LDAP Installation and Setup with Sterling B2B Integrator

Author

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1) OpenLDAP with Non-SSL

We will install OpenLDAP server on Linux machine.

1. Update the system using `yum update` (optional).
2. Install the packages required for OpenLDAP.

```
[root@server ~]# yum -y install openldap compat-openldap openldap-clients
openldap-servers openldap-servers-sql openldap-devel
```

> Expected versions:
>
> - `compat-openldap.x86_64 1:2.3.43-5.el7`
> - `openldap-clients.x86_64 0:2.4.44-22.el7`
> - `openldap-devel.x86_64 0:2.4.44-22.el7`
> - `openldap-servers.x86_64 0:2.4.44-22.el7`

3. Start and enable the LDAP service.

```
[root@server ~]# systemctl start slapd
[root@server ~]# systemctl enable slapd
Created symlink from /etc/systemd/system/multi-user.target.wants/slapd.service to
/usr/lib/systemd/system/slapd.service
```

4. Set a LDAP `root` password and save the output.

```
[root@server ~]# slappasswd
New password: <Type password here, it will not be visible>
Re-enter new password:
{SSHA}0/0M8zkS7ODyRWv6rp/qXtiySXBORkcV
```

5. Configure OpenLDAP. Create the `db.ldif` file in the `/etc/openldap/` directory with the following contents and save it.

```
dn: olcDatabase={2}hdb,cn=config
changetype: modify
```

```
replace: olcSuffix
olcSuffix: dc=support,dc=com

dn: olcDatabase={2}hdb,cn=config
changetype: modify
replace: olcRootDN
olcRootDN: cn=admin,dc=support,dc=com

dn: olcDatabase={2}hdb,cn=config
changetype: modify
replace: olcRootPW
olcRootPW: hashed_output_from_the_slappasswd_command
olcRootPW: {SSHA}0/0M8zkS7ODyRWv6rp/qXtiySXBORkcV
```

Deploy the configuration using `ldapmodify`.

```
[root@server openldap]# ldapmodify -Y EXTERNAL -H ldapi:/// -f db.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
modifying entry "olcDatabase={2}hdb,cn=config"
modifying entry "olcDatabase={2}hdb,cn=config"
modifying entry "olcDatabase={2}hdb,cn=config"
```

Common Errors

```
[root@server openldap]# ldapmodify -Y EXTERNAL -H ldapi:/// -f db.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
ldapmodify: wrong attributeType at line 5, entry "olcDatabase={2}hdb,cn=config"
```

Remove all the unwanted spaces from `.ldif` file.

6. Now restrict monitor access only to the ldap user. Create `monitor.ldif` file in the openldap directory with the following contents and save it.

```
dn: olcDatabase={1}monitor,cn=config
changetype: modify
replace: olcAccess
olcAccess: {0}to * by
dn.base="gidNumber=0+uidNumber=0,cn=peercred,cn=external, cn=auth" read by
dn.base="cn=admin,dc=support,dc=com" read by * none
```

Deploy the changes using `ldapmodify`.

```
[root@server openldap]# ldapmodify -Y EXTERNAL -H ldapi:/// -f monitor.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
modifying entry "olcDatabase={1}monitor,cn=config"
```

7. Setting up the LDAP database. Execute the below commands to add LDAP schemas:

```
[root@server ~]# cp /usr/share/openldap-servers/DB_CONFIG.example
/var/lib/ldap/DB_CONFIG
[root@server ~]# chown -R ldap:ldap /var/lib/ldap
[root@server ~]# ldapadd -Y EXTERNAL -H ldapi:/// -f
/etc/openldap/schema/cosine.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
adding new entry "cn=cosine,cn=schema,cn=config"
[root@server ~]# ldapadd -Y EXTERNAL -H ldapi:/// -f
/etc/openldap/schema/nis.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
adding new entry "cn=nis,cn=schema,cn=config"
[root@server openldap]# ldapadd -Y EXTERNAL -H ldapi:/// -f
/etc/openldap/schema/inetorgperson.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
adding new entry "cn=inetorgperson,cn=schema,cn=config"
```

