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Creating users in Active Directory from employee data stored in SAP HR

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Summary

SAP provides an interface that allows creating and modifying users in a LDAP directory server such as Microsoft Active Directory from employee data stored in SAP HR as part of the SAP standard. The interface called *HR Data Retrieval in a LDAP Enabled Directory Service* extracts data using a query or an ABAP report and performs the export into a LDAP directory server using the LDAP Connector.
The usage of this interface allows for an optimized administration of users and thus can reduce the operational costs of an IT landscape. This collaboration brief describes how the LDAP interface has to be configured for Microsoft Active Directory and provides a sample report that can be used for testing purposes.

Applies to

- mySAP HR 4.6C together with a SAP Web Application Server 6.20 and higher
- SAP R/3 Enterprise, mySAP ERP
- Microsoft Active Directory 2000 and 2003

Keywords

Active Directory, HR, LDAP

Level of difficulty

Technical consultants, Developers

Contact

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Contents

Introduction

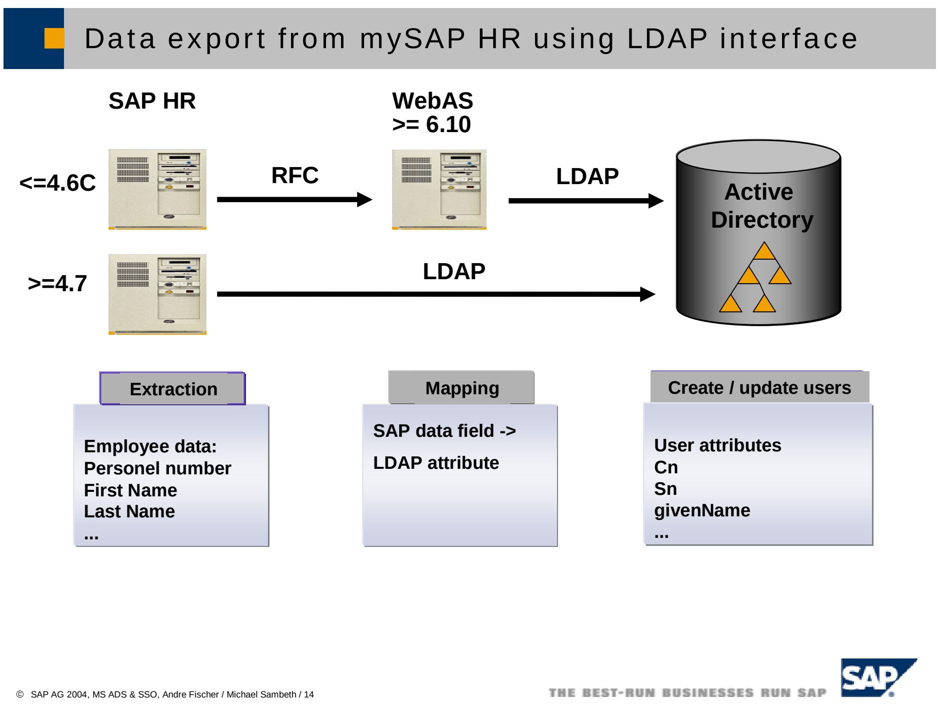
Using the SAP HR LDAP interface companies can set up automated processes to create and update users in Active Directory from employee data stored in SAP HR.

The SAP HR system is the master for basic user data such as

- First Name
- Last Name
- Employee Number
- …

Since user data has not to be entered manually the correctness of user data is enhanced and the process of changing user data is speed up.

The SAP HR LDAP interface uses the LDAP Connector. The ABAP coding used by the SAP HR LDAP interface is shipped only with SAP basis release 6.x onwards. If employee data is to be extracted from a SAP HR 4.6 system the appropriate LDAP function modules have to be called remotely in a separate Web Application Server which then acts as a LDAP gateway.


Data export from mySAP HR using LDAP interface
SAP HR
WebAS >= 6.10
<=4.6C
RFC
LDAP
Active Directory
>=4.7
LDAP
Extraction
Employee data: Personel number First Name Last Name ...
Mapping
SAP data field -> LDAP attribute
Create / update users
User attributes Cn Sn givenName ...
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THE BEST-RUN BUSINESSES RUN SAP

If SAP HR is running on a SAP Enterprise System or higher the function module *SPLDAP_RECEIVE_ATTRIBUTES* can be called locally.

The data from SAP HR can be extracted using two different methods. The first method is using a query while the second method is based on an extraction report.

The extraction report is the method of choice if complicated data is to be extracted from SAP HR. Furthermore it is easy to format the data before it is exported to the Active Directory. A typical example is that the telephone number in SAP HR has a different format than the one used in Active Directory.

Step 1: Data extraction in SAP HR

The extraction report in the appendix is based on the SAP report *RPLDAP_MANAGER*. It uses the logical database PNP. The macro *RP_PROVIDE_FROM_LAST* is used to retrieve the last entry of the current period in the table header entry from an internal infotype table (here p0001 and p0002). The data is transmitted to the function module *SPLDAP_RECEIVE_ATTRIBUTES*.

```
CALL FUNCTION 'SPLDAP_RECEIVE_ATTRIBUTES'
  DESTINATION
    LDAPDEST
  EXPORTING
    LOGSYS          = LOGSYS
    SERVERID        = LDAPSRV
    ATTRIBUTES_S    = attributes[]
    INITIAL_RUN     = LDAPINITIALRUN
  IMPORTING
    RETURN          = ERRORS[].
```

The function module *SPLDAP_RECEIVE_ATTRIBUTES* is part of the ABAP stack in a Web Application Server and is remote enabled. If the extraction report runs in a SAP HR system having the release 4.6 or lower it can to be called remotely in separate SAP Web Application Server that than acts as a LDAP gateway.

The function module *SPLDAP_RECEIVE_ATTRIBUTES* needs the following input parameters:

DESTINATION	RFC destination that is configured to access the SAP Web Application Server remotely where the LDAP Connector is configured. (Only needed for a SAP HR system having a release of 4.6 or lower)
LOGSYS	Logical system name of the client where the extraction report runs. This value is retrieved using the function module 'OWN_LOGICAL_SYSTEM_GET'
SERVERID	Name of the LDAP server as it is configured in transaction LDAP in the SAP Web Application Server
ATTRIBUTES_S	Internal table that receives the name and values of the Logical SAP Data Fields that are mapped in transaction LDAP against the directory services attributes of the user object. The internal table has the following fields: PERNR ATTR_TAB

	ATTR_FIELD
	VALUE
INITIAL_RUN	If this flag is set the function module first tries to create a user. It will try to update the user if the user already exists. If the flag is omitted the function module will first try to update the user and will then try to create the user if it does not exist

The logical SAP data fields can be represented by freely-definable names whereas the name of the SAP data structure is fixed to EMPLOYEE. In our example we therefore choose meaningful names such as FIRSTNAME and LASTNAME for the SAP data fields. The SAP data fields are mapped to the directory services attributes using transaction *LDAPMAP* in the SAP Web Application Server as described later.

If the first name and the last name of the two employees Bill Smith and Bob Smith are extracted the table ATTRIBUTES_S will have the following content.

