

KNIME Server Advanced Setup Guide

KNIME AG, Zurich, Switzerland
Version 4.8 (last updated on 2021-02-12)



Table of Contents

- Introduction..... 1
- Enterprise User Authentication..... 2
 - Configuring an LDAP connection for KNIME Server 2
 - Configuring Single-Sign-On with Kerberos and LDAP 16
- Dynamic profiles for server-managed customizations 32

Introduction

This guide covers advanced topics of a KNIME Server deployment, setup and configuration in an enterprise environment.

If you are looking to install KNIME Server, you should first consult the [KNIME Server Installation Guide](#).

For guides on connecting to KNIME Server from KNIME Analytics Platform, or using KNIME WebPortal please refer to the following guides:

- [KNIME Explorer User Guide](#)
- [KNIME WebPortal User Guide](#)

For all regular administration configuration options and a basic understanding of KNIME server please consult the [KNIME Server Administration Guide](#).

In the following it is assumed that you have a knowledge of all topics covered in the previously mentioned guides.

Enterprise User Authentication

User authentication in an enterprise environment is usually done through some centralized service. The most used service is LDAP. LDAP authentication is the recommended authentication in any case where an LDAP server is available. If you are familiar with your LDAP configuration you can add the details during installation time, or edit the `server.xml` file post installation. If you are unfamiliar with your LDAP settings, you may need to contact your LDAP administrator, or use the configuration details for any other Tomcat based system in your organization. This section describes how to set up KNIME Server for LDAP authentication.

Another possibility of user authentication is single-sign-on. KNIME Server can be configured to support Kerberos authentication in combination with LDAP. This section also contains steps for a simple Kerberos setup.

Configuring an LDAP connection for KNIME Server

KNIME Server manages all user authentication by the built-in mechanisms of Apache Tomcat. Therefore the most comprehensive documentation for configuring authentication is the [Apache Tomcat Realm Configuration HOW-TO](#). Specifically for information about LDAP (also Active Directory) configuration, see section [JNDIRealm](#).

Terminology

Throughout this document we refer to establishing an *LDAP connection*, *LDAP account* etc. Since one of the popular ways to manage user authentication is Microsoft Active Directory, which supports LDAP, you may want to substitute *LDAP account* for *Active Directory account*.

Quickstart

In most cases it should be possible to contact your local LDAP/Active Directory administrator; they should be able to provide the necessary information.

You can ask for the following:

1. Do they already have configuration details for a Tomcat server? If so, this connection information can be reused.
2. LDAP Connection information (Hostname, Port, is TLS/SSL used?).
3. Whether they are using bind mode, or comparison mode.

4. How the group information is stored.

They will need to provide configuration that can fit into a template like this:

```
<Realm  className="org.apache.catalina.realm.JNDIRealm"
  connectionURL="ldap://localhost:389"
  userPattern="uid={0},ou=people,dc=mycompany,dc=com"
  roleBase="ou=groups,dc=mycompany,dc=com"
  roleName="cn"
  roleSearch="(uniqueMember={0})"
/>
```

This information is added to the `server.xml` file which is found in `<apache-tomee>/conf/server.xml`.

A restart of the Apache TomEE process and KNIME Server is required for the changes to the configuration file to take effect.

Advanced Troubleshooting

The remaining sections of this documentation describe how to setup an LDAP connection for KNIME Server. This is only intended as a way to gather related information into one place, not as comprehensive documentation for either LDAP or Tomcat.

The first prerequisite is Apache Directory Studio, or some other LDAP configuration tool. We use [Apache Directory Studio](#) to do the testing. The benefit of using this tool is that it is open source, free to download, works on Windows/Linux/Mac, so a customer can download the software and do queries to get started.

We will follow three basic steps:

1. LDAP Connection information (Hostname, Port, SSL?).
2. Whether they are using bind mode, or comparison mode.
3. How the group information is stored.

LDAP Connection information (Hostname, Port, SSL)

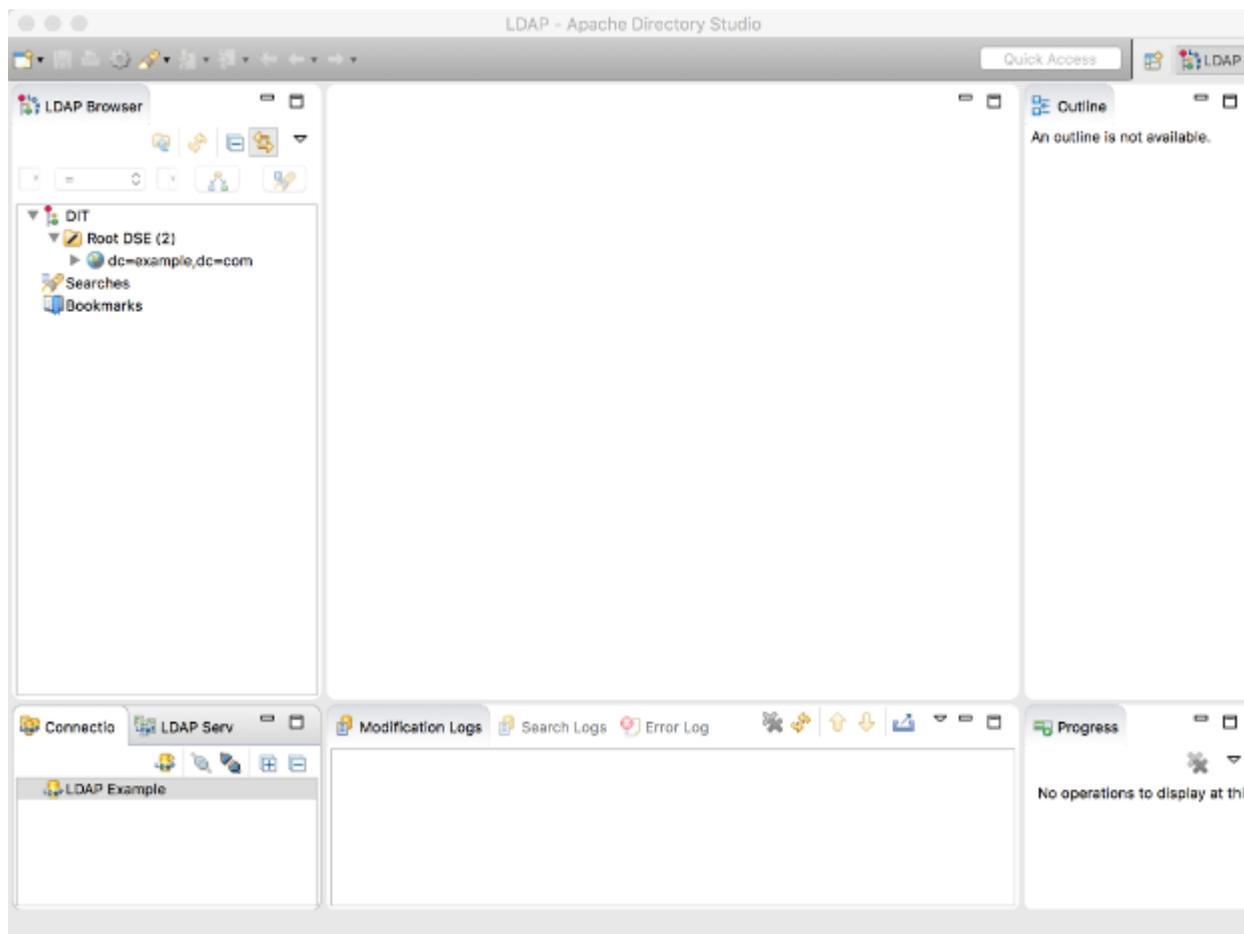
To establish a connection to an LDAP server you'll need to know:

- The LDAP server hostname (or IP)
- Whether the server uses SSL secured connections or not

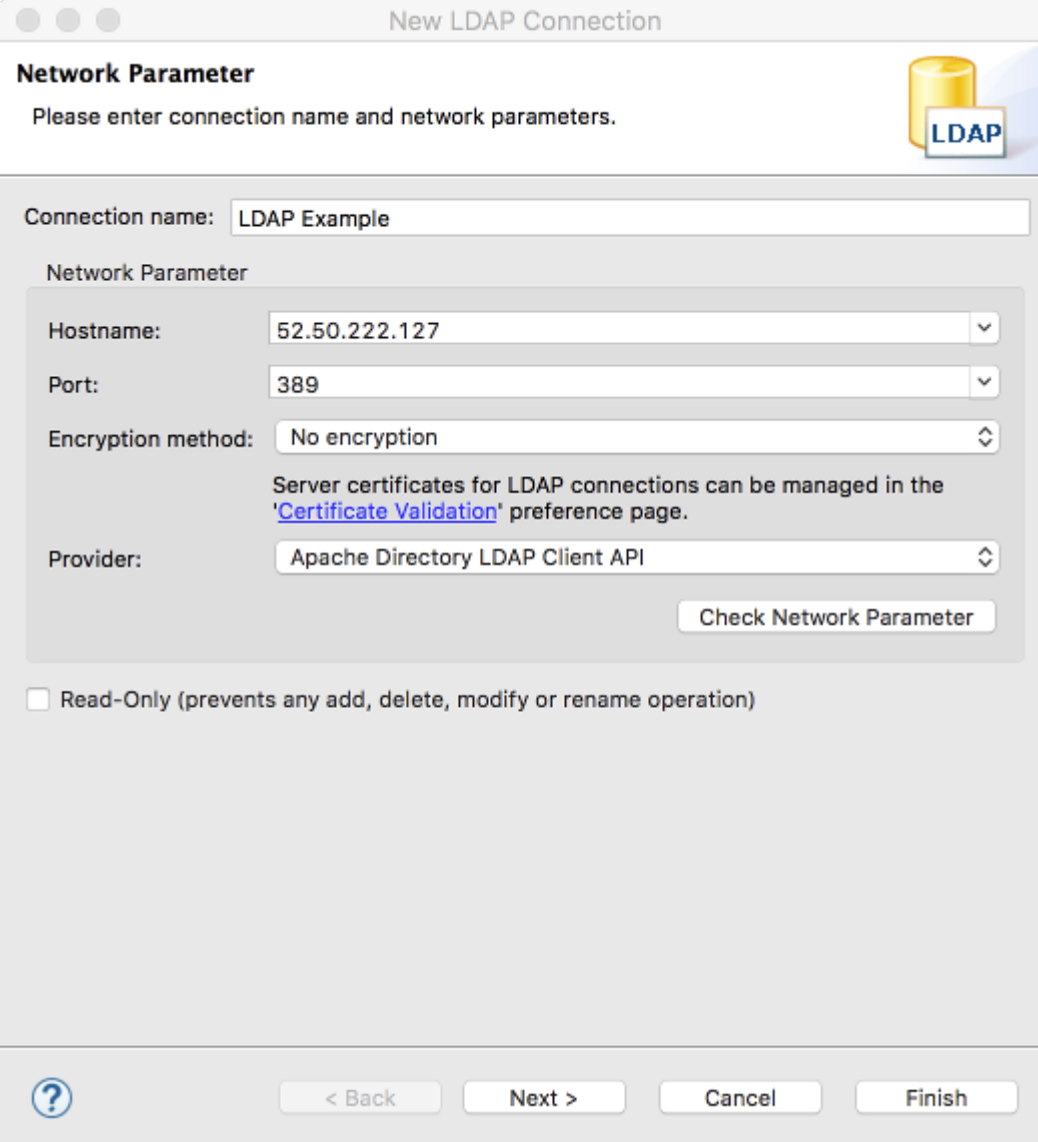
- Which port is being used – default ports are 389 for LDAP (unencrypted, or encrypted by TLS) and 636 for LDAPS (SSL secured)

Setup Apache Directory Studio to browse your LDAP directory

Setup connection to server



Add in the connection details of your LDAP server



The image shows a 'New LDAP Connection' dialog box. At the top, it says 'New LDAP Connection' and 'Please enter connection name and network parameters.' There is an LDAP icon in the top right. The 'Connection name' field is 'LDAP Example'. The 'Network Parameter' section contains: 'Hostname' (52.50.222.127), 'Port' (389), 'Encryption method' (No encryption), and 'Provider' (Apache Directory LDAP Client API). A note mentions 'Certificate Validation' preference page. A 'Check Network Parameter' button is present. At the bottom, there is a 'Read-Only' checkbox and navigation buttons: '?', '< Back', 'Next >', 'Cancel', and 'Finish'.