8. Create the `ldapadmin.ldif` file for your domain and save it.

```
dn: dc=support,dc=com
dc: support
objectClass: top
objectClass: domain

dn: cn=admin,dc=support,dc=com
objectClass: organizationalRole
cn: admin
description: LDAP Manager

dn: ou=People,dc=support,dc=com
objectClass: organizationalUnit
ou: People

dn: ou=Group,dc=support,dc=com
objectClass: organizationalUnit
ou: Group
```

9. Now, deploy these configuration changes to the OpenLDAP server using the LDAP user `admin`.

```
[root@server openldap]# ldapadd -x -W -D "cn=admin,dc=support,dc=com" -f
ldapadmin.ldif
Enter LDAP Password:
adding new entry "dc=support,dc=com"
adding new entry "cn=admin,dc=support,dc=com"
adding new entry "ou=People,dc=support,dc=com"
adding new entry "ou=Group,dc=support,dc=com"
```

Note: Enter the LDAP `root` password, that you have created using `slapdpasswd`.

10. Restart the OpenLDAP.

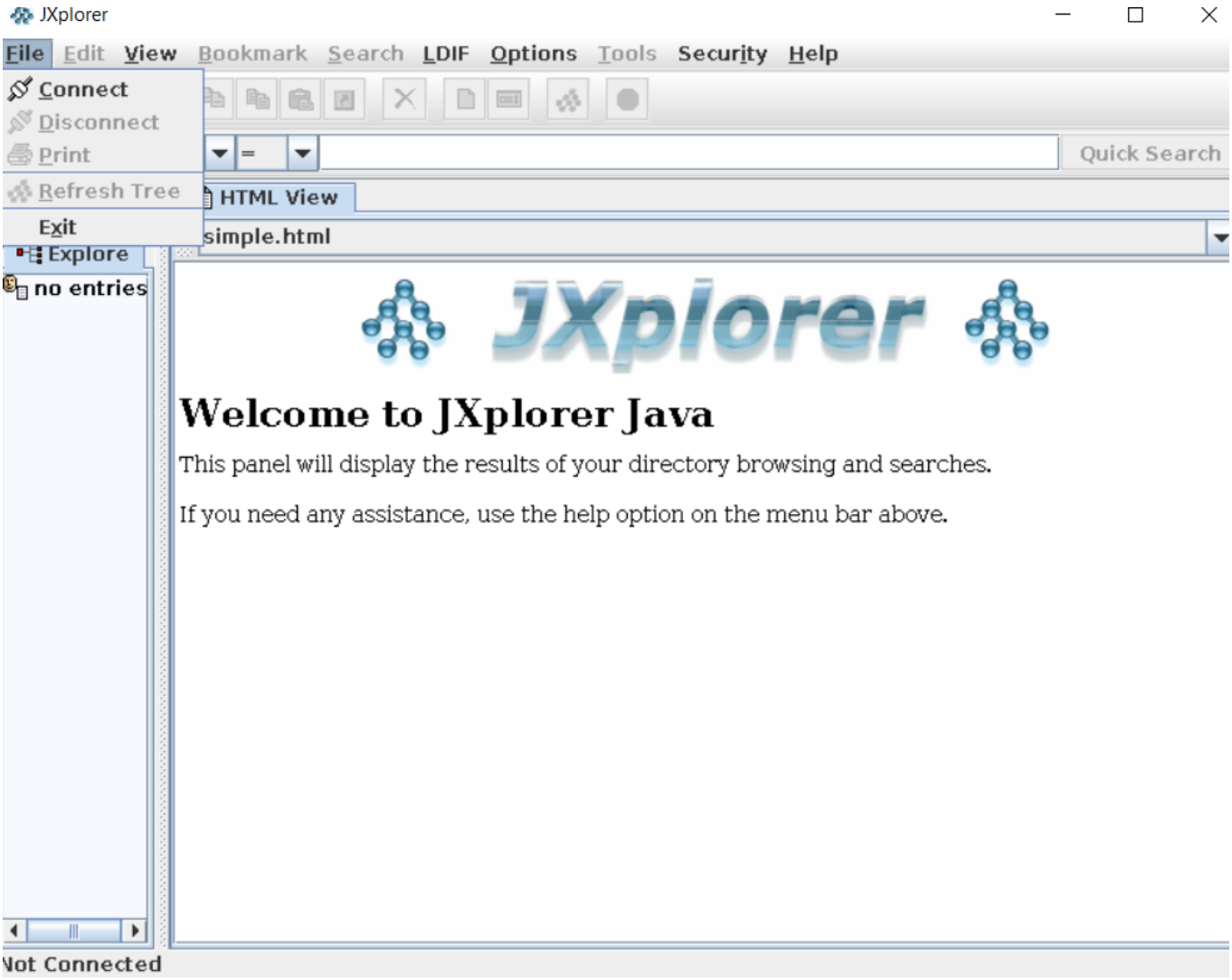
```
[root@server ~]# systemctl restart slapd
```

