manages Identities
- User-IDs
- Passwords
- Groups
- Access righgts
- Policies

Sign-on

Authenticate

Authenticate

Add, Change, Delete, ...

User

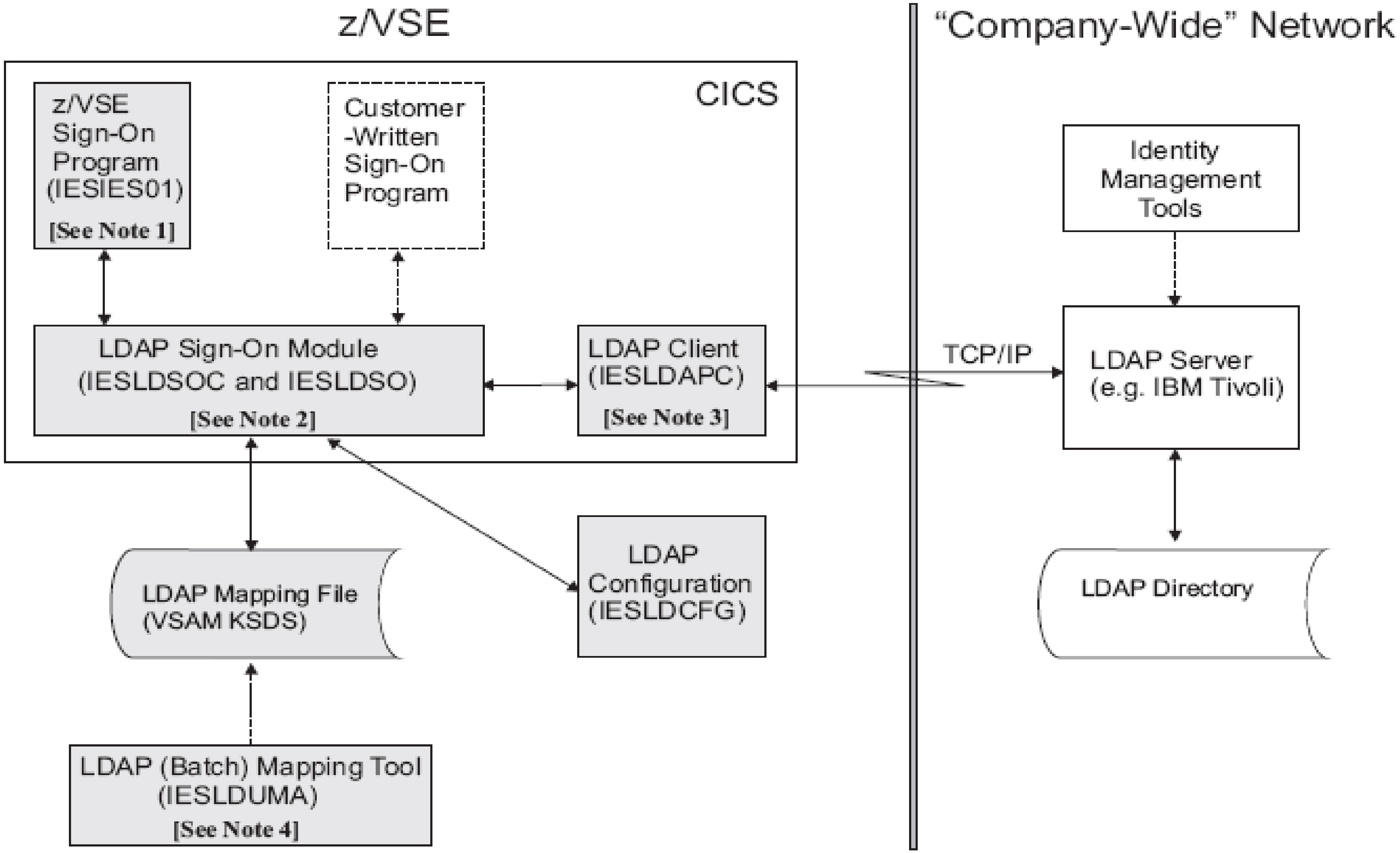
User

User

User

Administrator

z/VSE V4.2 LDAP Signon Support


z/VSE
"Company-Wide" Network
CICS
z/VSE Sign-On Program (IESIES01)
[See Note 1]
Customer -Written Sign-On Program
LDAP Sign-On Module (IESLDSOC and IESLDSO)
[See Note 2]
LDAP Client (IESLDAPC)
[See Note 3]
TCP/IP
Identity Management Tools
LDAP Server (e.g. IBM Tivoli)
LDAP Directory
LDAP Mapping File (VSAM KSDS)
LDAP Configuration (IESLDCFG)
LDAP (Batch) Mapping Tool (IESLDUMA)
[See Note 4]

LDAP User Mapping File

- **VSAM KSDS file used to store the user-ID mappings**
  - LDAP Users & Passwords: up to 64 characters
  - VSE Users & Passwords: up to 8 characters
- **The LDAP mapping file contains:**
  - Records containing user-IDs that are to be used for LDAP-authentication
    - Contain a mapping of a long-user-ID (used in the LDAP environment) to a short-user-ID (used in z/VSE)
    - These user-IDs are referred to as being LDAP-enabled.
  - Records containing user-IDs that are not used for LDAP-authentication (for example, the SYSA user-ID)
    - These user-IDs are referred to as being not LDAP-enabled, and these users can sign on to z/VSE even if the LDAP server is not operational.
- **Maintained using batch tool IESLDUMA**