New LDAP Connection

Please enter connection name and network parameters.

Network Parameter

Connection name: LDAP Example

Hostname: 52.50.222.127

Port: 389

Encryption method: No encryption

Server certificates for LDAP connections can be managed in the '[Certificate Validation](#)' preference page.

Provider: Apache Directory LDAP Client API

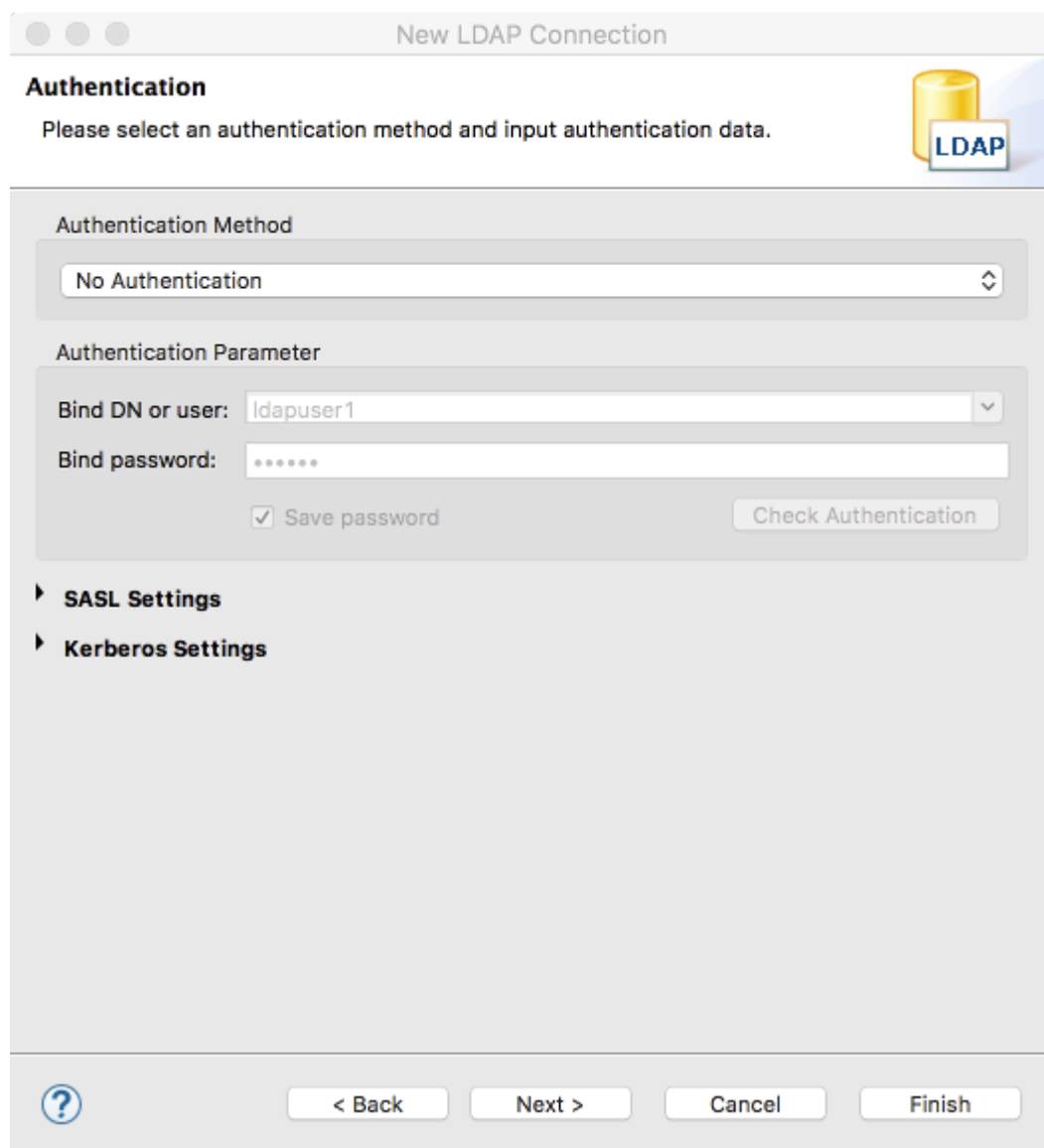
Check Network Parameter

☐ Read-Only (prevents any add, delete, modify or rename operation)

? < Back Next > Cancel Finish

Setup connection to LDAP server

Note that we don't use authentication here. Typically, you will need to authenticate, and in most cases this can be your LDAP username and password.



The image shows a 'New LDAP Connection' dialog box. At the top, it says 'Authentication' and 'Please select an authentication method and input authentication data.' There is an LDAP icon in the top right. The 'Authentication Method' dropdown is set to 'No Authentication'. The 'Authentication Parameter' section contains a 'Bind DN or user:' field with 'ldapuser1', a 'Bind password:' field with masked characters, a 'Save password' checkbox, and a 'Check Authentication' button. Below this are expandable sections for 'SASL Settings' and 'Kerberos Settings'. At the bottom are buttons for '< Back', 'Next >', 'Cancel', and 'Finish', along with a help icon.

New LDAP Connection

Authentication
Please select an authentication method and input authentication data.

Authentication Method
No Authentication

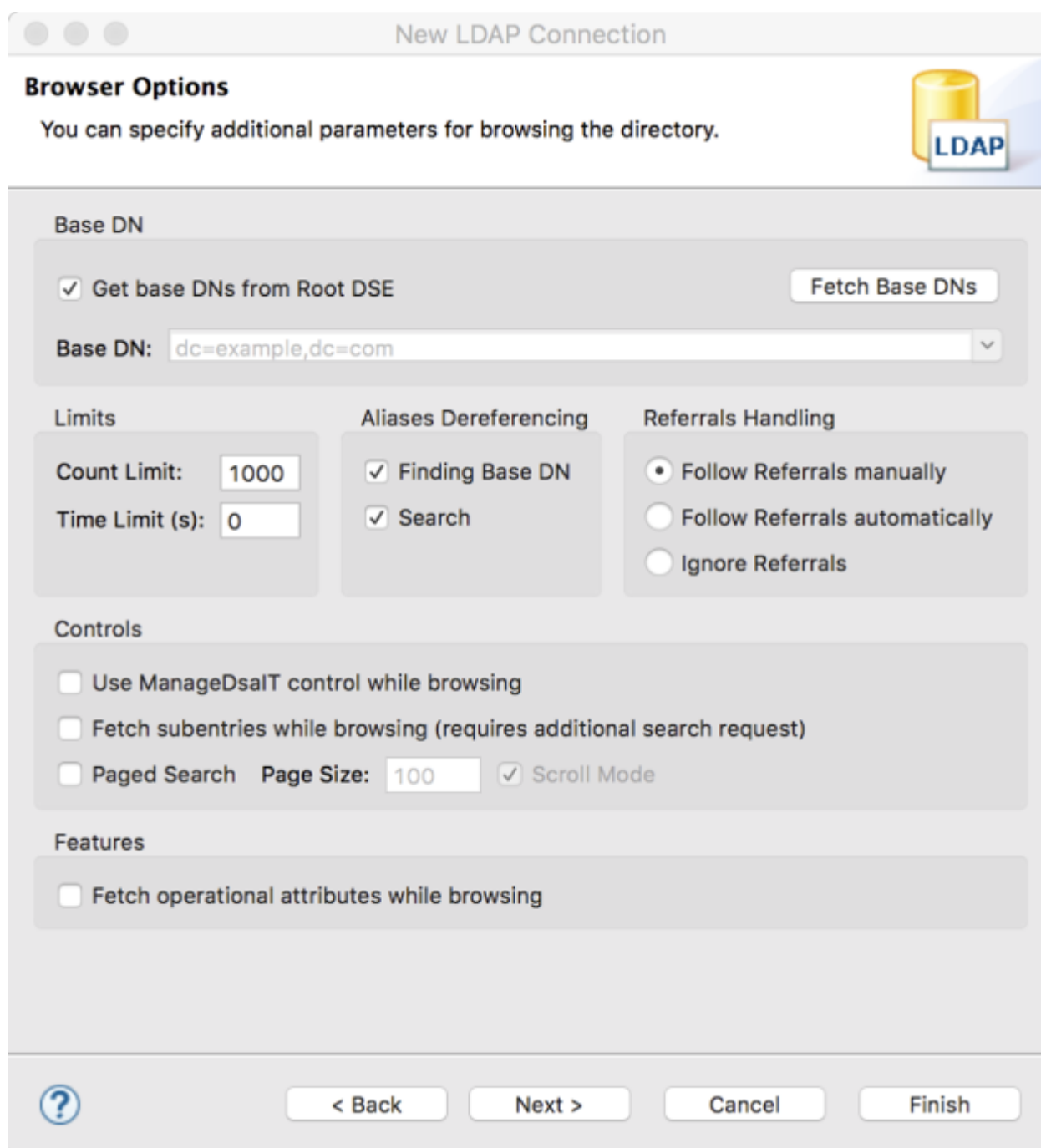
Authentication Parameter
Bind DN or user: ldapuser1
Bind password:
☒ Save password
Check Authentication

▶ **SASL Settings**
▶ **Kerberos Settings**

? < Back Next > Cancel Finish

Setup connection

You can click 'Fetch Base DN's' to autopopulate the answers. In our example the Base DN is `dc=example,dc=com`. This will vary, for example `knime.com` might use the Base DN `dc=knime,dc=com`.



The image shows a 'New LDAP Connection' dialog box with a title bar containing three window control buttons. The main title is 'New LDAP Connection'. Below the title bar, there is a section titled 'Browser Options' with a sub-header 'You can specify additional parameters for browsing the directory.' To the right of this text is an icon of a yellow cylinder with a blue label that says 'LDAP'. The dialog box is divided into several sections: 'Base DN' with a checkbox 'Get base DN from Root DSE' (checked) and a 'Fetch Base DN's button, and a text field 'Base DN:' containing 'dc=example,dc=com'; 'Limits' with 'Count Limit:' set to '1000' and 'Time Limit (s):' set to '0'; 'Aliases Dereferencing' with checkboxes 'Finding Base DN' and 'Search' (both checked); 'Referrals Handling' with radio buttons 'Follow Referrals manually' (selected), 'Follow Referrals automatically', and 'Ignore Referrals'; 'Controls' with checkboxes 'Use ManageDsaIT control while browsing', 'Fetch subentries while browsing (requires additional search request)', and 'Paged Search' (checked), and a 'Page Size:' field set to '100' and a 'Scroll Mode' checkbox (checked); and 'Features' with a checkbox 'Fetch operational attributes while browsing'. At the bottom, there is a help icon (question mark in a circle) and four buttons: '< Back', 'Next >', 'Cancel', and 'Finish'.

New LDAP Connection

Browser Options

You can specify additional parameters for browsing the directory.