11. Now, check the LDAP connection. You can install any LDAP client application. Here, I have downloaded the JXplorer LDAP client application to interact with the OpenLDAP server. You can get this from the IBM G2O site. I have downloaded `JXv3.2rc2deploy.tar.bz2`.

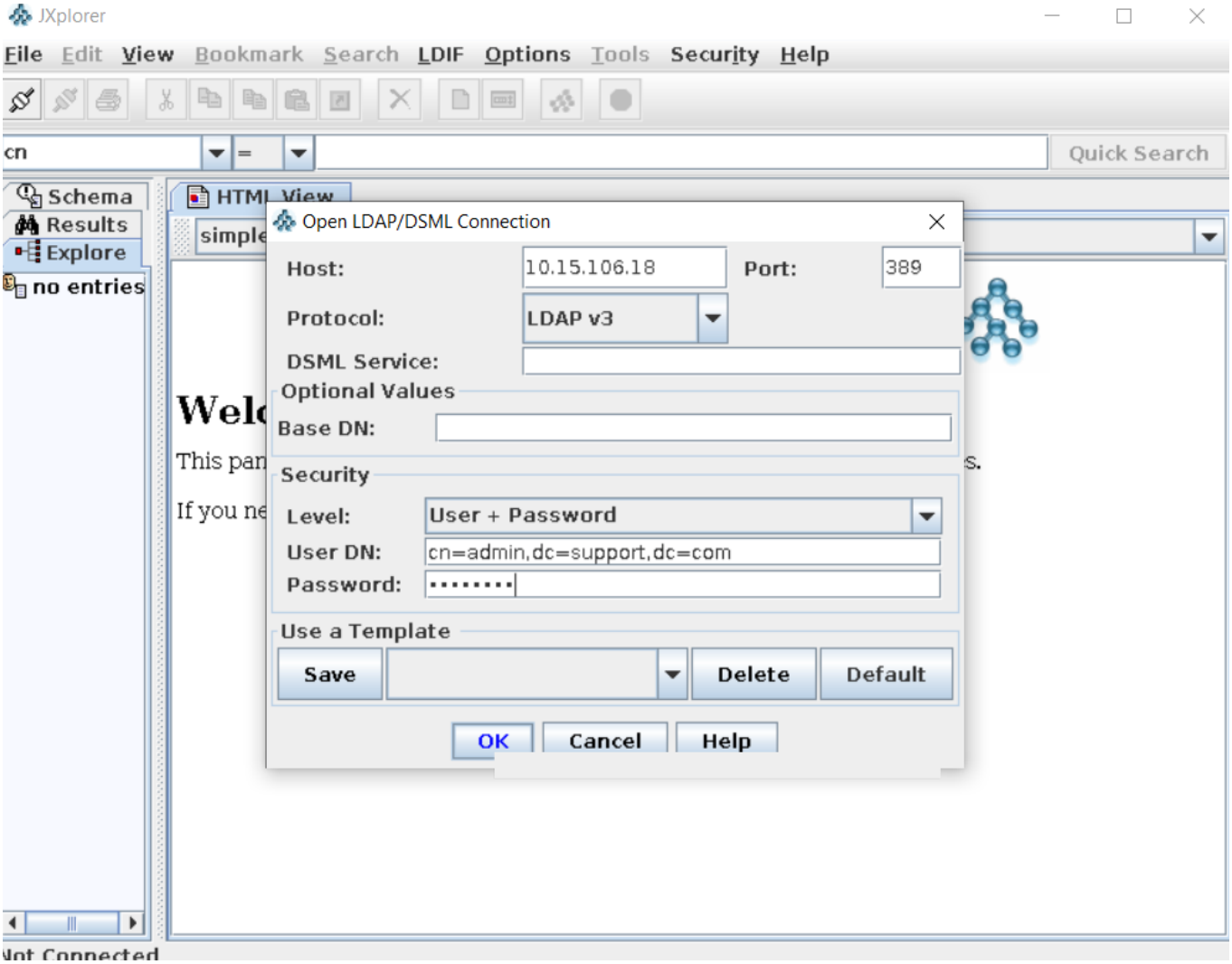
```
[root@server ~]# tar -xf JXv3.2rc2deploy.tar.bz2
[root@server ~]# ls
jxplorer  JXv3.2rc2deploy.tar.bz2 SBI
[root@server ~]# cd jxplorer/
[root@server jxplorer]# ls
example.ldif  htmldocs  icons  images  jars  jxplorer.bat  jxplorer.ico
jxplorer.sh  language  licence.txt  log4j.xml  plugins  RELEASE.TXT  security
templates
[root@server jxplorer]# chmod +x jxplorer.sh
[root@server jxplorer]# ./jxplorer.sh
starting JXplorer...
Use "jxstart.sh console" if you want logging to the console
```