PERNR	ATTR_TAB	ATTR_FIELD	VALUE
0000001	EMPLOYEE	FIRSTNAME	Bill
0000001	EMPLOYEE	LASTNAME	Smith
0000001	EMPLOYEE	SAMACCOUNTNAME	E00000001
0000002	EMPLOYEE	FIRSTNAME	Bob
0000002	EMPLOYEE	LASTNAME	Smith
0000002	EMPLOYEE	SAMACCOUNTNAME	E00000002

The filling of the internal table is performed in the following section of the coding

```
get pernr.

  rp-provide-from-last p0001 space keyda keyda.
  rp-provide-from-last p0002 space keyda keyda.

  ATTRIBUTES_WA-PERNR = p0001-pernr.

* lastname
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'LASTNAME'.
  attributes_wa-value = p0002-nachn.
  append attributes_wa to attributes.

* firstname
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'FIRSTNAME'.
  attributes_wa-value = p0002-vorna.
  append attributes_wa to attributes.

* sAMAccountName
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'SAMACCOUNTNAME'.
* --------------------------------
* Using the employee number a unique name is created
* for the sAMAccountName
* --------------------------------
  concatenate ‘E’ p0001-pernr into attributes_wa-value.
  append attributes_wa to attributes.

* other attributes have to added here.
* attributes_wa-attr_tab = 'EMPLOYEE'.
* attributes_wa-attr_field = '<name of SAP data field>'.
* <coding to retrieve data from SAP HR if it cannot be retrieved>
* <from a infotype or subtype>
* attributes_wa-value = <SAP HR data>.
* append attributes_wa to attributes.

end-of-selection.
```

If additional data such as the cost center should be exported from SAP HR than one would just have to add the following coding.

```
* cost center
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'COSTCENTER'.
  attributes_wa-value = p0001-kostl.
  append attributes_wa to attributes.
```

Step 2: Configuration of the LDAP interface

In the following we will describe the configuration steps that are necessary for the configuration of the LDAP Connector. This configuration steps have to be performed on the SAP Web Application Server.

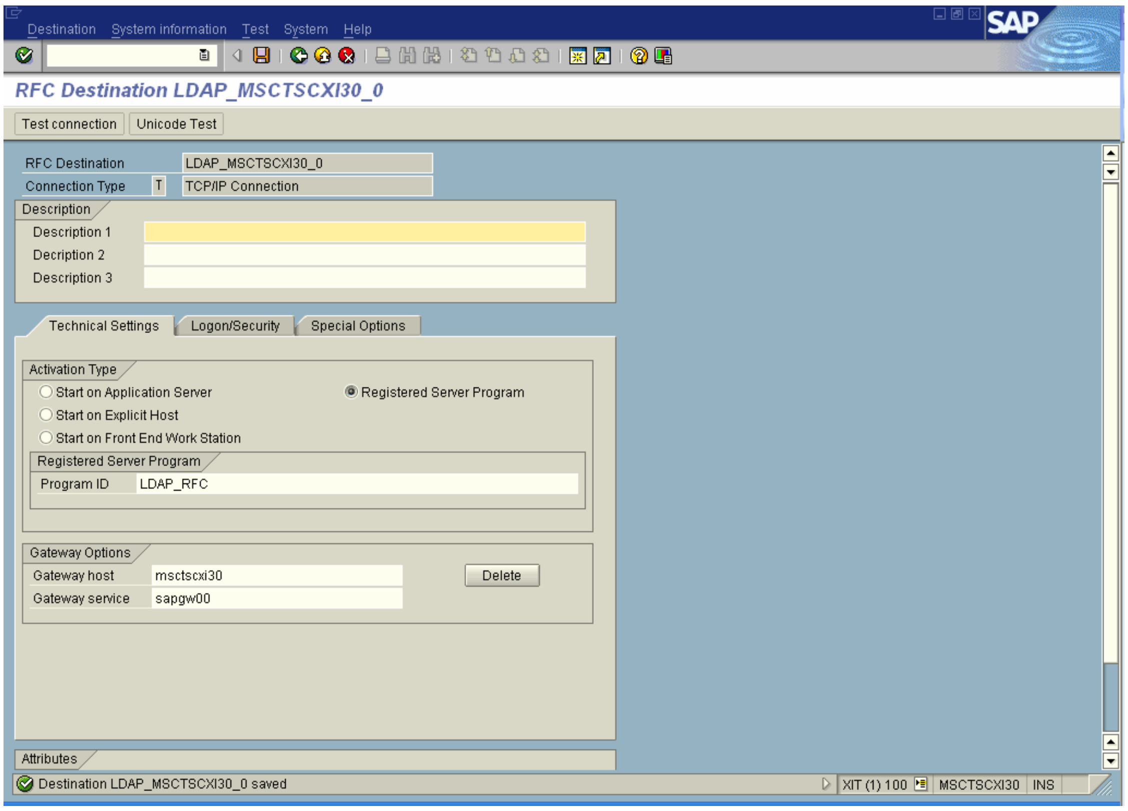
RFC destination and LDAP Connector

First you have to create a RFC destination in the Web Application Server that is used for the communication with the *LDAP Connector* using transaction SM59. The LDAP Connector has to be configured using connection type T with activation type “Registered Server Program”. As “*ProgramID*” speficy the same string as for the destination name, which in turn should follow the naming convention

```
LDAP_<ApplicationServerName>[_<n>]
```

(use the postfix number if you configure more than one LDAP Connector to run on the same application server).

As gateway options enter the gateway of the application server where the LDAP Connector will be started.



RFC Destination LDAP_MSCTSCXI30_0

RFC Destination	LDAP_MSCTSCXI30_0
Connection Type	T TCP/IP Connection

Description

Description 1	
Decription 2	
Description 3	

Activation Type

○ Start on Application Server
● Registered Server Program
○ Start on Explicit Host
○ Start on Front End Work Station

Registered Server Program

Program ID	LDAP_RFC

Gateway Options

Gateway host	msctscxi30
Gateway service	sapgw00

Destination LDAP_MSCTSCXI30_0 saved

XIT (1) 100 MSCTSCXI30 INS

Figure 1: Configuration of the RFC destination of the LDAP Connector

When the RFC connection has been created the LDAP Connector can be configured using transaction LDAP.

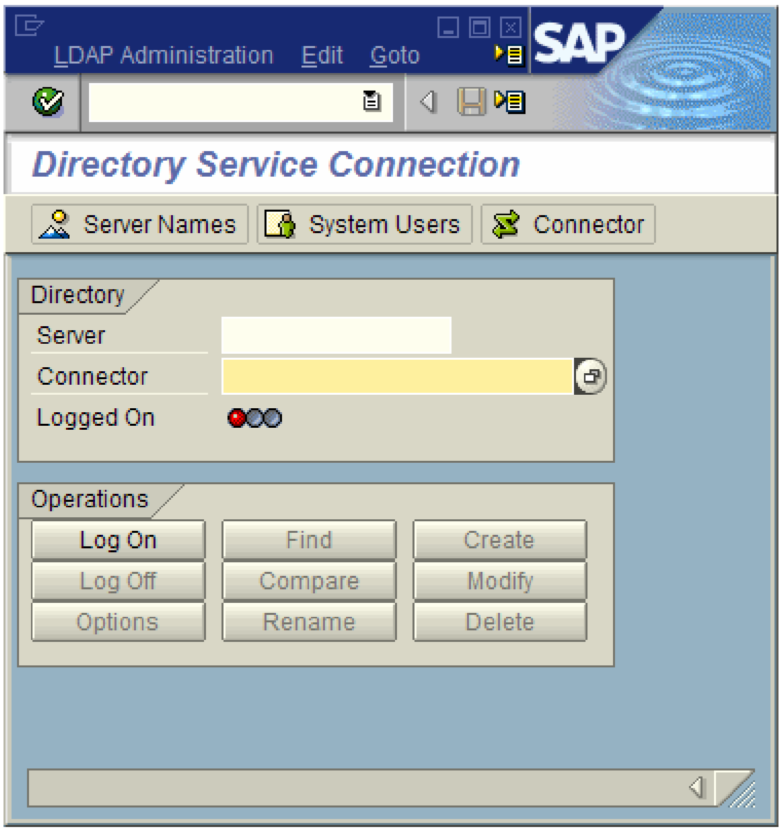
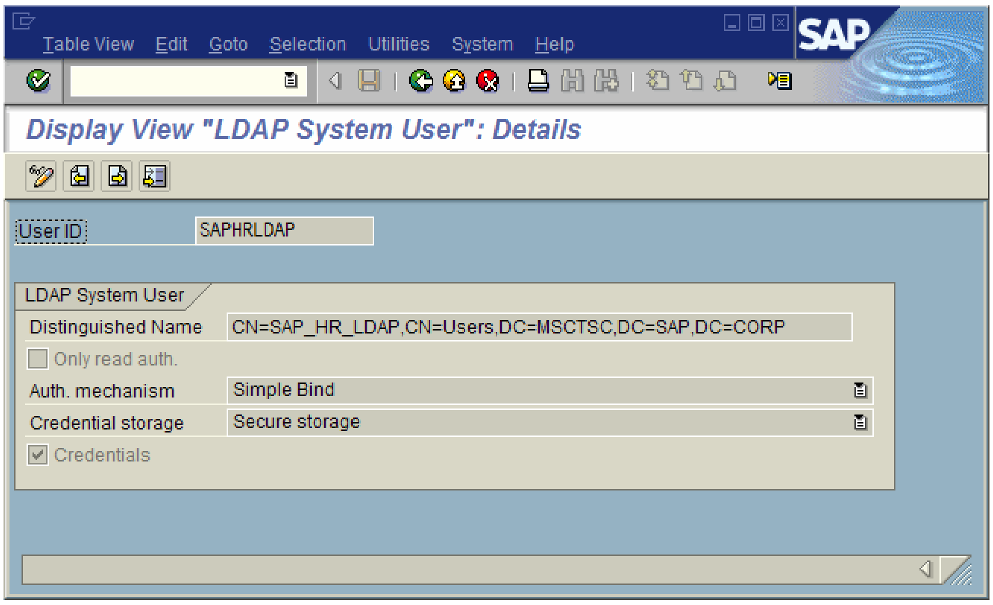