Base DN

☒ Get base DN from Root DSE Fetch Base DN's

Base DN:

Limits

Count Limit:

Time Limit (s):

Aliases Dereferencing

☒ Finding Base DN

☒ Search

Referrals Handling

☒ Follow Referrals manually

☐ Follow Referrals automatically

☐ Ignore Referrals

Controls


☐ Use ManageDsaIT control while browsing

☐ Fetch subentries while browsing (requires additional search request)

☒ Paged Search Page Size: ☒ Scroll Mode

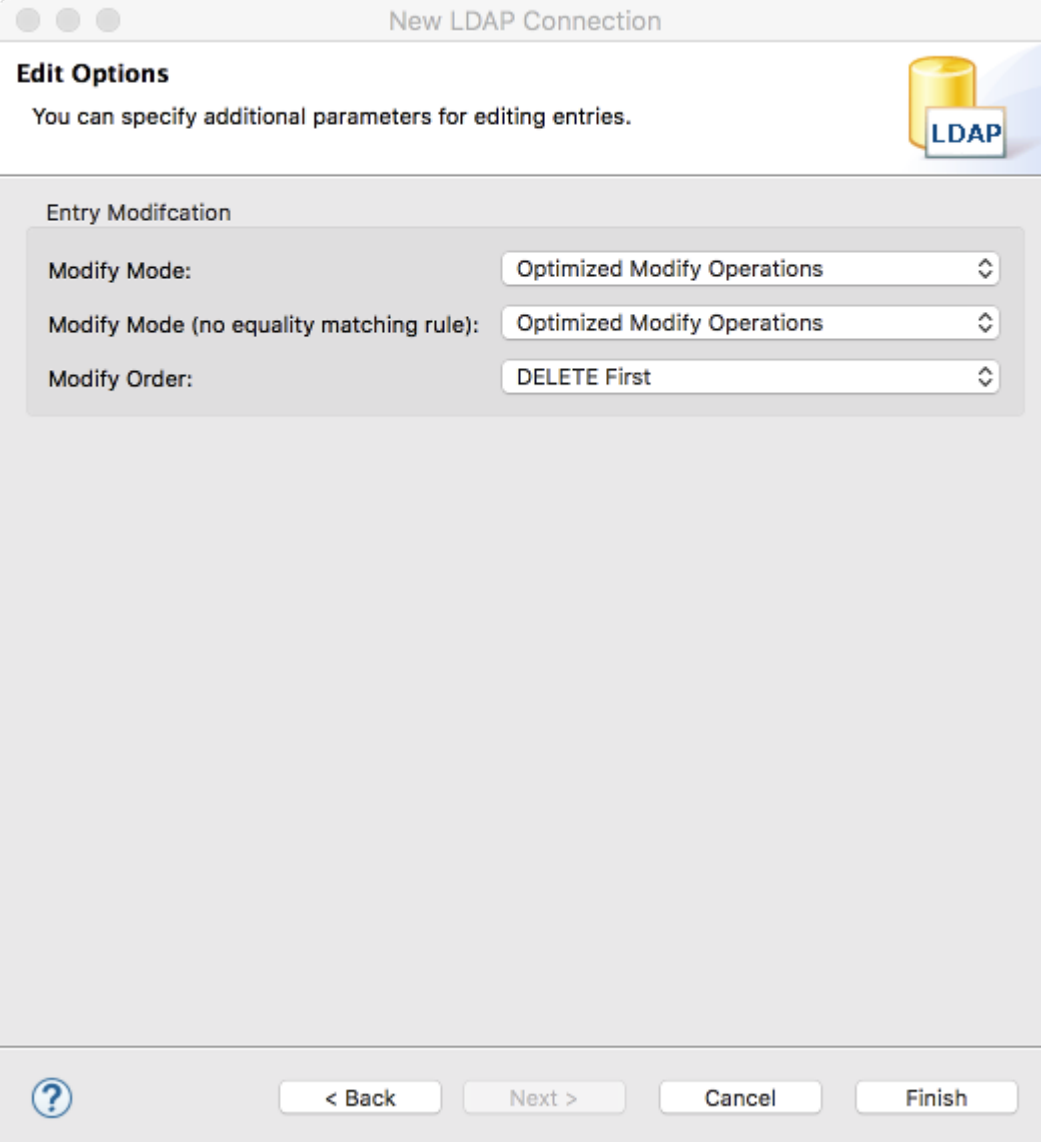
Features

☐ Fetch operational attributes while browsing

 < Back Next > Cancel Finish

Finalize connection

You can leave the next page as is, and click Finish.



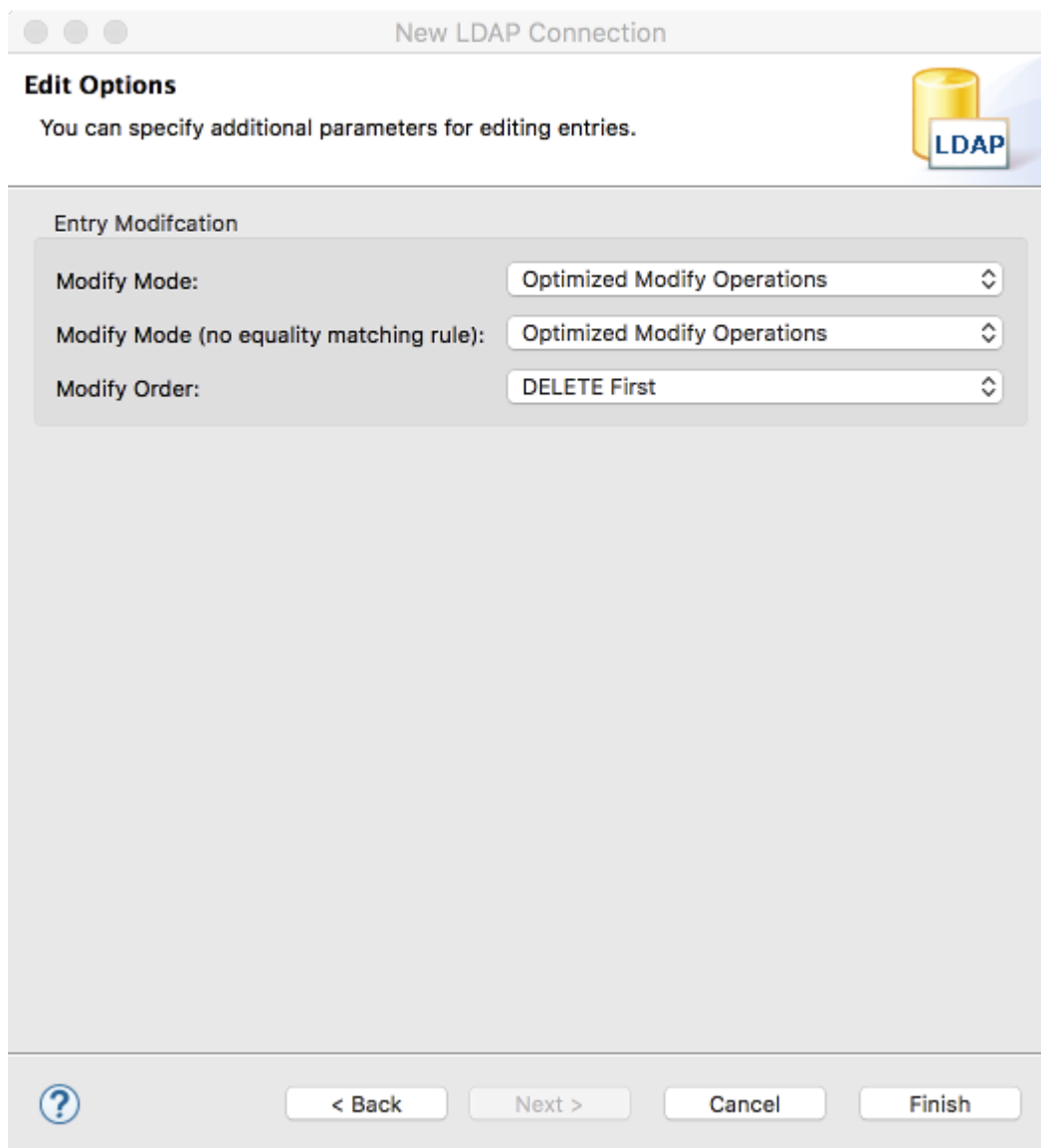
The image shows a 'New LDAP Connection' dialog box. At the top, the title bar says 'New LDAP Connection'. Below it, the section 'Edit Options' is highlighted, with a subtext: 'You can specify additional parameters for editing entries.' To the right of this text is an icon of a yellow cylinder with a blue label that says 'LDAP'. Below the 'Edit Options' section is a larger section titled 'Entry Modification'. This section contains three rows of settings, each with a label and a dropdown menu:

Entry Modification	
Modify Mode:	Optimized Modify Operations
Modify Mode (no equality matching rule):	Optimized Modify Operations
Modify Order:	DELETE First

At the bottom of the dialog box, there is a row of four buttons: a help button (a circle with a question mark), '< Back', 'Next >', 'Cancel', and 'Finish'.

Browse LDAP Tree

The LDAP Browser is now populated, and you can begin browsing the LDAP directory.



New LDAP Connection

Edit Options


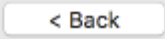
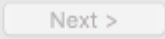


You can specify additional parameters for editing entries.

Entry Modification

Modify Mode: Optimized Modify Operations

Modify Mode (no equality matching rule): Optimized Modify Operations

Modify Order: DELETE First

Determine information required for KNIME/Tomcat LDAP configuration

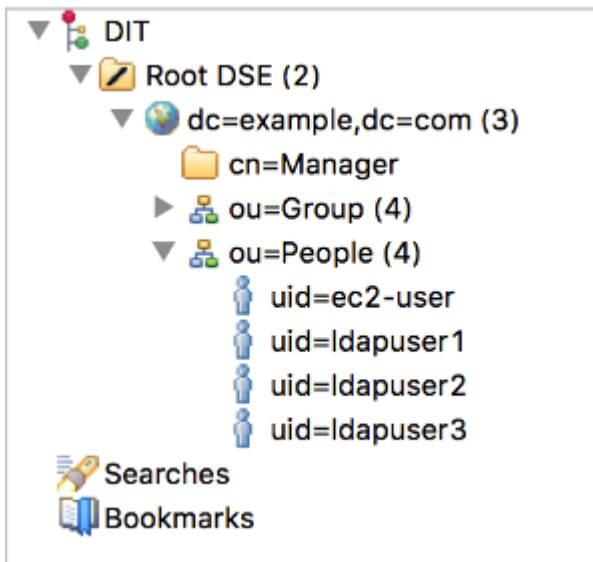
First refer to the [Tomcat documentation on LDAP](#). The documentation is very comprehensive, we distilled some of the key points below. For full details refer to the Tomcat documentation.

Basically we need to construct something that looks like:

```
<Realm  className="org.apache.catalina.realm.JNDIRealm"
        connectionURL="ldap://52.50.222.127:389"
        userPattern= TOBEDETERMINED
        roleBase= TOBEDETERMINED
        roleName= TOBEDETERMINED
        roleSearch= TOBEDETERMINED
/>
```

We already know the `connectionURL`, since this was required to setup Apache Directory Studio.

Next we need to determine the `userBase` property. The first item in the tree is usually the Base DN, which will define the `userBase` property.