If any errors check `./jxplorer.sh console`.

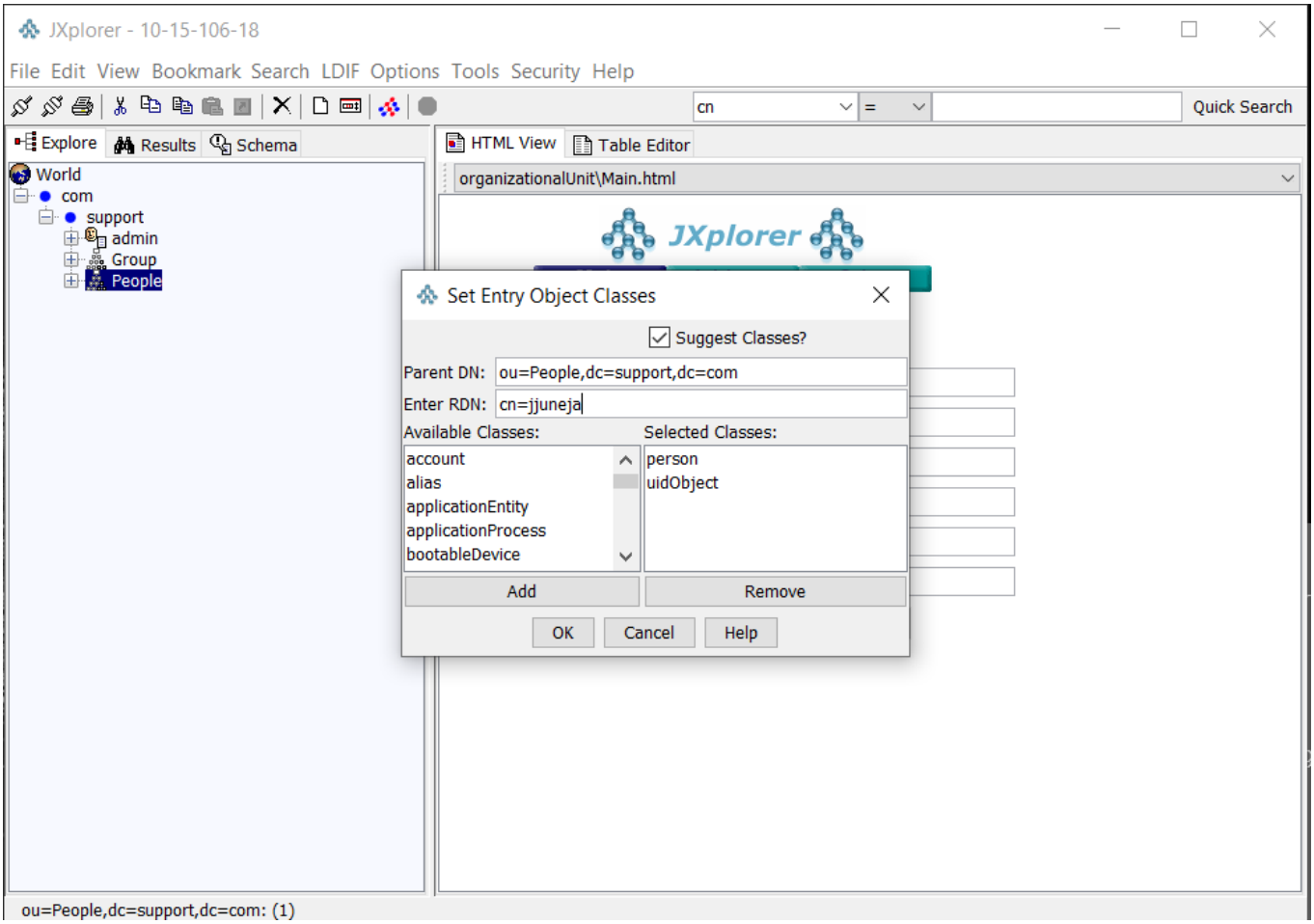
You will see the below screen.