Figure 2: Transaction LDAP

Press the button Connector.

LDAP Connector

The next configuration step is the definition of the LDAP Connector. Start transaction LDAP and choose the button *Connector*.

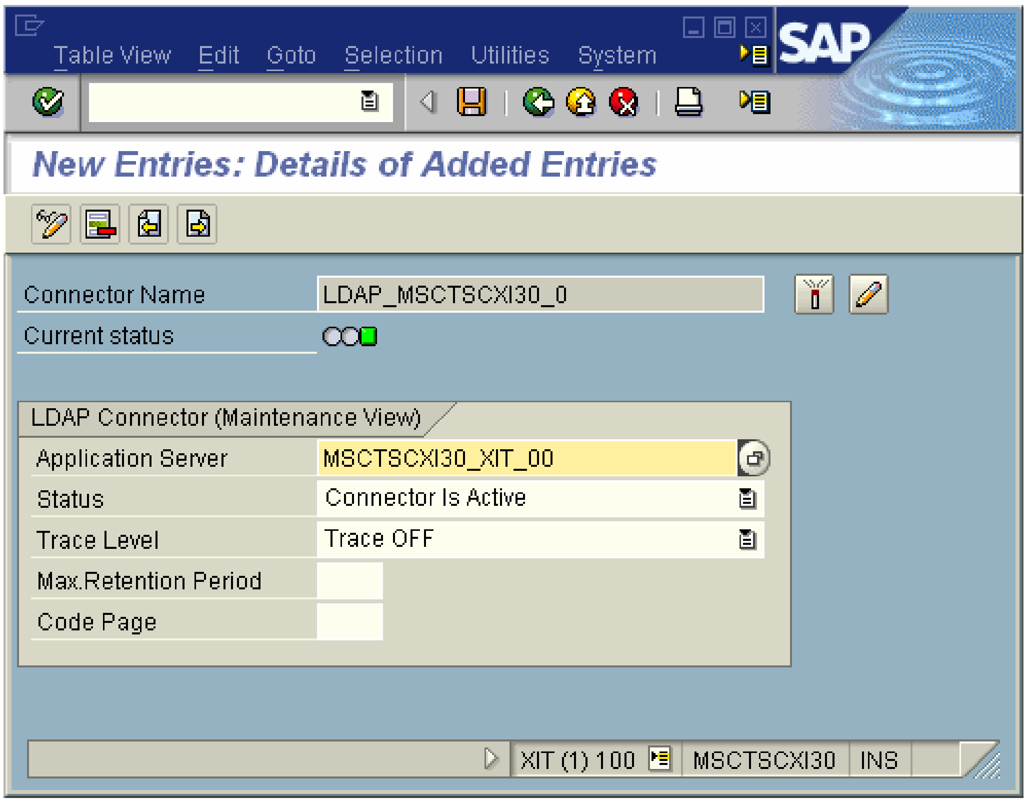


User ID: SAPHRLDAP

LDAP System User

Distinguished Name	CN=SAP_HR_LDAP,CN=Users,DC=MSCTSC,DC=SAP,DC=CORP
☐ Only read auth.	
Auth. mechanism	Simple Bind
Credential storage	Secure storage
☑ Credentials	

The connector name is the RFC destination that has been created in the previous step.



Connector Name	LDAP_MSCTSCXI30_0
Current status	

LDAP Connector (Maintenance View)

Application Server	MSCTSCXI30_XIT_00
Status	Connector Is Active
Trace Level	Trace OFF
Max.Retention Period	
Code Page	

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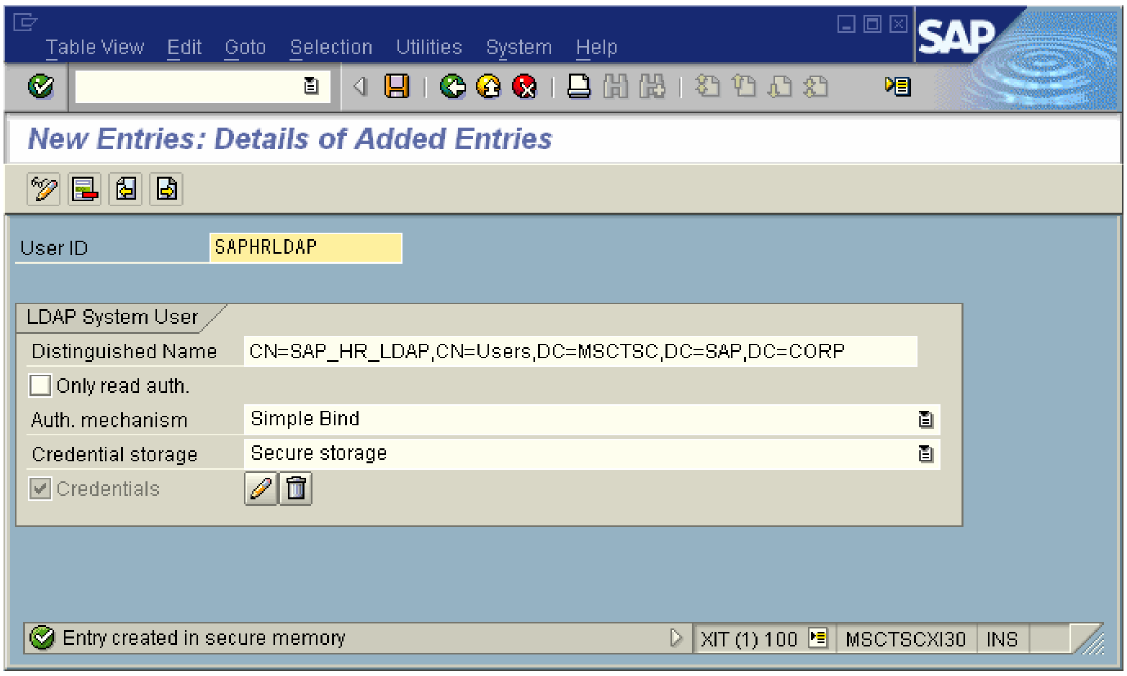
Figure 3: LDAP Connector configuration

System logon

As a next step the credentials have to be specified that are used for the connection to the LDAP directory as the so called *System Logon* (here SAPHRLDAP). The user is specified using its *distinguishedName* while the password is stored in the secure storage.