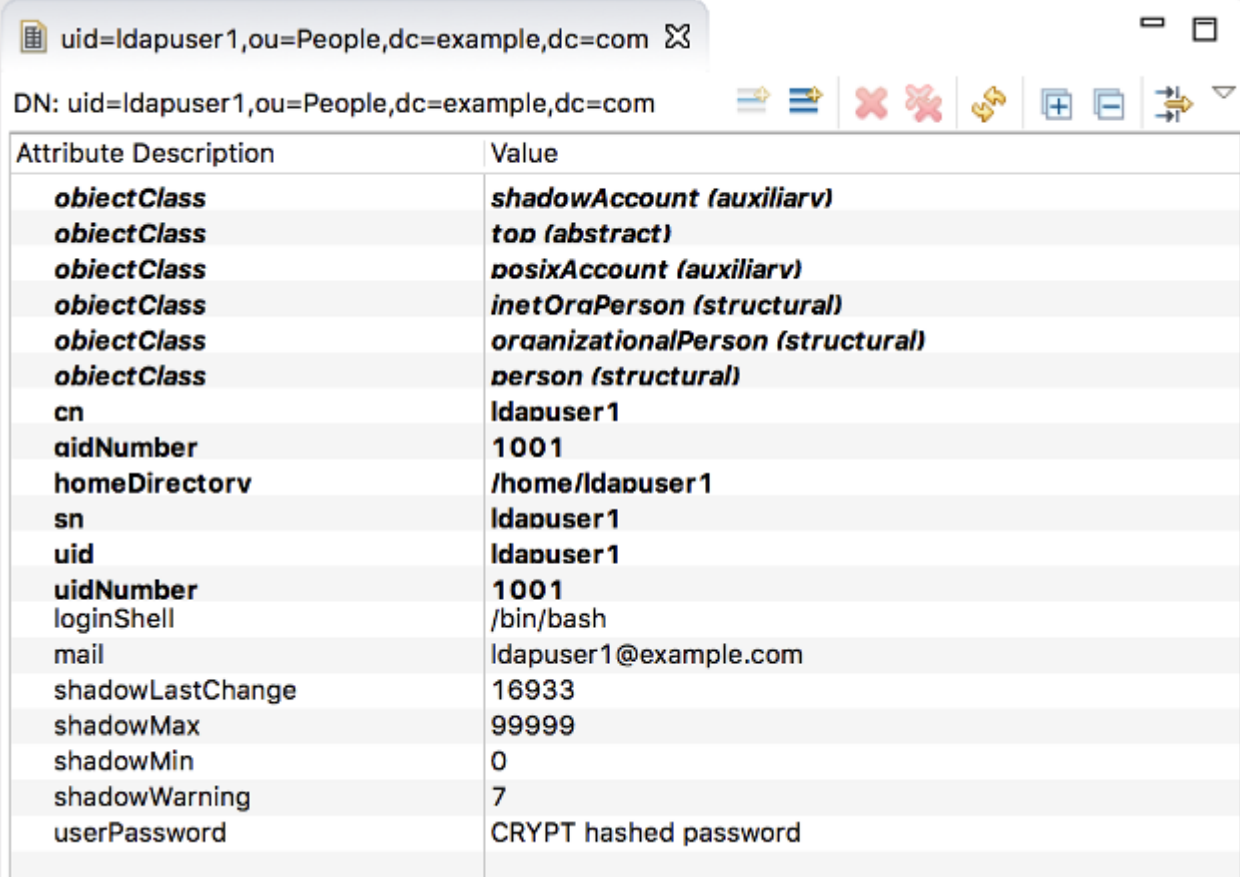
You can browse the tree to find the users. In our case `ou=People`. Expanding the subtree shows the list of users. In our case there are four users (*ec2-user*, *ldapuser1*, *ldapuser2*, *ldapuser3*).

Determine whether users are checked by bind mode, or comparison mode

Bind Mode

In our case, if users log in as e.g. *ldapuser1* (the username is the same as the key).

We already know the Base DN, and looking at the user information we see that the `uid` is the username that we want to use to authenticate. So we can construct the `userPattern`.



Attribute Description	Value
objectClass	shadowAccount (auxiliary)
objectClass	top (abstract)
objectClass	posixAccount (auxiliary)
objectClass	inetOrgPerson (structural)
objectClass	organizationalPerson (structural)
objectClass	person (structural)
cn	ldapuser1
uidNumber	1001
homeDirectory	/home/ldapuser1
sn	ldapuser1
uid	ldapuser1
uidNumber	1001
loginShell	/bin/bash
mail	ldapuser1@example.com
shadowLastChange	16933
shadowMax	99999
shadowMin	0
shadowWarning	7
userPassword	CRYPT hashed password

Use the userPattern: uid={0},ou=people,dc=example,dc=com

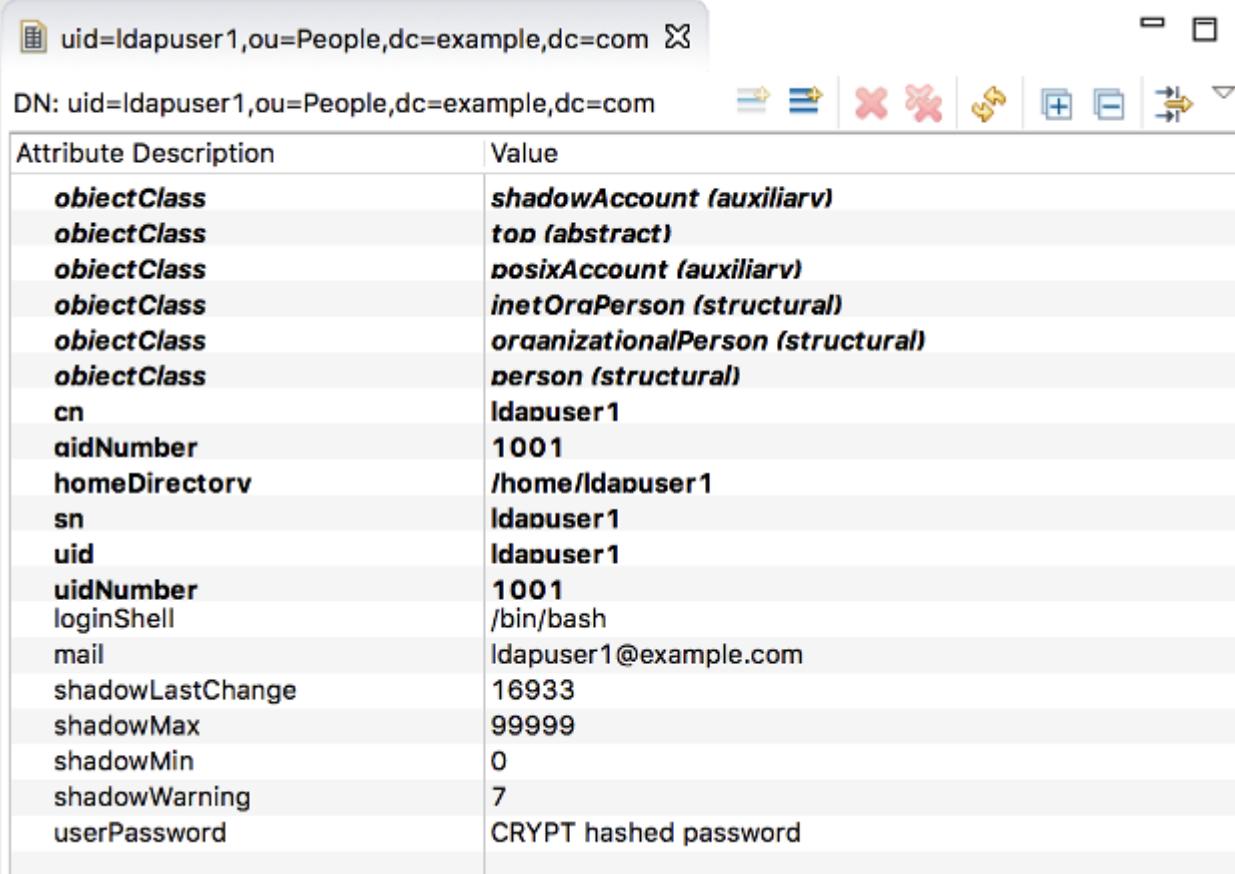
So the example would look like:

```
<Realm  className="org.apache.catalina.realm.JNDIRealm"
        connectionURL="ldap://52.50.222.127:389"
        userPattern="uid={0},ou=people,dc=example,dc=com"
        roleBase=TOBEDETERMINED
        roleName=TOBEDETERMINED
        roleSearch=TOBEDETERMINED
/>
```

Note that we still don't know how to specify roleBase, roleName, roleSearch. We'll come back to that later.

Comparison Mode

In this case there is no one-to-one mapping between the login name and the username, we want to use e.g. the email address category. In this example that is ldapuser1@example.com.



Attribute Description	Value
objectClass	shadowAccount (auxiliary)
objectClass	top (abstract)
objectClass	posixAccount (auxiliary)
objectClass	inetOrgPerson (structural)
objectClass	organizationalPerson (structural)
objectClass	person (structural)
cn	ldapuser1
uidNumber	1001
homeDirectory	/home/ldapuser1
sn	ldapuser1
uid	ldapuser1
uidNumber	1001
loginShell	/bin/bash
mail	ldapuser1@example.com
shadowLastChange	16933
shadowMax	99999
shadowMin	0
shadowWarning	7
userPassword	CRYPT hashed password

To perform this kind of login, we need comparison mode:

Here the Base DN is needed for `userBase`, and we also need to define `userSearch`. Here we are searching for `mail`.

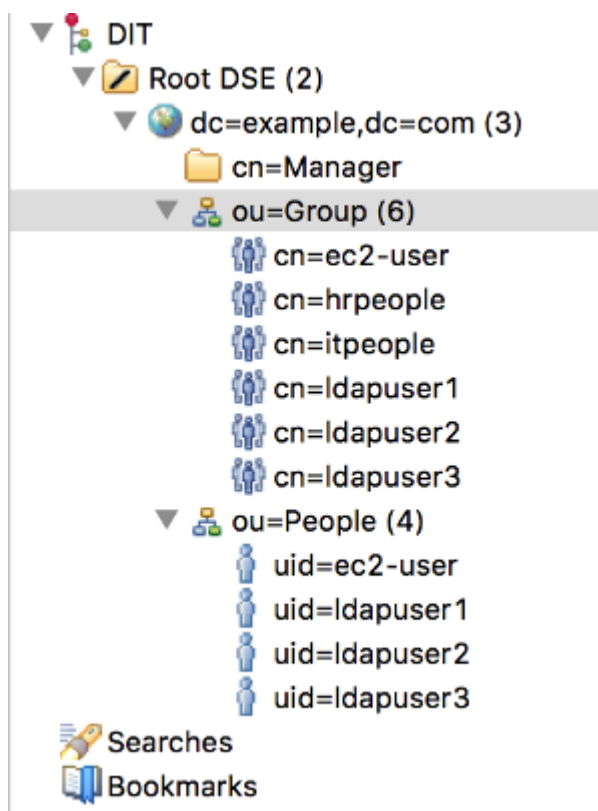
```
<Realm  className="org.apache.catalina.realm.JNDIRealm"
  connectionName="cn=Manager,dc=example,dc=com"
  connectionPassword="secret"
  connectionURL="ldap://52.50.222.127:389"
    userBase="ou=people,dc=example,dc=com"
    userSearch="(mail={0})"
    userRoleName="memberOf"
    roleBase= TOBEDETERMINED
    roleName= TOBEDETERMINED
    roleSearch= TOBEDETERMINED
/>
```

Group access

Now that users are authenticated, we need to configure the groups that have access:

For that we will need the `roleBase` and the `roleName` parameters. You can browse the `ou=Group` tree for more information. Here let's take the example that the `hrpeople` group

should be able to access KNIME Server.



cn=hrpeople,ou=Group,dc=example,dc=com

DN: cn=hrpeople,ou=Group,dc=example,dc=com

Attribute Description	Value
objectClass	groupOfNames (structural)
cn	hrpeople
member	cn=ldapuser3.ou=people.dc=example.dc=com
member	cn=ldapuser2.ou=people.dc=example.dc=com
description	Human Resources group

In the example, value is member that we want to search for is 'member'.