LDAP Password cache

- **Authentication against a remote LDAP server can be time consuming (requires network communication)**
- **When a user signs on multiple times within a short period of time, it is very unlikely that the LDAP password has changed**
- **If caching is enabled, a shortpath is used to authenticate a user**
  - A password hash (SHA-256) of the last sucessfull signon attempt (LDAP bind) is stored in the User Mapping File
    - There is no way to recover the password from a hash
  - A subsequent signon request builds the password hash, and compares the hash against the stored hash
    - If it is the same, the user has entered the same password
  - A stored password hash has an expiration period. When it is over, a full LDAP signon (LDAP bind) is enforced

LDAP Configuration

- **Per default, LDAP signon is not enabled.**
- **You need to create a configuration to enable LDAP signon support**
  - Use Skeleton SKLDCFG in ICCF library 59
- **Specifies (summary)**
  - DLBL Name of LDAP User Mapping File (default: IESLDUM)
  - IPs or hostnames of one or multiple LDAP Servers
  - Settings for Authentication method (see next foils)
  - Settings for Cache usage and expiration
  - Settings for Secure Socket Layer (SSL)

LDAP Authentication Methods

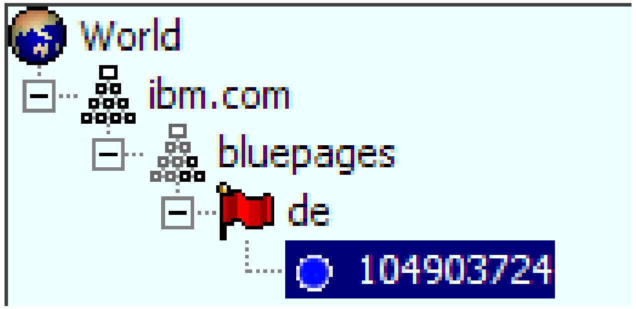
- **LDAP Authentication relies on the LDAP bind operation with distinguished name (DN) and password**

- Direct Authentication:
  - The specified user-ID is used directly for the LDAP bind operation.
  - A pattern is used to build the distinguished name for the bind, e.g. „cn=%u,dc=ibm,dc=com“

- Search Authentication:
  - In case the specified user-ID cannot be used directly for bind.
  - Instead, a LDAP search operation is performed first using the attribute that is specified in the configuration (e.g. „email“).
  - An additional search filter can be specified to further limit the search result, e.g. „dept=3229“
  - The search result’s distinguished name is then used for the LDAP bind operation.

LDAP Authentication Examples with IBM Bluepages

- **LDAP Server: bluepages.ibm.com**


World
ibm.com
bluepages
de
104903724

- **Direct Authentication:**
  - DN would be “**uid=104903724,c=de,ou=bluepages,o=ibm.com**“
  - So pattern would be „**uid=%u,c=de,ou=bluepages,o=ibm.com**“
  - LDAP User ID would be IBM personal number: „**104903724**“
  - LDAP Bind will be performed with „**uid=104903724,c=de,ou=bluepages,o=ibm.com“** and the specified password

LDAP Authentication Examples with IBM Bluepages

§ Search Authentication:

- Every person entry has an attribute named „**email**“ that contains the user‘s email address
- BaseDN for search (start of search) would be „**ou=bluepages,o=ibm.com**“
- Additional search filter either empty (no filter) or „**dept=3229**“ if search should be limited to persons in department 3229
- LDAP User ID would be email address: „**ifranzki@de.ibm.com**“
- LDAP Search will be:
  - Start at „**ou=bluepages,o=ibm.com“** and look for entries where **email=ifranzki@de.ibm.com & dept=3229**
  - Result will be just me, i.e. My DN: **uid=104903724,c=de,ou=bluepages,o=ibm.com**
- LDAP Bind will be performed with „**uid=104903724,c=de,ou=bluepages,o=ibm.com“** and the specified password

Using your own CICS Sign-on program

- **The Interactive Interface signon program (IESIES01) has been adapted to support LDAP authentication**
  - If LDAP authentication is configured and enabled, it will automatically show longer fields for userid and password

- **If customers use their own sign-on program, they need to adapt it to use LDAP sign-on support:**
  - Enlarge fields in screen (BMS map) for userid and password
  - Support case sensitive input
  - Call LDAP Sign-on Program IESLDSOC to perform LDAP authentication
    - Using EXEC CICS LINK with COMMAREA (see Admin Guide)
  - Sample CICS Sign-on Program supporting LDAP is available on request (zvse@de.ibm.com)

Restrictions

- **No support for using long-user-IDs in the ID statement within batch jobs**
  - ID statements can only use a short-user-ID and short-password (a “z/VSE” user-ID and password).
- **LDAP sign-on is only possible using a CICS sign-on panel.**
  - The z/VSE-provided LDAP sign-on panel (IUI signon)
  - A customer-written sign-on panel.
- **Only LDAP Authentication (using Bind) is supported**
  - Kerberous authentication (often used by MS Active Directory) is not supported

LDAP Tools and Documentation

- **LDAP Browser**
  - JXplorer (http://www.jxplorer.org/)
- **z/VSE Manuals:**
  - **Planning:** Subchapter in chapter 18. Security and Encryption Support: LDAP Sign-On Support
  - **Administration:** Chapter 45. Maintaining User Profiles in an LDAP Environment
- **Internet:**
  - Wikipedia: http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

Questions ?