Start transaction LDAP and choose the button *System Users*.



New Entries: Details of Added Entries

User ID	SAPHRLDAP

LDAP System User

Distinguished Name	CN=SAP_HR_LDAP,CN=Users,DC=MSCTSC,DC=SAP,DC=CORP
☐ Only read auth.	
Auth. mechanism	Simple Bind
Credential storage	Secure storage
☑ Credentials	

Entry created in secure memory

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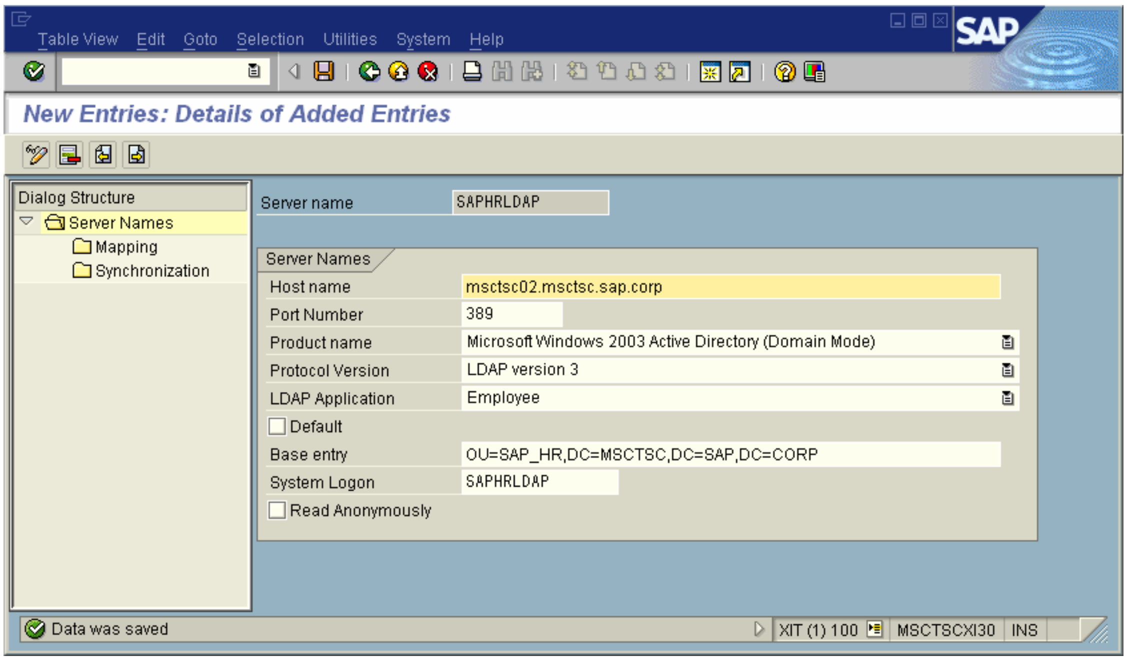
Figure 4: LDAP system user

The distinguished Name can be determined from Active Directory using tools like ADSIEdit.msc.

LDAP server

Now we can specify the configuration settings for the LDAP server including the System Logon that should be used for the LDAP connection. Start transaction LDAP and choose the button *Server Names.*



New Entries: Details of Added Entries

Dialog Structure
- Server Names
  - Mapping
  - Synchronization

Server name	SAPHRLDAP

Server Names

Host name	msctsc02.msctsc.sap.corp
Port Number	389
Product name	Microsoft Windows 2003 Active Directory (Domain Mode)
Protocol Version	LDAP version 3
LDAP Application	Employee
☐ Default	
Base entry	OU=SAP_HR,DC=MSCTSC,DC=SAP,DC=CORP
System Logon	SAPHRLDAP
☐ Read Anonymously	

Data was saved

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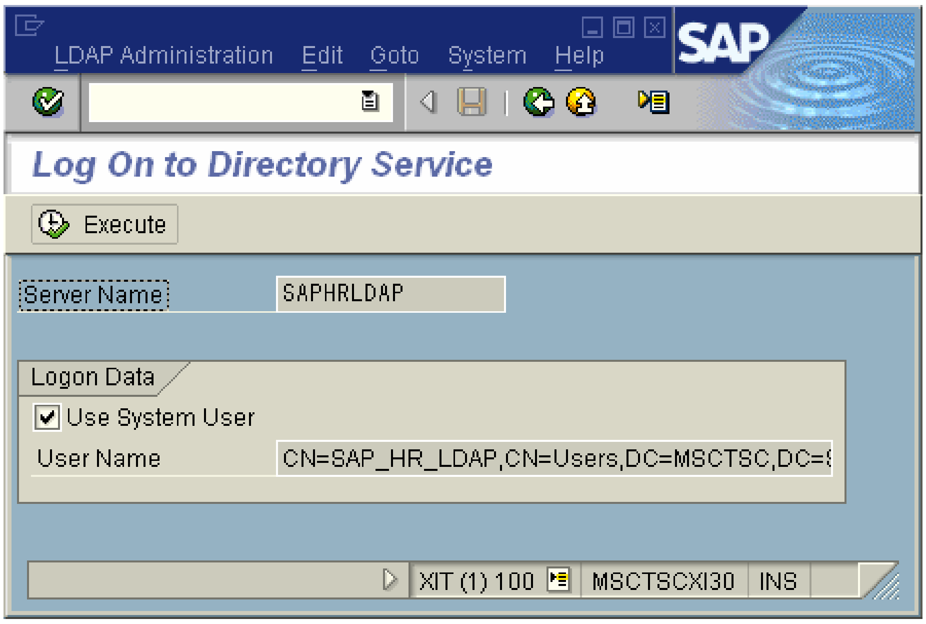
Figure 5: LDAP server configuration

To check the configuration start transaction LDAP -> Log on. Check the check box *Use System User.*



Log On to Directory Service

Server Name	SAPHRLDAP

Logon Data

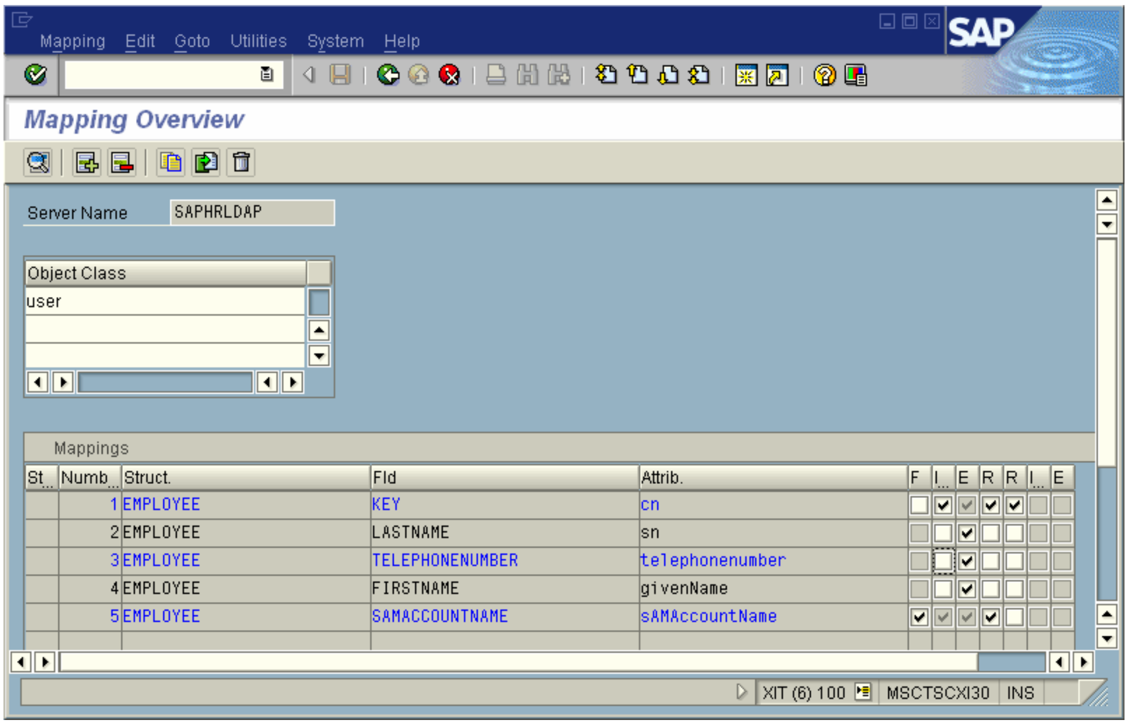
☑ Use System User	
User Name	CN=SAP_HR_LDAP,CN=Users,DC=MSCTSC,DC=