Which leads to the configuration:

```
<Realm  className="org.apache.catalina.realm.JNDIRealm"
  connectionURL="ldap://52.50.222.127:389"
    userBase="ou=people,dc=example,dc=com"
    userSearch="(mail={0})"
    userRoleName="memberOf"
      roleBase="ou=Group,dc=example,dc=com"
      roleName="cn"
      roleSearch="(member={0})"
/>
```

There is a second possibility where group membership is stored in the user data (this is uncommon, and not covered in this guide. See the full Tomcat documentation).

Nested roles (where a role/group can contain other roles/groups) are also possible, in which case add the `roleNested` parameter. E.g. Group 'IT', contains some usernames, plus 'Windows', 'UNIX', 'Mac' groups. Those groups may also contain sub-groups.

Hopefully you now have the details that you need to connect KNIME Server to LDAP.

Active Directory Example

If you are using Active Directory as your user database and stuck to the default structure, the following configuration serves as a good starting point:

```
<Realm className="org.apache.catalina.realm.JNDIRealm"
  connectionName="cn=Manager,dc=example,dc=com"
  connectionPassword="secret"
  connectionURL="ldap://52.50.222.127:389"
  userSubtree="true"
  userBase="cn=Users,dc=domain,dc=com"
  userSearch="(sAMAccountName={0})"
  userRoleName="memberOf"
  roleBase="cn=Users,dc=domain,dc=com"
  roleName="cn"
  roleSearch="(member={0})"
  roleSubtree="true"
  roleNested="true"/>
```

You have to adjust the three highlighted connection parameters, as well as the two `dc` values in the `userBase` and `roleBase`. The other parameters can usually be used as they are.

Combined Realm

It is possible to setup a combined realm where both the user database and LDAP authentication are used in parallel. Generally this is not recommended, but can be useful for debugging and initial setup/testing. The example below shows how this might work.


```
<Realm className="org.apache.catalina.realm.LockOutRealm">
  <Realm className="org.apache.catalina.realm.UserDatabaseRealm"
    resourceName="UserDatabase"/>
  <Realm className="org.apache.catalina.realm.JNDIRealm"
    connectionURL="ldap://52.50.222.127:389"
    userBase="ou=people,dc=example,dc=com"
    userSearch="(mail={0})"
    userRoleName="memberOf"
    roleBase="ou=Group,dc=example,dc=com"
    roleName="cn"
    roleSearch="(member={0})"/>
</Realm>
```

Encrypted LDAP

In case you are using encrypted LDAP authentication and your LDAP server is using a self-signed certificate, Tomcat will refuse it. In this case you need to add the LDAP server's certificate to the global Java keystore, which is located in `<jre-directory>/lib/security/cacerts`:

```
keytool -import -v -noprompt -trustcacerts -file
<server certificate> -keystore <jre>/lib/security/cacerts -storepass changeit
```

Alternatively, you can copy the cacerts file, add your server certificate, and add the following two system properties to `<tomee-directory>/conf/catalina.properties`:

```
javax.net.ssl.trustStore=<copied keystore>
javax.net.ssl.keyStorePassword=changeit
```

Troubleshooting

In some cases you will want to extract additional log file information about the LDAP authentication process. In this case you can edit `apache-tomee*/conf/logging.properties` to add:

```
org.apache.catalina.realm.level = ALL
org.apache.catalina.realm.useParentHandlers = true
org.apache.catalina.authenticator.level = ALL
org.apache.catalina.authenticator.useParentHandlers = true
```

Once you have made the changes you will need to restart the `knime-server` process/service.

When you have successfully debugged your problem, don't forget to comment out or remove these lines from the `logging.properties` file, as it will create unnecessarily large log files.

Configuring Single-Sign-On with Kerberos and LDAP

Single-Sign-On can be configured for KNIME Server. This includes the WebPortal, but also all other services (REST, SOAP, etc.) KNIME Server provides.

The technology used to achieve this is Kerberos, which is a network protocol used for authentication by the means of tickets and strong encryption. In the following it is assumed that you are familiar with the basic concepts of Kerberos and LDAP, as explained in the section before. You can find comprehensive documentation for the latest version of Kerberos [here](#).

This section describes step-by-step how to set up Kerberos authentication by the means of an **Active Directory** service and **Windows clients**. Other setups are possible and may require different procedures to be functional.



Most setups will deviate in certain aspects from this guide, so make adjustments where necessary.

Kerberos requires setup for all three parties involved: the Kerberos and LDAP service (Active Directory), the TomEE server running KNIME Server, and the clients.

Active Directory Configuration

The first step is to set up the Active Directory correctly. It is assumed that you already have an Active Directory domain with users and correct groups for KNIME Server usage set up. Additional steps specific to Kerberos are:

1. Create a technical user for the TomEE server in LDAP.
2. Associate a Service Principal Name (SPN) on with the newly created user for the TomEE server. To do so, open a Windows PowerShell and enter:

```
setspn -s HTTP/TOMEE_FQDN@REALM TECHNICAL_USER
```

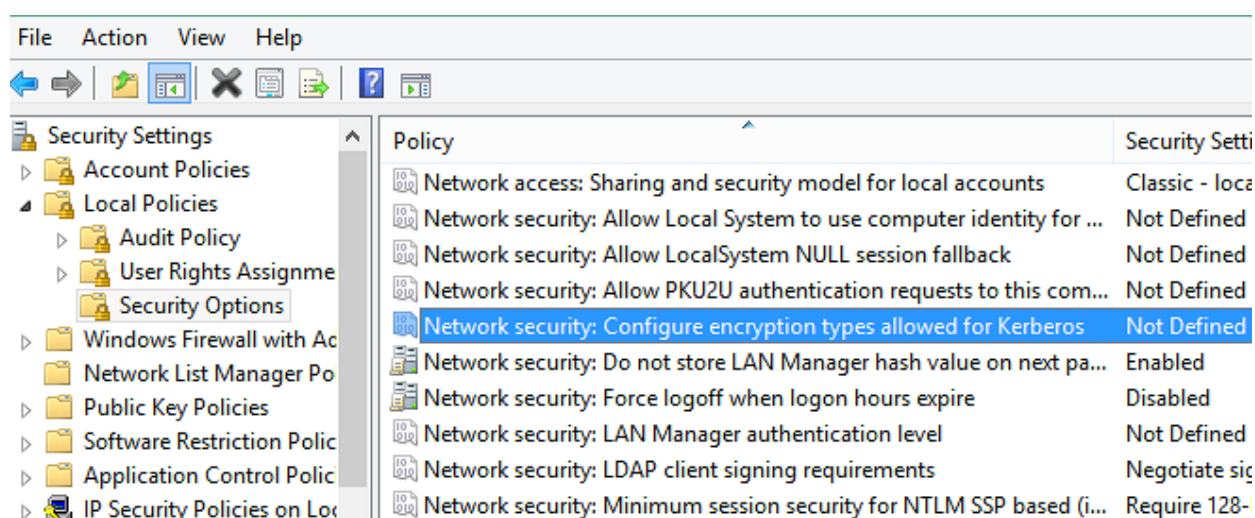
In the above command, replace

- TOMEE_FQDN with the fully qualified domain name (FQDN) of the machine that runs KNIME Server (and thus the TomEE server),

- REALM with the Kerberos realm of your Active Directory installation,
- and TECHNICAL_USER with the name of the technical user you have created in the previous step.

It is important that for the TOMEE_FQDN the DNS entries (FQDN to IP) as well as reverse DNS entries (IP to FQDN) entries can be resolved by the domain controller **and** all clients.

3. Make sure that the right encryption methods are active on the domain controller:

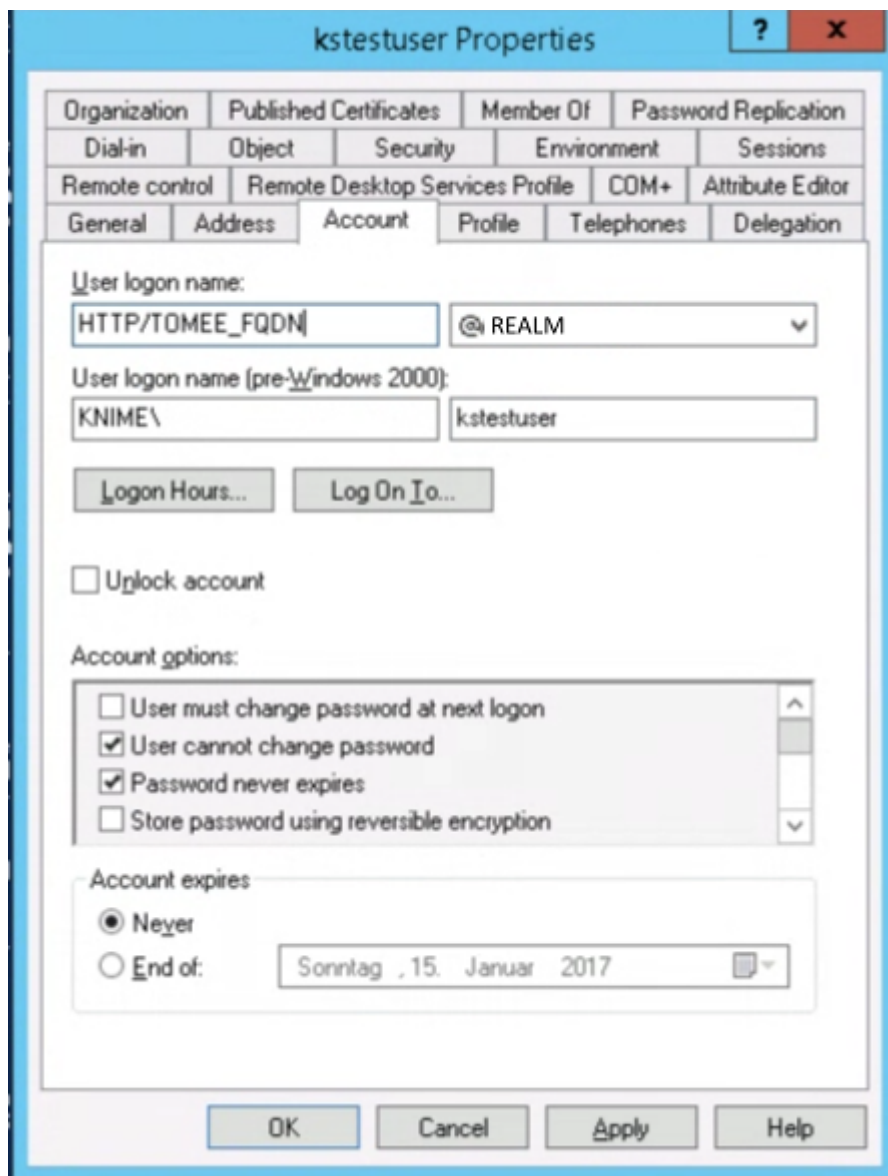


- a. Go to *Administrative Tools* → *Local Security Policy*
 - b. Browse to *Security Settings/Local Policies/Security Options*
 - c. Find the entry *Network security: Configure encryption types allowed for Kerberos*. If the value is not defined, then all encryption types are allowed. If it is defined, make sure it contains at least the methods: RC4_HMAC, AES128, AES256 and Future Encryption Types.
4. Open a Windows PowerShell and create a keytab file using the following command. Adjust the values according to your settings:

```
ktpass /out PATH/tomcat.keytab
      /mapuser TECHNICAL_USER@REALM
      /princ HTTP/TOMEE_FQDN@REALM
      /Pass +rndPass
      /crypto AES256-SHA1 ptype KRB5_NT_PRINCIPAL
```

The created keytab file needs to be copied to the TomEE server later.