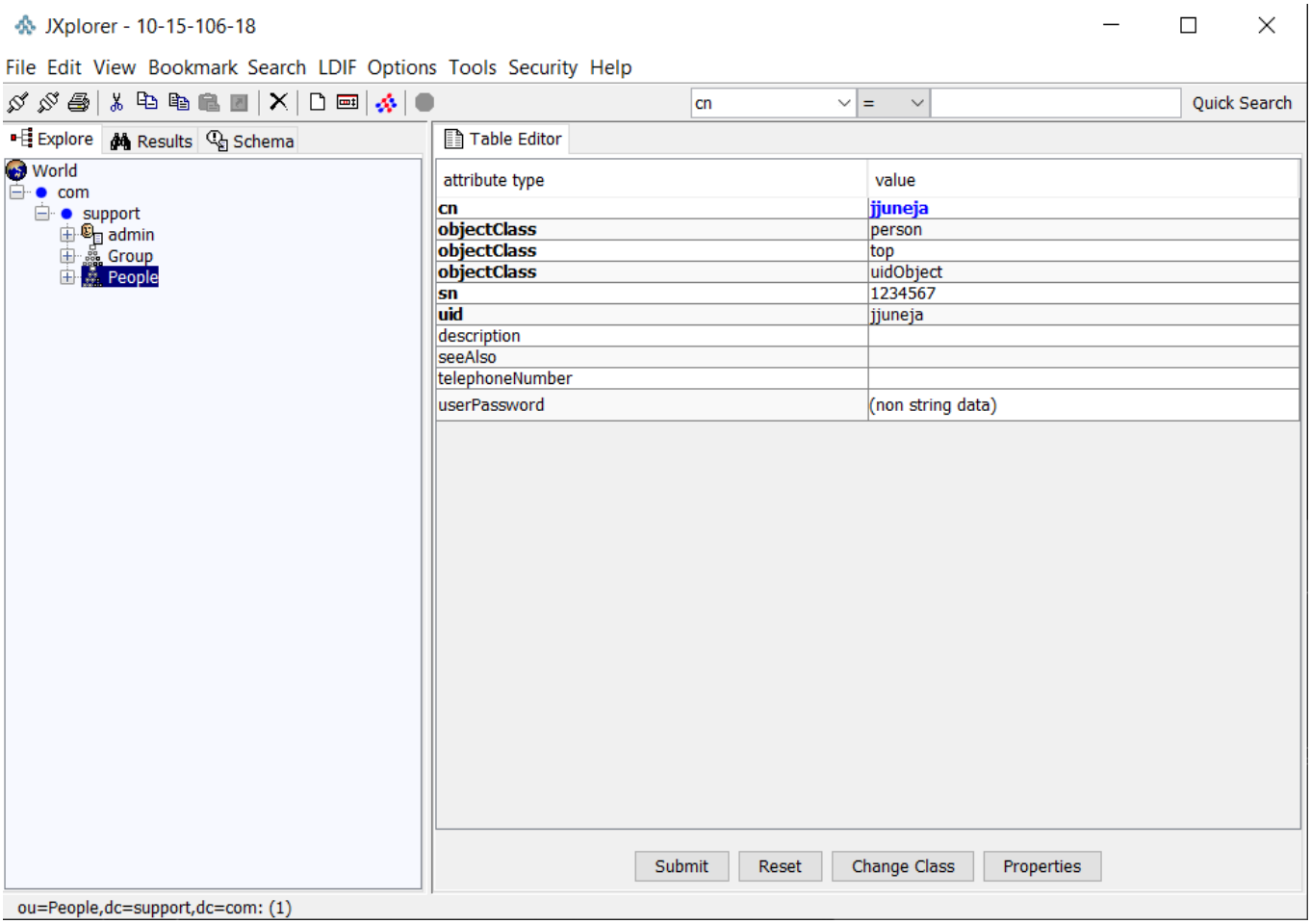
12. Now, log into your OpenLDAP server with JXPlorer client tool.