XIT (1) 100 MSCTSCXI30 INS

Figure 6:Log on to Directory Service using the System User

Attribute mapping

The employee data that is retrieved from the SAP HR system is sent to the SAP Web Application Server using the data structure EMPLOYEE and self defined SAP data fields.



Server Name SAPHRLDAP

Object Class
user

Mappings

St..	Numb..	Struct.	Fld	Attrib.	F	I...	E	R	R	I...	E
	1	EMPLOYEE	KEY	cn		✓	✓	✓	✓		
	2	EMPLOYEE	LASTNAME	sn			✓				
	3	EMPLOYEE	TELEPHONENUMBER	telephonenumber			✓				
	4	EMPLOYEE	FIRSTNAME	givenName			✓				
	5	EMPLOYEE	SAMACCOUNTNAME	sAMAccountName	✓	✓	✓	✓			

Figure 7: LDAPMAP – attribute mapping

The attribute mapping allows that the values of the SAP data fields are mapped to the corresponding attribute names used in Active Directory. The attribute mapping can also be called directly using transaction LDAPMAP. The mapping flags have the following meaning:

Filter	Determines how corresponding entries for SAP Objects can be found in the directory (Only one line can be checked)
Import Mapping	Determines which mappings are used to read directory entries (not relevant for this scenario. Only for the "Filter" line this indicator must be set)
Export Mapping	Determines which mappings are used to write directory entries
Required	Determines which attributes are essential (mandatory) for new directory entries
RDN mapping	Marks the mapping which is used to form the RDN of new directory entries (Only one line can be checked)
Import	Not relevant for this scenario
Export	Not relevant for this scenario

Remarks:

The object class that we use in the Active Directory (user) has two mandatory attributes which are *cn* (common name) and *sAMAccountName*. If these attributes are not used, the creation of an object using this object class will fail. Therefore we marked them as required.

The attribute *sAMAccountName* has to be unique in each domain and is indexed too. Therefore the flag *filter* is checked for this mapping.

The function module SPLDAP_RECEIVE_ATTRIBUTES internally fills the SAP data field KEY in the structure EMPLOYEE. Thus a mapping has to be maintained for the SAP data field KEY. Since this field is used to build the relative distinguished Name for the user object the flag *RDN Mapping* has to be checked for this mapping.

However no data has to be filled into the internal table ATTRIBUTES_S for the SAP data field KEY that is send to the function module.

As a default the function module fills the data field KEY with a default value that consists out of the name of the logical system of the SAP HR system and the personnel number) being used as the naming attribute *cn* in the Active Directory.

If another value than the default should be used for cn one has to implement the BADI HRLDAP_ATTRIBUTES in the SAP Web Application Server.

Step 3: BADI Implementation

The method GET_RDN of the BADI HRLDAP_ATTRIBUTES has to be implemented in the SAP Web Application Server. To do this start transaction SE19 enter a new name for the implementation like *Z_HRLDAP_ATTRIBUTES* and follow the steps described in the documentation

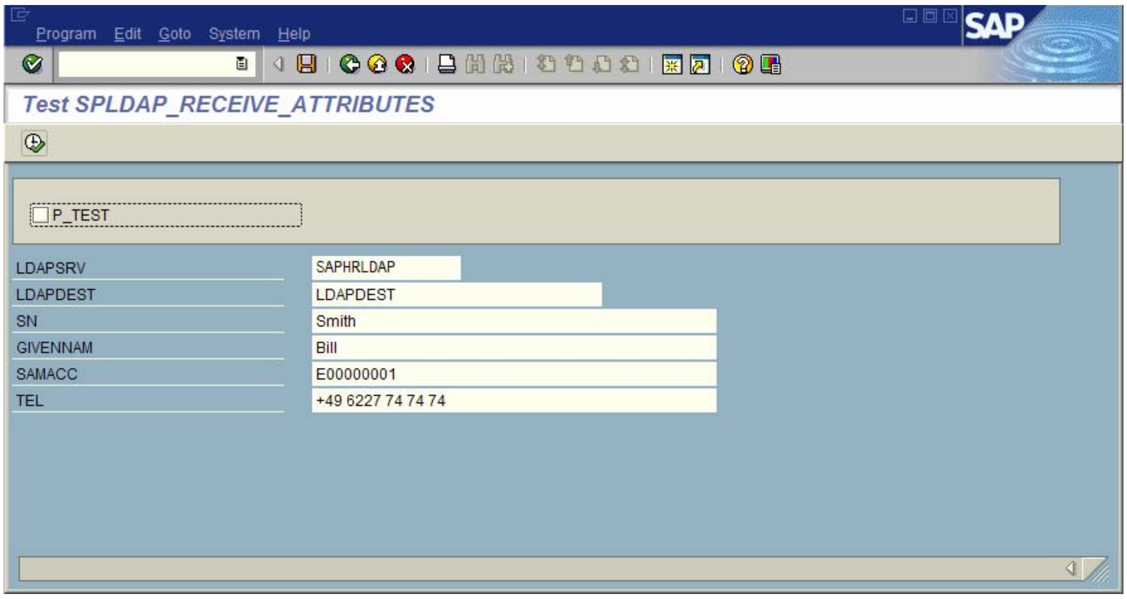
http://help.sap.com/saphelp_erp2004/helpdata/en/eb/3e7cf4940e11d295df0000e82de14a/content.htm

In our example we fill the value of cn with the first name and the last name of an employee using a space as a separator. This is the default value that is used if a user object is created using the MMC SnapIn “Users and Computers”.

```
method IF_EX_HRLDAP_ATTRIBUTES~GET_RDN .

FIELD-SYMBOLS: <fs_data> LIKE LINE OF data.

  DATA vals_wa TYPE valstructc.

  CLEAR rdn.
  CLEAR xrdn.
* create cn that has the following structure
* firstname space lastname
  READ TABLE data
    WITH KEY var = 'EMPLOYEE'
             fld = 'FIRSTNAME'
    ASSIGNING <fs_data>.

  IF sy-subrc EQ 0.
    READ TABLE <fs_data>-vals INDEX 1
                              INTO vals_wa.
    IF sy-subrc EQ 0.
        rdn = vals_wa-val.
    ENDIF.
  ENDIF.

 READ TABLE data
    WITH KEY var = 'EMPLOYEE'
             fld = 'LASTNAME'
    ASSIGNING <fs_data>.

  IF sy-subrc EQ 0.
    READ TABLE <fs_data>-vals INDEX 1
                              INTO vals_wa.
    IF sy-subrc EQ 0.
        concatenate rdn vals_wa-val into rdn separated by space.
    ENDIF.
  ENDIF.

*  CONCATENATE logsys pernr INTO rdn SEPARATED BY space.
endmethod.
```

Test report Z_TEST_SPLDAP_RECEIVE

The settings in the LDAP configuration and the BADI implementation mentioned above can be tested using the report Z_*TEST_SPLDAP_RECEIVE*. This way it is possible to test the technical side of the SAP HR LDAP interface without the need to have development authorizations in the SAP HR system.