5. Open the "User Properties" in Active Directory for the technical TomEE user you have created. Then go to the "Account" tab and make sure the following settings are set:



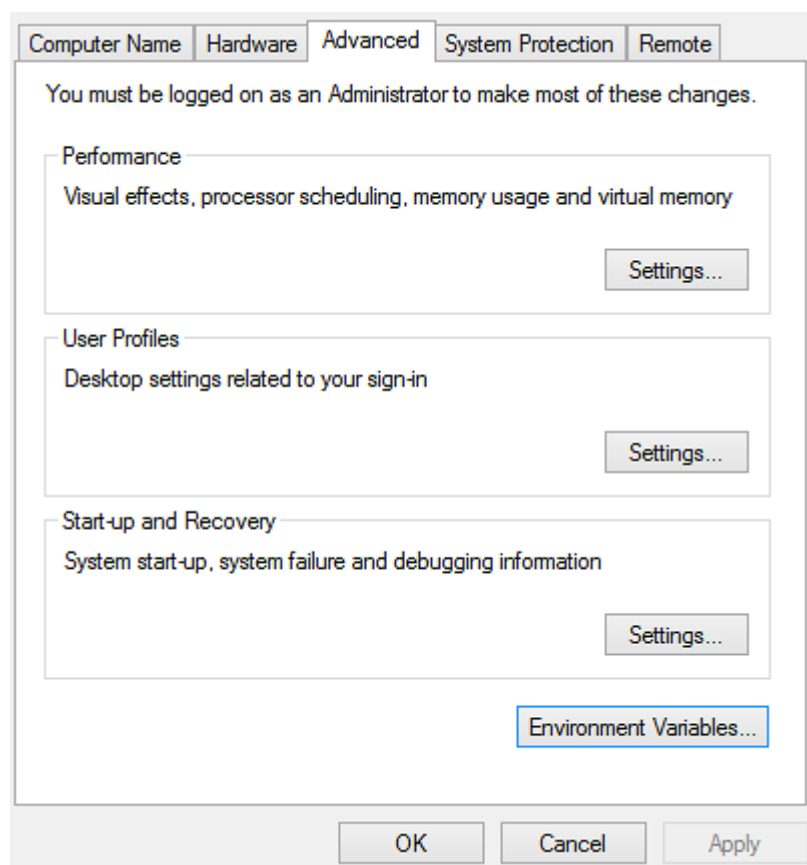
- a. User logon name is correctly set
 - b. Password never expires = true
 - c. User cannot change password = true
 - d. This account supports Kerberos AES 128 bit encryption = true
 - e. This account supports Kerberos AES 256 bit encryption = true
 - f. Use Kerberos DES encryption for this account = false (recommended)
6. Then go to the "Delegation" tab and set the radio button to *Trust this user for delegation to any service (Kerberos only)*

TomEE Server Configuration

1. Install KNIME Server as outlined in the [KNIME Server Installation Guide](#).

2. Make appropriate configuration adjustments as explained in the [KNIME Server Administration Guide](#).
3. Setup LDAP authentication in the `server.xml` to connect to your Active Directory, as described in [Configuring an LDAP connection for KNIME Server](#). Note that it might be necessary to create a temporary listing user to perform the LDAP lookups. This step is optional, but recommended to test that basic LDAP authentication is functional.
4. Verify that the environment variables `JAVA_HOME` and `CATALINA_HOME` are properly defined:
 - `JAVA_HOME` should point to the JDK8 home directory (containing a `bin` folder)
 - `CATALINA_HOME` should point to the TomEE directory (containing a `bin` folder).

On Windows this can be done in *Control Panel* → *System* → *Advanced system settings*



- a. Click on Environment Variables
- b. In the System Variables group check for the existence of `JAVA_HOME` and `CATALINA_HOME`. Create or adjust the values accordingly.

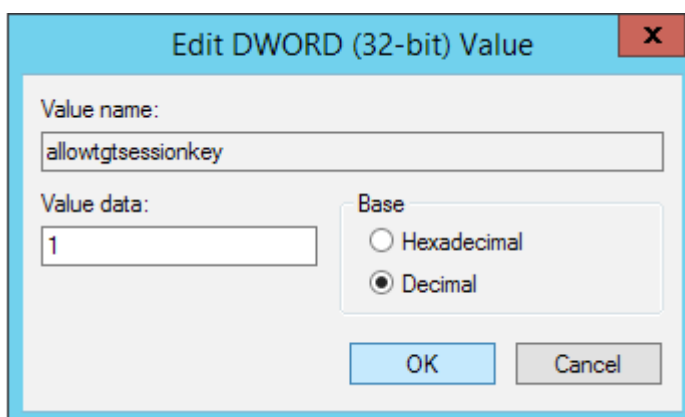
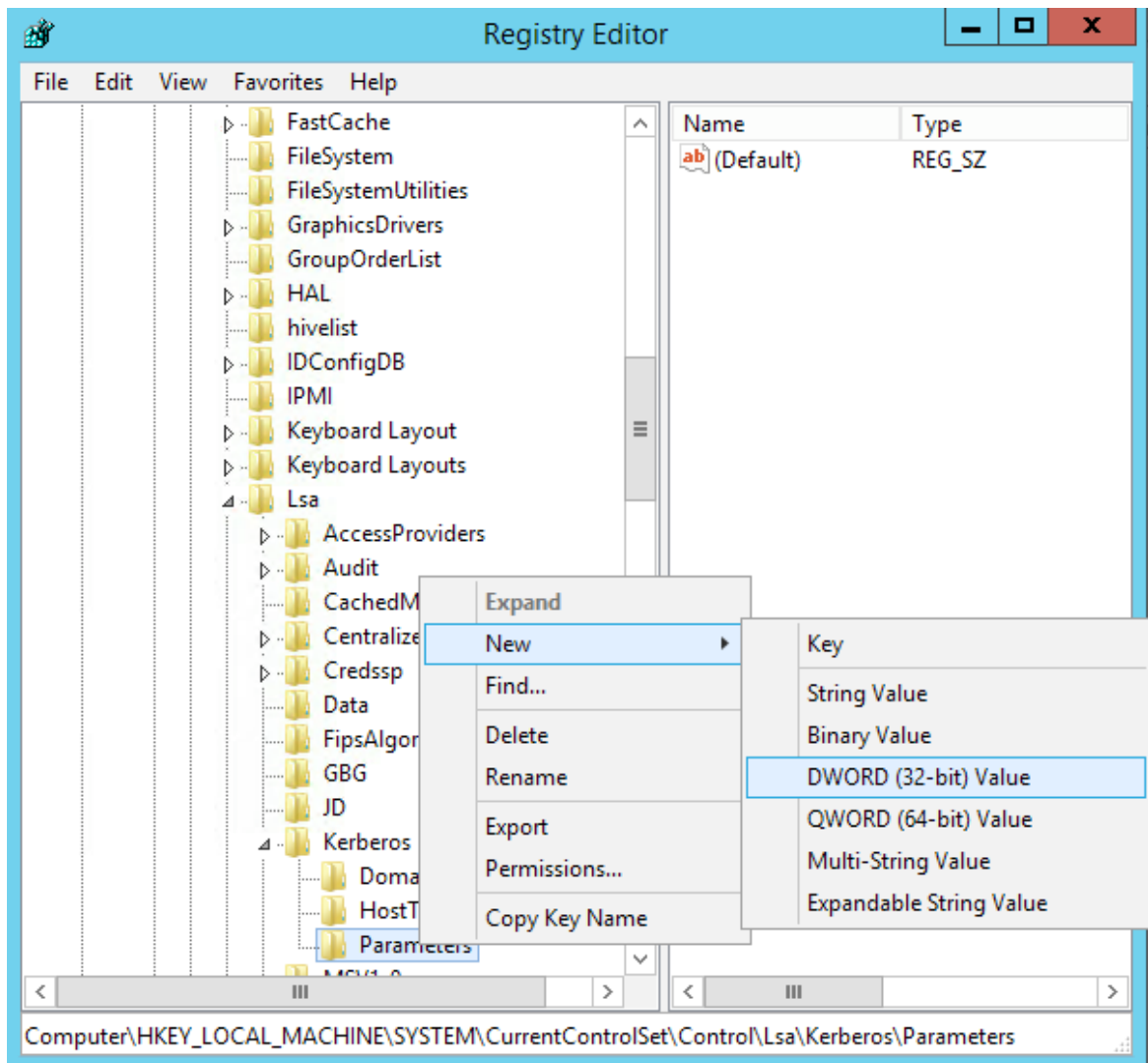
On Linux create or change the values in `/etc/default/knime-server`

5. Once a working standard LDAP setup has been verified, make a backup of the contents

of <CATALINA_HOME>/conf by copying it to <CATALINA_HOME>/conf_ldap.

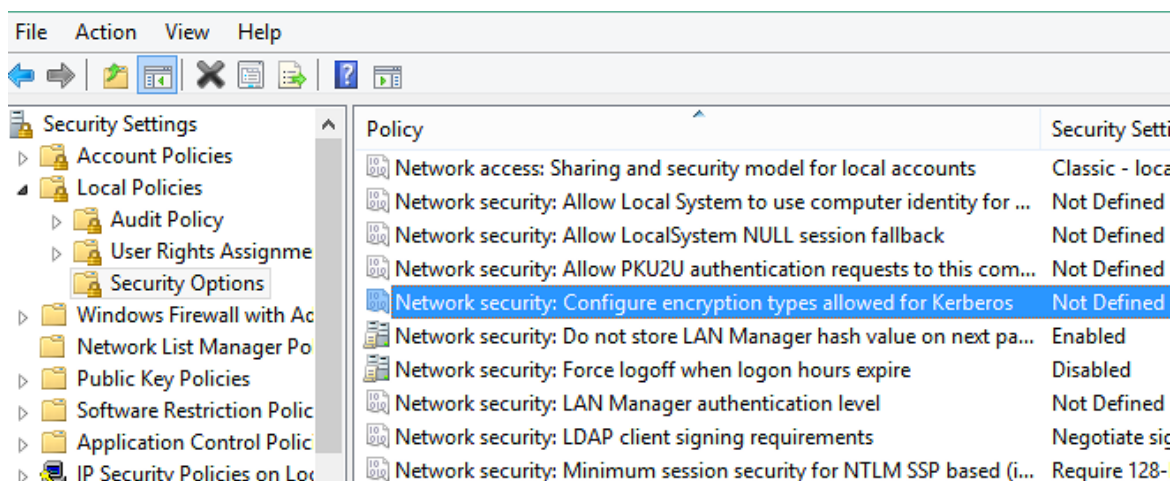
6. On Windows, open *regedit* and do the following:

- a. Navigate to
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\Lsa\Kerberos\Parameters.
- b. Add the key `allowtgtsessionkey` (REG_DWORD) and set the value to 1.



7. On Windows, make sure that the right encryption methods for Kerberos are active:

- a. Go to *Administrative Tools* → *Local Security Policy*
- b. Browse to *Security Settings/Local Policies/Security Options*
- c. Find the entry *Network security: Configure encryption types allowed for Kerberos*



- d. If the value is not defined all encryption types are allowed. If it is defined, make sure it contains at least the methods: RC4_HMAC, AES128, AES256 and Future Encryption Types.

8. Install the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy files for JDK8:

- a. Download the archive from [the Oracle Website](#)
- b. Create a backup of the security policy files in the Java 8 JRE locations (jre/lib/security, and jdk/jre/lib/security)
- c. Extract the archive into your Java 8 JRE locations (jre/lib/security, and jdk/jre/lib/security) replacing the files in those directories.