13. After you are logged in you can create objects. Right click on **People** > **New** and you get a pop-up menu window. Move the `person` and `uidObject` classes over to the selected classes. Enter `RDN` in form `cn=TheusernameOfYourChoice`. Hit **Ok**.



14. You will see your new object shown in the table editor tab on the right. You need to fill in the required fields and because this user will be used for user authentication, we will set a password. After required fields are completed hit **Submit** button then you will see the user added to the user under the branch you added it to.



15. Adding LDAP external authentication to Sterling Integrator for using external authentication.

- The `authentication_policy.properties` or the `customer_overrides.properties` files need following parameters to added which enables the external authentication in SI so that it will talk to the OpenLDAP server to authenticate the SI user.

- Here are the `customer_override.properties` lines for basic LDAP authentication. Notice I set my `search_root` to only look at users under the People, but you can change the `search_root` to another group or high up to find users under the `search_filter's` DN. This search is a top down search so you will not see users on another LDAP tree branch.

```
authentication_policy.authentication_1.className=com.sterlingcommerce.woodst
ock.security.LDAPAuthentication
authentication_policy.authentication_1.display_name=OPENLDAP
authentication_policy.authentication_1.enabled=true
authentication_policy.authentication_1.jndi_factory=com.sun.jndi.ldap.LdapCt
xFactory
authentication_policy.authentication_1.server=10.15.106.18
authentication_policy.authentication_1.port=389
authentication_policy.authentication_1.security_type=simple
authentication_policy.authentication_1.principle=cn=admin,dc=support,dc=com
authentication_policy.authentication_1.credentials=password
authentication_policy.authentication_1.password_attribute=userPassword
authentication_policy.authentication_1.search_root=dc=support,dc=com
authentication_policy.authentication_1.search_filter=(uid=<userid>)
authentication_policy.authentication_1.with_user_bind=false
```