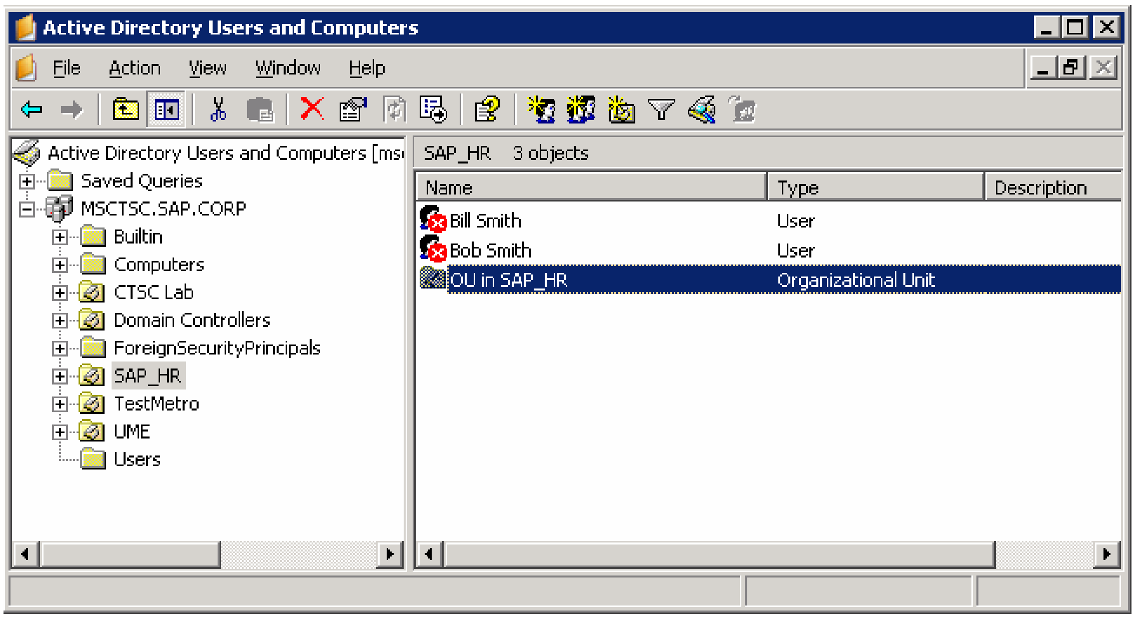
P_TEST

LDAPSRV	SAPHRLDAP
LDAPDEST	LDAPDEST
SN	Smith
GIVENNAM	Bill
SAMACC	E00000001
TEL	+49 6227 74 74 74

Figure 8: Test report *Z_TEST_SPLDAP_RECEIVE*

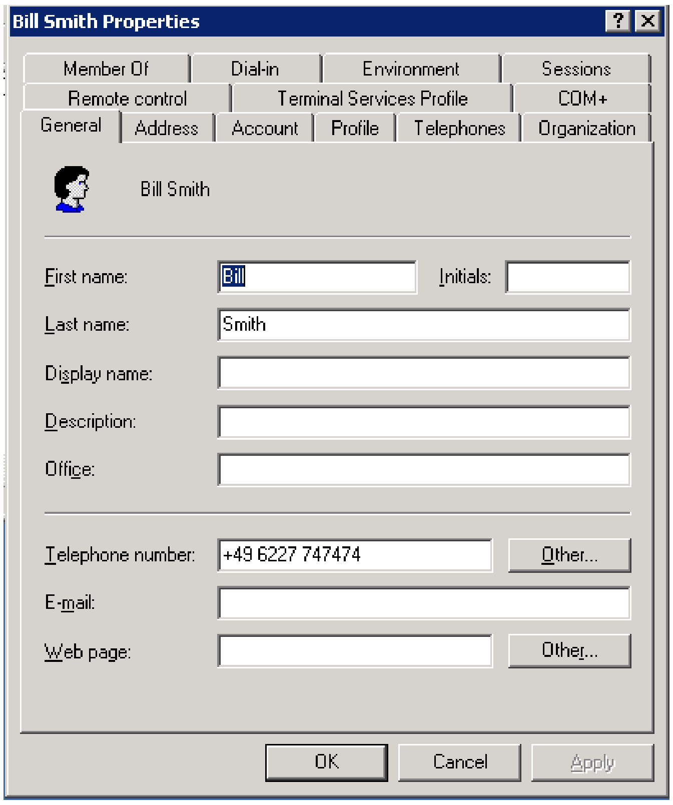
Result

While new users are created as deactivated accounts without a password in Active Directory existing user accounts will be updated when user information changes in SAP HR.


Active Directory Users and Computers
File Action View Window Help
Active Directory Users and Computers [ms
Saved Queries
MSCTSC.SAP.CORP
Builtin
Computers
CTSC Lab
Domain Controllers
ForeignSecurityPrincipals
SAP_HR
TestMetro
UME
Users
SAP_HR 3 objects

Name	Type	Description
Bill Smith	User	
Bob Smith	User	
OU in SAP_HR	Organizational Unit	

Figure 9: Active Directory – MMC “Users and Computers”


Bill Smith Properties

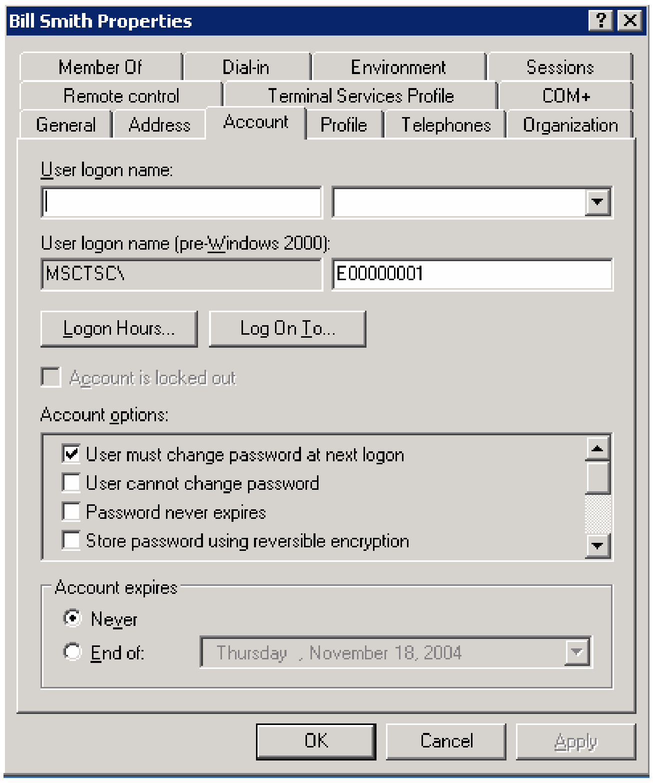
Member Of | Dial-in | Environment | Sessions | Remote control | Terminal Services Profile | COM+ | General | Address | Account | Profile | Telephones | Organization

Bill Smith

First name:	Bill	Initials:	
Last name:	Smith		
Display name:			
Description:			
Office:			
Telephone number:	+49 6227 747474	Other...	
E-mail:			
Web page:		Other...	

OK | Cancel | Apply

Figure 10: Telephone number user Bill Smith


Bill Smith Properties

Member Of | Dial-in | Environment | Sessions | Remote control | Terminal Services Profile | COM+ | General | Address | Account | Profile | Telephones | Organization

User logon name:

User logon name (pre-Windows 2000): MSCTSC\ E00000001

Logon Hours... | Log On To...

☐ Account is locked out

Account options:

☑ User must change password at next logon
☐ User cannot change password
☐ Password never expires
☐ Store password using reversible encryption

Account expires
● Never
○ End of: Thursday , November 18, 2004

OK | Cancel | Apply

Figure 11: sAMAccountName user Bill Smith

User information in Active Directory

User information in Active Directory is stored in the attributes of the user object. While for basic user information such as the first name or the last name the SAP HR system will be the leading system other attributes such as the email address might be maintained by the Exchange administration.