9. Copy the previously created keytab file for the SPN to a location of your choosing. Recommended would be <CATALINA_HOME>/conf/

10. Create a krb5.ini file in <CATALINA_HOME>/conf/. The contents of the file should look like:

```
[libdefaults]
default_realm=REALM
default_keytab_name="FILE:<CATALINA_HOME>/conf/tomcat.keytab"
default_tkt_enctypes=aes256-cts-hmac-sha1-96,aes128-cts-hmac-sha1-96
default_tgs_enctypes=aes256-cts-hmac-sha1-96,aes128-cts-hmac-sha1-96
forwardable=true

[realms]
REALM={
  kdc=DOMAIN_CONTROLLER_FQDN:88
}

[domain_realm]
yourdomain.com=REALM
*.yourdomain.com=REALM
```

Adjust the values according to your configuration but keep the `FILE:` prefix for the keytab name. If you want to use a different location or file name for this file you can do so by defining the following Java system property in `<CATALINA_HOME>/conf/system.properties`:

```
java.security.krb5.conf=PATH_TO_KRB5_CONF
```

11. Create or edit the file `<CATALINA_HOME>/conf/jaas.conf`. The contents of the file should look like:


```
com.sun.security.jgss.krb5.accept {  
  com.sun.security.auth.module.Krb5LoginModule  
  required  
  doNotPrompt=true  
  principal="HTTP/TOMEE_FQDN@REALM"  
  keyTab="<CATALINA_HOME>/conf/tomcat.keytab"  
  storeKey=true  
  useKeyTab=true  
  useTicketCache=true  
  isInitiator=true  
  refreshKrb5Config=true  
  moduleBanner=true  
  storePass=true;  
};  
com.sun.security.jgss.krb5.initiate {  
  com.sun.security.auth.module.Krb5LoginModule  
  required  
  doNotPrompt=true  
  principal="HTTP/TOMEE_FQDN@REALM"  
  keyTab="<CATALINA_HOME>/conf/tomcat.keytab"  
  storeKey=true  
  useKeyTab=true  
  useTicketCache=true  
  isInitiator=true  
  refreshKrb5Config=true  
  moduleBanner=true  
  storePass=true;  
};
```

Adjust the values according to your configuration. Note that the location to the keytab file must be given as an absolute path and contain forward slashes, even on Windows.

If you want to use a different location or file name for the `jaas.conf` you can do so by defining the following Java system property in `<CATALINA_HOME>/conf/system.properties`:

```
java.security.auth.login.conf=PATH_TO_JAAS_CONF
```

In Kerberos documentation this file is often referred to as the `login.conf`.

12. Add the following property to the list of JVM system properties at startup. They can be defined in `<CATALINA_HOME>/conf/system.properties`:

```
javax.security.auth.useSubjectCredsOnly=false
```

13. Configure the KNIMEServerAuthenticator valve:

- a. Navigate to <CATALINA_HOME>/conf/Catalina/localhost/
- b. Edit the knime.xml file (the name of the file is equal to the context root that was set in the KNIME Server installer, the default is knime, if the knime.war file was renamed to renamed.war, the xml file will be called renamed.xml)
- c. Find the line

```
<Valve
  className="com.knime.enterprise.tomcat.authenticator.KnimeServerAuthenticator
  " enableSpnego="false"
  basicAuthPaths="/rest,/webservices" formAuthPaths="/" />
```

- d. Change it to

```
<Valve
  className="com.knime.enterprise.tomcat.authenticator.KnimeServerAuthenticator
  " enableSpnego="true"
  basicAuthPaths="/rest,/webservices" />
```

- e. By default, the REST and SOAP webservices are set up to use basic HTTP authentication. If you want to use Single-Sign-On also for the REST and/or SOAP webservices, e.g. if you are using a REST client that supports Kerberos, adjust the basicAuthPaths attribute accordingly. It is a comma separated list of paths overwriting the default authentication method. Deleting the attribute enables Kerberos for all services.

For example if REST is supposed to be used with Single-Sign-On the attribute would look like this: basicAuthPaths="/webservices"

14. Modify the server.xml and adjust the JNDIRealm settings to connect to your LDAP. If you have successfully tested your setup in step 3, it is sufficient to remove the connectionName and connectionPassword attributes.

Please note that with Kerberos the connectionName and connectionPassword attributes are ignored. Also the use of the userPattern is not supported by Tomcat when using Kerberos. Use userBase in combination with userSearch instead.

The realm definition could look like this:

```
<Realm className="org.apache.catalina.realm.JNDIRealm"
  connectionURL="ldap://dc.domain.com:3268"
  userSubtree="true"
  userBase="cn=Users,dc=domain,dc=com"
  userSearch="(sAMAccountName={0})"
  userRoleName="memberOf"
  roleBase="cn=Users,dc=domain,dc=com"
  roleName="cn"
  roleSearch="(member={0})"
  roleSubtree="true"
  roleNested="true"/>
```

If you are using Kerberos in a combined realm, make sure the JNDIRealm connecting to your LDAP is **first** in the list of realms.

15. Restart KNIME Server for the changes to take effect. Inspect the log files in `<CATALINA_HOME>/logs` to make sure that there are no error messages relating to your changes.

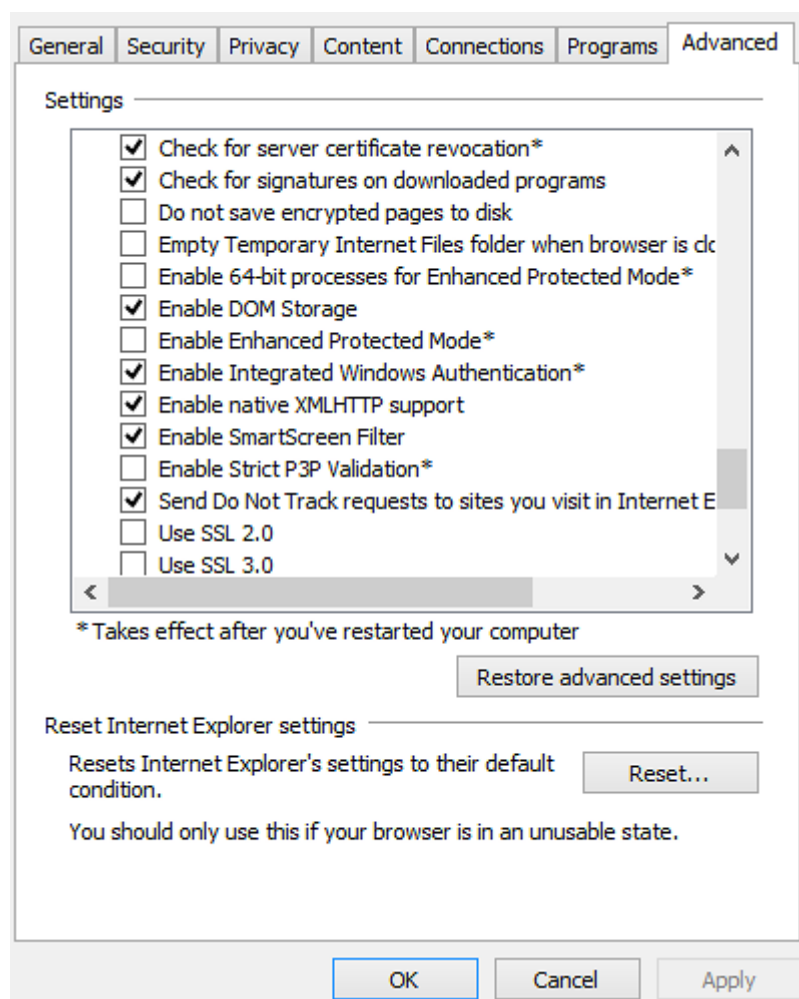
Client Configuration

Client configuration requires two steps:

1. The client machine needs to be part of the domain, and the end user logged into that domain.
2. All browsers used by the client need to have Kerberos authentication enabled. The following sections describe how to Internet Explorer and Firefox for Kerberos authentication.

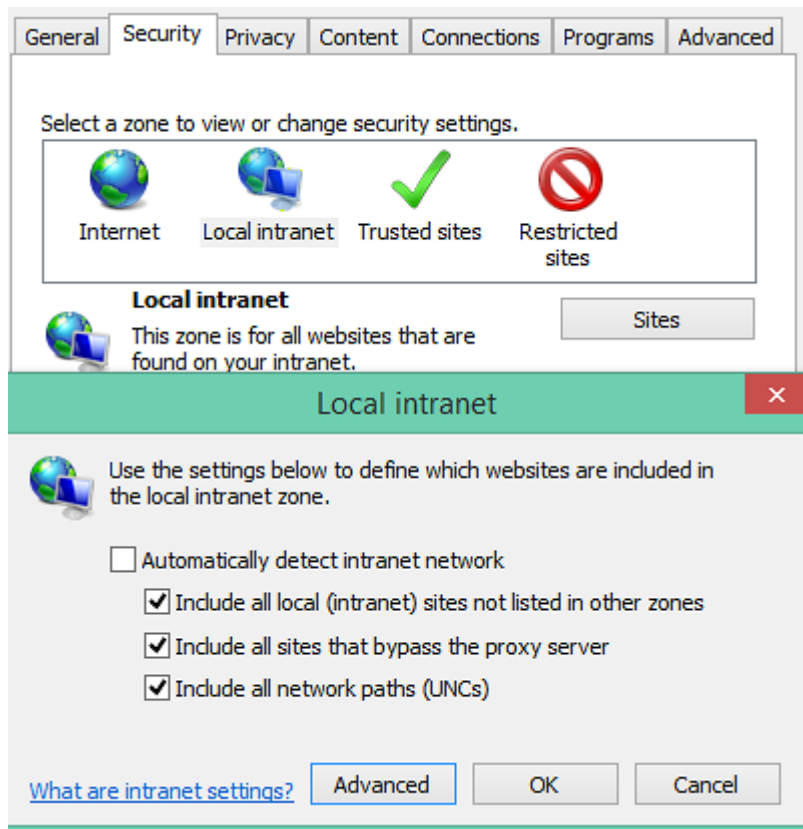
Enabling Kerberos Authentication in Internet Explorer

1. Open the "Internet Options" menu and browse to the "Advanced" tab.

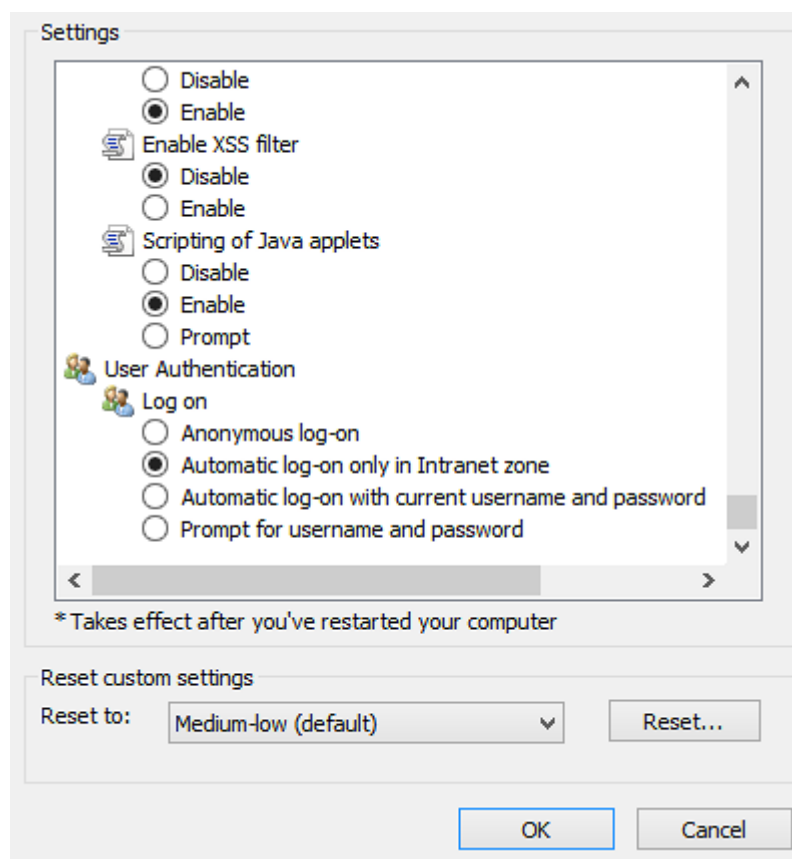


The setting "Enable Integrated Windows Authentication" needs to be checked.