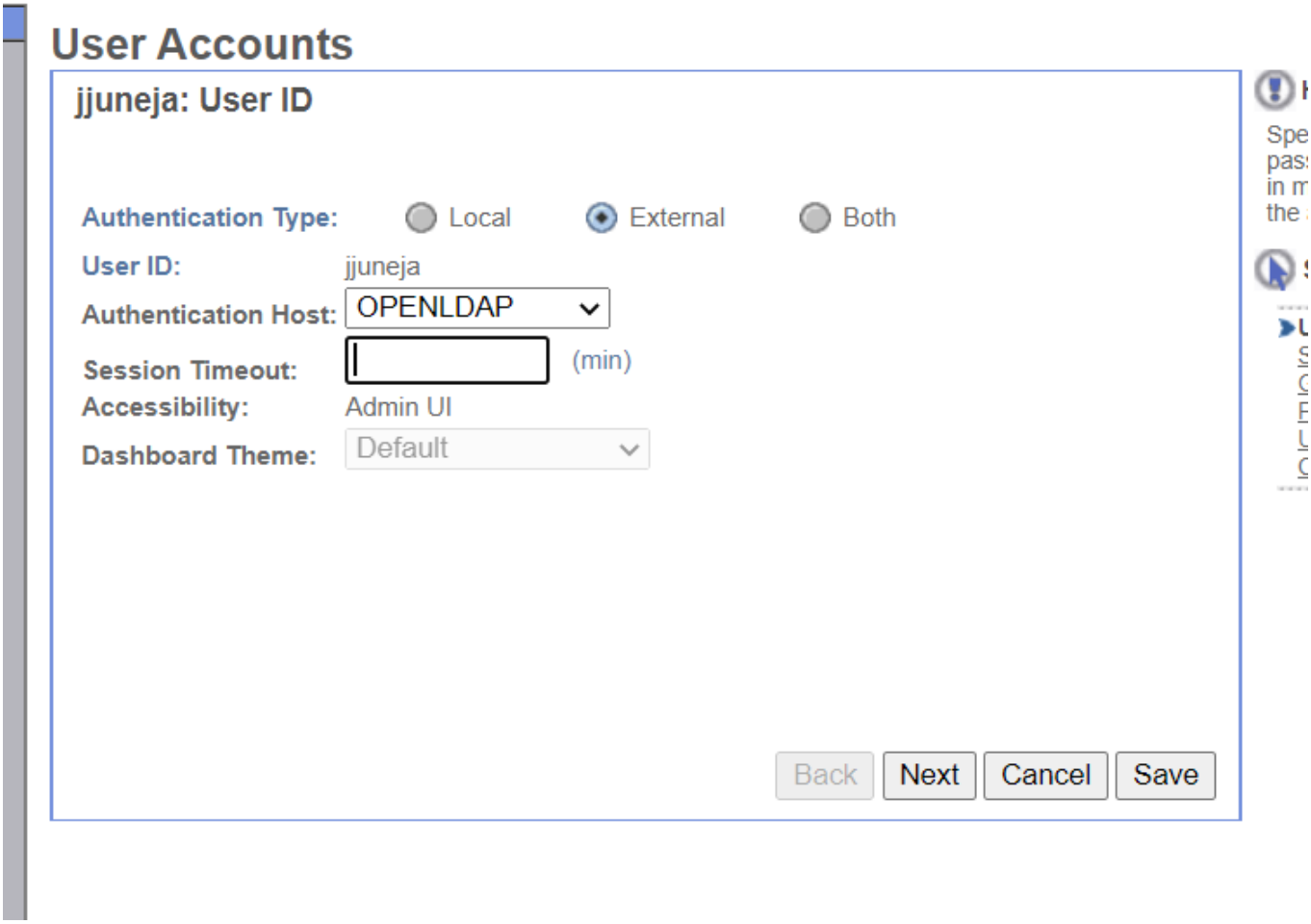
- To encrypt the password, execute the below query:

Navigate to (`/<SI Install dir>/bin/`) execute `sudo ./encrypt_string.sh password`.

- Edit the file:

```
authentication_policy.authentication_1.credentials=OBSCURED:rO0ABXQABkRFU2Vk
ZXVyAAJbQqzzF/gGCFTgAgAAeHAAAAAIpYOdxqgKQ>+tzcgARamF2YS5sYW5nLkludGVnZXIS4qC
k94GHOAIAAUkABXZhbHVleHIAEGphdmEubGFuZy5OdW1iZXKGrJUdC5TgiwIAAHhwAAAAZXVxAH4
AAQAAABAaoPBADLNLpY7F/QRvkhcB
```

17. Create the `user` inside of SI and set to external authentication and set permissions. After you save this you should now be able to authenticate the users you create in OpenLDAP server in SI.



18. Login to dashboard using external credentials and In case the configuration was not successful, you can check the `authentication.log` in debug mode for troubleshooting.

```
[2021-06-04 20:41:39.995] DEBUG SecurityManager user:jjuneja attempting to
log in (SSO:false)
[2021-06-04 20:41:39.995] DEBUG LDAPAuthentication user:jjuneja is
identified as an EXTERNAL User
[2021-06-04 20:41:39.995] DEBUG LDAPAuthentication performing LDAP
search....
```

```
[2021-06-04 20:41:39.995] ALL LDAPAuthenticationLDAP
port:ldap://10.15.106.18:389
[2021-06-04 20:41:39.998] DEBUG LDAPAuthentication ...search filter:
(uid=jjuneja)
[2021-06-04 20:41:39.998] DEBUG LDAPAuthentication ...selected
attributes:userPassword
[2021-06-04 20:41:39.998] DEBUG LDAPAuthentication ...search
root:dc=support,dc=com
[2021-06-04 20:41:40.0] DEBUG LDAPAuthentication entry found ->
cn=jjuneja,ou=People,dc=support,dc=com
[2021-06-04 20:41:40.0] DEBUG LDAPAuthentication ...performing password
comparison directly
[2021-06-04 20:41:40.0] DEBUG LDAPAuthentication ......performing password
comparison...
[2021-06-04 20:41:40.0] DEBUG LDAPAuthentication has performed an LDAP
authentication for user:jjuneja and the user is  Authenticated
[2021-06-04 20:41:40.0] ALL LDAPAuthentication LDAP Authentication Policy
(authentication_1) has been used by jjuneja.
[2021-06-04 20:41:40.0] DEBUG LDAPAuthentication LDAP Authentication:Enabled
[2021-06-04 20:41:40.0] DEBUG SecurityManager user:jjuneja authorization
SUCCEEDED (SSO:false)
```

2) OpenLDAP With SSL

Go back to LDAP server and generate required certificates/keys.