Attributes that can be provided by mySAP HR

distinguishedName: CN=Bill Smith,OU=SAP_HR,DC=MSCTSC,DC=SAP,DC=CORP

sn: Smith

givenName: Bill

employeeNumber: 00000001

sAMAccountName: E0000001

userPrincipalName: Bill.Smith@SAP.COM

…

Attributes that are typically maintained in Microsoft Active Directory

mail: Bill.Smith@sap.com

memberOf: CN=Users,DC=MSCTSC,DC=SAP,DC=CORP;
CN=Domain Admins,CN=Users,DC=MSCTSC,DC=SAP,DC=CORP;
CN=SAP Users,CN=Users,DC=MSCTSC,DC=SAP,DC=CORP;

…

Conclusion

SAP HR data can be used to control it-user life cycles. Using the SAP HR LDAP interface processes can be made more secure and faster. Furthermore the quality of data in the Active Directory can be improved.

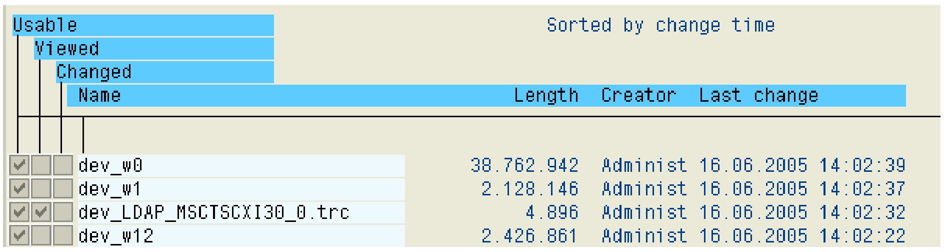
Limitations

This concept only works for data extraction from HR and can not be used to write back any information from the LDAP server to the HR system. However it is possible to write such functionality yourself using the LDAP function modules provided by the SAP standard.

The interface does not provide an option out of the box only to export the data of those employees that have changed. However this can be done programmatically if one creates a table that has the same structure as the internal table *attributes* to store the data that is exported so that the report can check whether the data that is to be exported has changed.

Troubleshooting

If the LDAP trace is activated for the LDAP Server in transaction LDAP a log file is generated that can be accessed using transaction ST11:



```
Usable                                      Sorted by change time
 Viewed
  Changed
   Name                                        Length  Creator  Last change

✓      dev_w0                              38.762.942  Administ 16.06.2005 14:02:39
✓      dev_w1                               2.128.146  Administ 16.06.2005 14:02:37
✓ ✓    dev_LDAP_MSCTSCXI30_0.trc                4.896  Administ 16.06.2005 14:02:32
✓      dev_w12                              2.426.861  Administ 16.06.2005 14:02:22
```

Figure 12: LDAP Developer Trace

References

- SAP documentation: "HR Data Retrieval in a LDAP Enabled Directory Service" http://service.sap.com/security -> Media Library -> Literature & Brochures or directly via the following link http://service.sap.com/~sapidb/011000358700001865612002E/HR_LDAP_EN.PDF
- SAP Online Help: "Provide the Last Entry in the Period" http://help.sap.com/saphelp_47x200/helpdata/en/60/d8bc17576311d189270000e8322f96/frameset.htm
- SAP Online Help: "Configuring the LDAP Connector" http://help.sap.com/saphelp_erp2004/helpdata/en/10/1a063a15c611d4b61f0000e835363f/frameset.htm
- Steps to Activate BAdI Implementations http://help.sap.com/saphelp_erp2004/helpdata/en/5f/071eed117c11d5b37d0050dadef62b/frameset.htm

Appendix 1: Test report for SPLDAP_RECEIVE_ATTRIBUTES

The following coding can be used to test the function module S

```
*&---------------------------------------------------------------------*
*& Report  Z_TEST_SPLDAP_RECEIVE                                       *
*&                                                                     *
*&---------------------------------------------------------------------*
*& written by Andre Fischer, CTSC-MS, SAP AG                           *
*&                                                                     *
*&---------------------------------------------------------------------*

REPORT  Z_TEST_SPLDAP_RECEIVE                   .

DATA: mid  TYPE sy-msgid VALUE 'LDAPSYNC',
      mtype TYPE sy-msgty VALUE 'I',
      num  TYPE sy-msgno.

tables: LDAPSERVER.

data:   ldapinitialrun(1),
        LOGSYS LIKE  TBDLS-LOGSYS,
        ERRORS LIKE BAPIRET2 OCCURS 0,
        ERRORS_WA LIKE BAPIRET2.

* structure for short ldap-attributes
* fieldnames must be equal to basis structure LDA_ATTR_L (for RFC-call)

TYPES: BEGIN OF TS_LDAP_ATTR_L,
        PERNR LIKE LDA_ATTR_L-PERNR,
        ATTR_TAB LIKE LDA_ATTR_L-ATTR_TAB,
        ATTR_FIELD LIKE LDA_ATTR_L-ATTR_FIELD,
        VALUE LIKE LDA_ATTR_L-VALUE,
      END OF TS_LDAP_ATTR_L.


data: attributes type ts_ldap_attr_l occurs 0,
      attributes_wa type ts_ldap_attr_l.

SELECTION-SCREEN BEGIN OF BLOCK B1 WITH FRAME TITLE TEXT-001.
PARAMETERS: P_TEST default 'X' AS CHECKBOX.
SELECTION-SCREEN END OF BLOCK B1.

Parameters: LDAPSRV  Default 'SAPHRLDAP' LIKE LDAPSERVER-SERVERID,
            LDAPDEST Default 'NONE' LIKE rfcdes-rfcdest.


* LIKE LDAPSERVER-BASE allows case sensitive input

parameters:
sn default 'Smith' LIKE LDAPSERVER-BASE,
givenNam default 'Bill' LIKE LDAPSERVER-BASE,
samacc default 'E00000001' LIKE LDAPSERVER-BASE,
tel default '+49 6227 747474' LIKE LDAPSERVER-BASE.

* get own logical system
CALL FUNCTION 'OWN_LOGICAL_SYSTEM_GET'
  IMPORTING
```

```
    OWN_LOGICAL_SYSTEM              = LOGSYS
  EXCEPTIONS
    OWN_LOGICAL_SYSTEM_NOT_DEFINED = 1
    OTHERS                          = 2.

IF SY-SUBRC NE 0.
* TODO: Komprimierung sy-mandt: 3 -> 2 Stellen !!!
  CONCATENATE SY-SYSID SY-MANDT INTO LOGSYS.
ENDIF.


  ATTRIBUTES_WA-PERNR = '01234567'.
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'LASTNAME'.
  attributes_wa-value = sn.
  append attributes_wa to attributes.

  ATTRIBUTES_WA-PERNR = '01234567'.
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'FIRSTNAME'.
  attributes_wa-value = givenNam.
  append attributes_wa to attributes.

  ATTRIBUTES_WA-PERNR = '01234567'.
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'SAMACCOUNTNAME'.
  attributes_wa-value = samacc.
  append attributes_wa to attributes.

  ATTRIBUTES_WA-PERNR = '01234567'.
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'TELEPHONENUMBER'.
  attributes_wa-value = tel.
  append attributes_wa to attributes.

IF P_TEST = 'X'.
  EXIT.
ENDIF.

* ---------------------------------------------------------------------
* send attributes to ldap client

CALL FUNCTION 'SPLDAP_RECEIVE_ATTRIBUTES'
  DESTINATION LDAPDEST
EXPORTING
     LOGSYS         = LOGSYS
     SERVERID       = LDAPSRV
*     ATTRIBUTES_S    = attributes[]
     INITIAL_RUN    = LDAPINITIALRUN
       ATTRIBUTES_L    = attributes[]
*       ATTRIBUTES_X    = TOTAL_ATTRS_X[].
  IMPORTING
     RETURN         = ERRORS[].

IF NOT ERRORS[] IS INITIAL.
  READ TABLE ERRORS INDEX 1 INTO ERRORS_WA.
  MESSAGE ID mid TYPE mtype
    NUMBER ERRORS_WA-NUMBER
    WITH ERRORS_WA-MESSAGE_V1 ERRORS_WA-MESSAGE_V2
         ERRORS_WA-MESSAGE_V3 ERRORS_WA-MESSAGE_V4.

ENDIF.
```

Appendix 2: Test report SAP HR data extraction Z_SAP_HR_LDAP

The following coding can be used to extract employee data from an SAP HR system and export the data using a LDAP Connector that is running on a SAP Web Application Server.