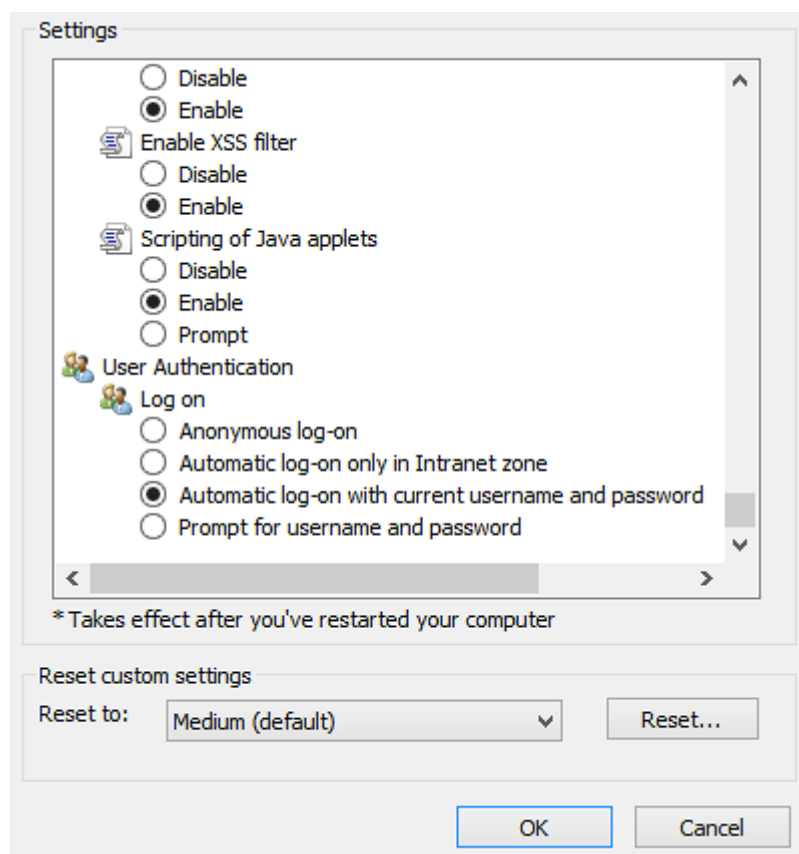
2. Browse to the "Security" tab, select "Local Intranet" and click on the "Sites" button.



3. Click on "Advanced" and add the URL of KNIME Server to the list of websites in the zone.
4. Click on "Custom Level" and check that in *Local Intranet Security Level* → *User Authentication* is set to "Automatic logon only in Intranet zone"

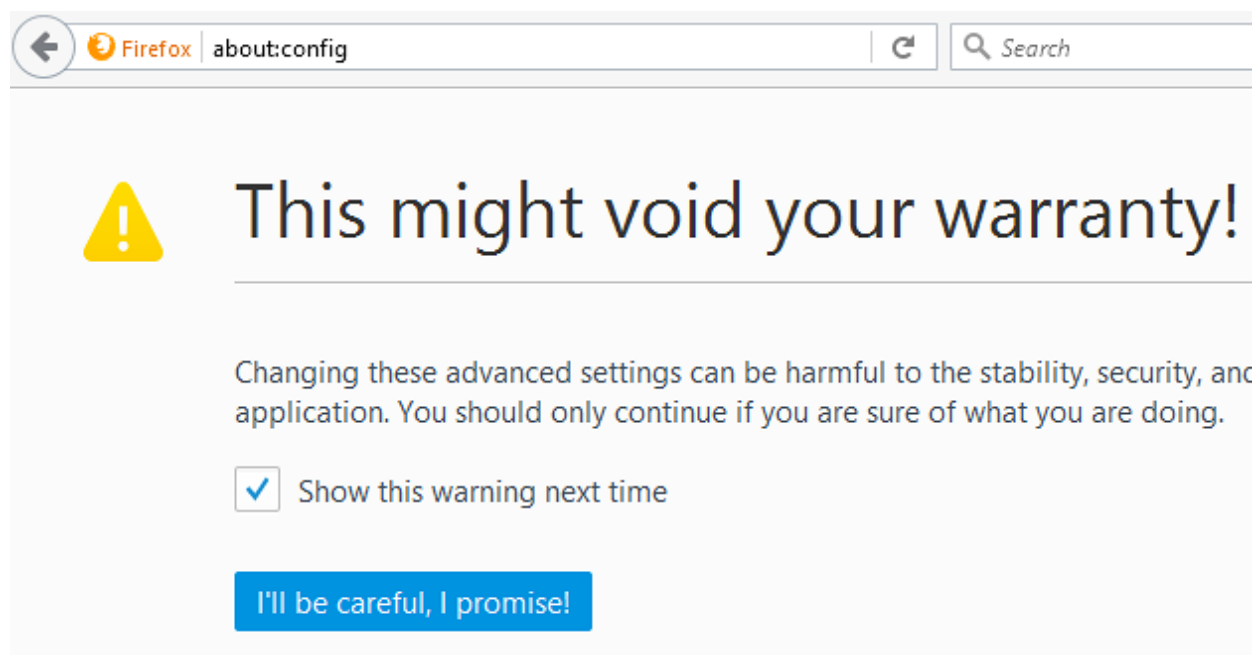


5. It might be necessary to also add KNIME Server to the list of trusted sites. To do so, go to "Trusted Sites" and click on the "Sites" button. Add the URL of KNIME Server to the list of websites in the zone.
6. Check that the *Trusted Sites Security Level* → *User Authentication* is set to "Automatic log-on with current username and password".

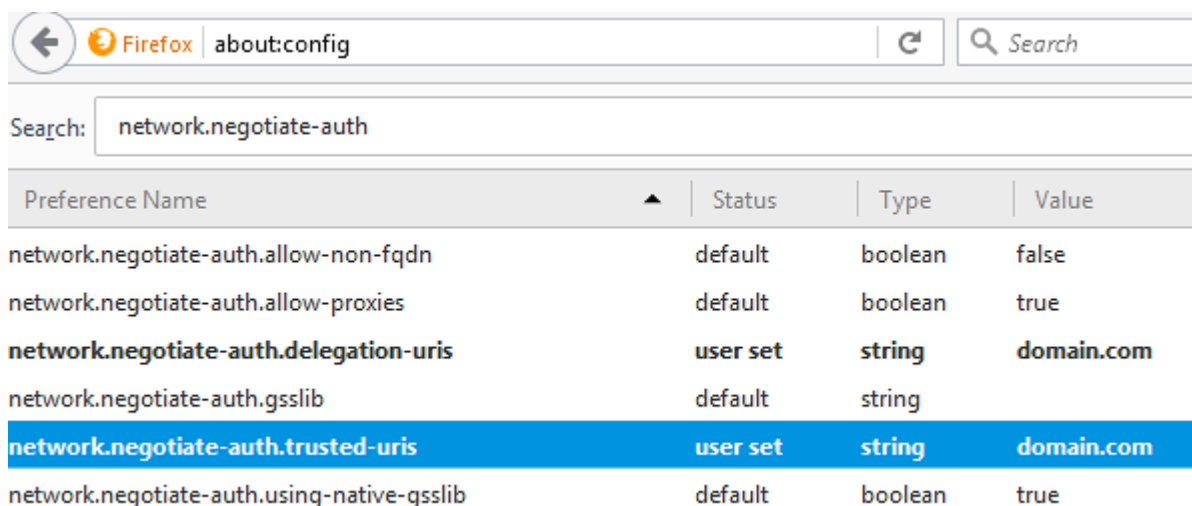


Enable Kerberos Authentication in Firefox

1. Start Firefox and type `about:config` in the address bar.
2. Ignore the warning by clicking on the "I'll be careful, I promise!" button.



3. Find the appropriate settings by typing `network.negotiate-auth` in the search field.



The screenshot shows the Firefox 'about:config' page with a search bar containing 'network.negotiate-auth'. A table of preferences is displayed below the search bar.

Preference Name	Status	Type	Value
network.negotiate-auth.allow-non-fqdn	default	boolean	false
network.negotiate-auth.allow-proxies	default	boolean	true
network.negotiate-auth.delegation-uris	user set	string	domain.com
network.negotiate-auth.gsslib	default	string	
network.negotiate-auth.trusted-uris	user set	string	domain.com
network.negotiate-auth.using-native-gsslib	default	boolean	true

Change the `network.negotiate-auth.delegation-uris` and `network.negotiate-auth.trusted-uris` to contain the URL of KNIME Server. It might be enough to just enter your domain.

Troubleshooting

A Kerberos setup is usually very complex and needs precise configuration. Error messages are often times cryptic. To debug a Kerberos setup it is very helpful to enable additional logging for the authentication in the TomEE server. To do so you can configure a few things.

1. To enable logging in the Krb5 modules, add or enable the following two lines in both section of the `jaas.conf` (or `login.conf` in `<CATALINA_HOME>/conf`):

```
debug=true
moduleBanner=true
```

Note that the debug output is only printed to console.

2. To increase the debug output of the Kerberos implementation in Java add the following system property on startup (can be done in `system.properties` file in `<CATALINA_HOME>/conf`):

```
-Dsun.security.krb5.debug=true
```

3. Add debugging for authentication and realm modules by adding to the `logging.properties` file in `<CATALINA_HOME>/conf`. For clarity all authentication output can be logged into a separate file.

[...]

```
4auth.org.apache.juli.FileHandler.level = FINE
4auth.org.apache.juli.FileHandler.directory = ${catalina.base}/logs
4auth.org.apache.juli.FileHandler.prefix = auth.
```

[...]

```
org.apache.catalina.realm.level = ALL
org.apache.catalina.realm.handlers = 4auth.org.apache.juli.FileHandler

org.apache.catalina.authenticator.level = ALL
org.apache.catalina.authenticator.handlers = 4auth.org.apache.juli.FileHandler

com.knime.enterprise.tomcat.handlers = 4auth.org.apache.juli.FileHandler
com.knime.enterprise.tomcat.level = DEBUG

org.apache.juli.logging.UserDataHelper.CONFIG = INFO_ALL

org.apache.coyote.http11.level = DEBUG
org.apache.coyote.http11.handlers = 4auth.org.apache.juli.FileHandler
```

Dynamic profiles for server-managed customizations

As mentioned in the [KNIME Server Administration Guide](#) it is possible to write a custom profile provider which selects the server and the list of profiles dynamically. This custom provider must be an implementation of the `org.knime.product.profiles.IProfileProvider` interface which is contained in the `org.knime.product` plug-in. The implementation of this interface must not make use of any classes that trigger reading preferences, otherwise the default preferences cannot be changed any more. This includes usage of commonly used KNIME classes such as `KNIMEConstants` or `NodeLogger`.

Therefore we suggest to create a new plug-in that only has a dependency to `org.knime.product` (for the `IProfileProvider` interface) and doesn't use any other KNIME classes otherwise. An exception are classes from the `org.knime.core.util` plug-in because it doesn't use any preferences (and never will be). Other than that, the implementation is straight-forward. The class `org.knime.product.profiles.ExampleProfileProvider` contains a minimal example of a custom profile provider that you can use as a starting point. Don't forget to register your implementation at the extension point `org.knime.product.profileProvider`.

If you have any questions implementing a custom profile provider, don't hesitate to contact us.

KNIME AG
Technoparkstrasse 1
8005 Zurich, Switzerland
www.knime.com
info@knime.com