If the SAP HR system is running on SAP Basis Release 6.20 or higher no separate Web Application Server is necessary. In this case the LDAP Connector can be configured in the system itself and the LDAP destination can be left blank or omitted.

When creating the report in the SAP HR system you have to maintain the logical database name in the program attributes. If you forget to maintain the name of the logical database you will get an error like `"PERNR" is not defined for the current logical database at line …`

To maintain the logical database name in the menue of the ABAP editor choose:

```
Goto -->Attributes.
```

```
*&---------------------------------------------------------------------*
*& Z_SAP_HR_LDAP                                                       *
*&                                                                     *
*&---------------------------------------------------------------------*
*& written by Andre Fischer, CTSC-MS, SAP AG                           *
*&                                                                     *
*&---------------------------------------------------------------------*


REPORT Z_SAP_HR_LDAP USING DATABASE PNP.


DATA:   PLVAR     LIKE OBJEC-PLVAR,
        OBJID     LIKE HROBJECT-OBJID,
        KEYDA     LIKE PLOG-BEGDA,
        P_OBJECTS LIKE HROBJECT OCCURS 0,
        P_OBJECTS_WA LIKE HROBJECT,
        S_OBJECTS LIKE HROBJECT OCCURS 0,
        S_OBJECTS_WA LIKE HROBJECT,
        I1001_ITAB  LIKE P1001 OCCURS 0 WITH HEADER LINE,
        I1001_ITAB2  LIKE P1001 OCCURS 0 WITH HEADER LINE,
*        LDAPDESTINATION LIKE LDA_TYPES-LDAPDESTINATION,
*        LDAPSERVER LIKE LDA_TYPES-LDAPSERVER,
        ldapinitialrun like lda_types-flag,
        LOGSYS LIKE  TBDLS-LOGSYS,
        ERRORS LIKE BAPIRET2 OCCURS 0,
        ERRORS_WA LIKE BAPIRET2.

DATA: mid  TYPE sy-msgid VALUE 'LDAPSYNC',
      mtype TYPE sy-msgty VALUE 'I',
      num  TYPE sy-msgno.

* structure for short ldap-attributes
* fieldnames must be equal to basis structure LDA_ATTR_L (for RFC-call)

TYPES: BEGIN OF TS_LDAP_ATTR_L,
        PERNR LIKE LDA_ATTR_L-PERNR,
        ATTR_TAB LIKE LDA_ATTR_L-ATTR_TAB,
        ATTR_FIELD LIKE LDA_ATTR_L-ATTR_FIELD,
        VALUE LIKE LDA_ATTR_L-VALUE,
      END OF TS_LDAP_ATTR_L.


data: attributes type ts_ldap_attr_l occurs 0,
      attributes_wa type ts_ldap_attr_l.


infotypes: 0001, 0002.
tables: pernr, rfcdes.

SELECTION-SCREEN BEGIN OF BLOCK B1 WITH FRAME TITLE TEXT-001.
PARAMETERS: P_TEST default 'X' AS CHECKBOX.
SELECTION-SCREEN END OF BLOCK B1.

Parameters: LDAPSRV  Default 'SAPHRLDAP' LIKE LDA_TYPES-LDAPSERVER,
            LDAPDEST Default 'LDAPDEST'  LIKE rfcdes-rfcdest.
* ---------------------------------------------------------------------
at selection-screen.

  clear: p_objects[], s_objects[], attributes[].

  CALL FUNCTION 'RH_GET_PLVAR'
    IMPORTING
      PLVAR     = PLVAR
    EXCEPTIONS
      no_plvar = 1
      OTHERS   = 2.
  if sy-subrc <> 0.
    MESSAGE E015(HRLDAP).
  endif.
  KEYDA = sy-datum.

* --------------------------------------------------------------------
get pernr.

  rp-provide-from-last p0001 space keyda keyda.
  rp-provide-from-last p0002 space keyda keyda.

  ATTRIBUTES_WA-PERNR = p0001-pernr.

* lastname
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'LASTNAME'.
  attributes_wa-value = p0002-nachn.
  append attributes_wa to attributes.

* firstname
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'FIRSTNAME'.
  attributes_wa-value = p0002-vorna.
  append attributes_wa to attributes.

* sAMAccountName
  attributes_wa-attr_tab = 'EMPLOYEE'.
  attributes_wa-attr_field = 'SAMACCOUNTNAME'.
* --------------------------------
* Using the employee number a unique name is created
* for the sAMAccountName
* --------------------------------
  concatenate ‘E’ p0001-pernr into attributes_wa-value.
  append attributes_wa to attributes.
```

```
* other attributes have to added here.

* for each additional attribute an appropriate field
* has to defined in the structure EMPLOYEE
* for example you can choose the following:
*
* attributes_wa-attr_tab = 'EMPLOYEE'.
* attributes_wa-attr_field = 'TELEPHONE'.
*
* if you want to transfer the telephone number
* of an employee from SAP HR to Active Directory

* In the web Application Server an appropriate mapping
* has to be defined using transaction LDAP for each new
* attribute (here called TELEPHONE).

* ----------------------------------------------------------------------

end-of-selection.

* get own logical system
  CALL FUNCTION 'OWN_LOGICAL_SYSTEM_GET'
    IMPORTING
      OWN_LOGICAL_SYSTEM             = LOGSYS
    EXCEPTIONS
      OWN_LOGICAL_SYSTEM_NOT_DEFINED = 1
      OTHERS                         = 2.

  IF SY-SUBRC NE 0.
* TODO: Komprimierung sy-mandt: 3 -> 2 Stellen !!!
    CONCATENATE SY-SYSID SY-MANDT INTO LOGSYS.
  ENDIF.

  loop at attributes into attributes_wa.
    write: / ATTRIBUTES_WA-PERNR , attributes_wa-attr_tab.
    write:  attributes_wa-attr_field ,attributes_wa-value.
  endloop.

  IF P_TEST = 'X'.
    EXIT.
  ENDIF.

* ----------------------------------------------------------------------
* send attributes to ldap client
* send attributes
CALL FUNCTION 'SPLDAP_RECEIVE_ATTRIBUTES'
  DESTINATION LDAPDEST
EXPORTING
     LOGSYS         = LOGSYS
     SERVERID       = LDAPSRV
*     ATTRIBUTES_S   = attributes[]
     INITIAL_RUN    = LDAPINITIALRUN
       ATTRIBUTES_L   = attributes[]
*       ATTRIBUTES_X   = TOTAL_ATTRS_X[].
  IMPORTING
     RETURN         = ERRORS[].

IF NOT ERRORS[] IS INITIAL.
  READ TABLE ERRORS INDEX 1 INTO ERRORS_WA.
  MESSAGE ID mid TYPE mtype
    NUMBER ERRORS_WA-NUMBER
    WITH ERRORS_WA-MESSAGE_V1 ERRORS_WA-MESSAGE_V2
         ERRORS_WA-MESSAGE_V3 ERRORS_WA-MESSAGE_V4.
```