1. Check OpenLDAP status:

```
[root@server ~]# systemctl status slapd
```

If OpenLDAP is disabled, restart the service.

2. Verify whether openssl is installed or not. If not installed execute the below command to install openSSL.

```
[root@server openldap]# yum -y install openssl
```

3. Generate your own CA certificate. Navigate to `/etc/pki/CA/` where we will keep our `serial` and `index.txt` file to keep a track of issued certificates. Execute below commands:

```
[root@server CA]# touch index.txt
[root@server CA]# echo 01 > serial
```

4. Create private key for CA certificate.

```
```

```
[root@server CA]# openssl genrsa -out ca.key 4096
Generating RSA private key, 4096 bit long modulus
.......................++
.....................................................++
e is 65537 (0x10001)
```

5. Generate CA Certificate.

```
[root@server CA]# openssl req -new -x509 -days 365 -key ca.key -out ca.cert.pem
You are about to be asked to enter information that will be incorporated into
your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank. For some fields there
will be a default value, If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [XX]:IN
State or Province Name (full name) []:Karnataka
Locality Name (eg, city) [Default City]:Bengaluru
Organization Name (eg, company) [Default Company Ltd]:support
Organizational Unit Name (eg, section) []:.
Common Name (eg, your name or your server's hostname) []:support.com
Email Address []:.
```

6. Generate LDAP server certificate.

- Configure openssl x509 extension to create SAN certificate.
- Create `server_cert_ext.cnf` file, edit the IP address and DNS parameters accordingly.

```
[v3_ca]
basicConstraints = CA:FALSE
nsCertType = server
nsComment = "OpenSSL Generated Server Certificate"
subjectKeyIdentifier = hash
authorityKeyIdentifier = keyid,issuer:always
keyUsage = critical, digitalSignature, keyEncipherment
extendedKeyUsage = serverAuth
subjectAltName = @alt_names
[alt_names]
IP.1 = 10.15.106.18
DNS.1 = support.com
```

7. Generate private key for LDAP server certificate.

- Next, we will need another private key for the LDAP server certificate which we will name as `support.com.key`.
- Navigate to private directory.

```
[root@server CA]# cd private/
[root@server private]# openssl genrsa -out support.com.key 4096
Generating RSA private key, 4096 bit long modulus
..........................++
..............................++
e is 65537 (0x10001)
```

8. Create Certificate Signing request (CSR).

> Note: Common Name should be server's hostname.

```
[root@server private]# openssl req -new -key support.com.key -out support.com.csr
You are about to be asked to enter information that will be incorporated into
your certificate request. What you are about to enter is what is called a
Distinguished Name or a DN. There are quite a few fields but you can leave some
blank. For some fields there will be a default value, If you enter '.', the field
will be left blank.
-----
Country Name (2 letter code) [XX]:IN
State or Province Name (full name) []:Karnataka
Locality Name (eg, city) [Default City]:Bengaluru
Organization Name (eg, company) [Default Company Ltd]:support
Organizational Unit Name (eg, section) []:admin
Common Name (eg, your name or your server's hostname) []:support.com
Email Address []:.
Please enter the following 'extra' attributes to be sent with your certificate
request
A challenge password []:
An optional company name []:
```

9. Create LDAP server certificate.

```
[root@server CA]# openssl ca -keyfile ca.key -cert ca.cert.pem -in
private/support.com.csr -out private/support.com.crt -extensions v3_ca -extfile
server_cert_ext.cnf
Using configuration from /etc/pki/tls/openssl.cnf
Check that the request matches the signature
Signature ok
Certificate Details:
        Serial Number: 1 (0x1)
        Validity
            Not Before: May 23 05:31:34 2021 GMT
            Not After : May 23 05:31:34 2022 GMT
        Subject:
            countryName               = IN
            stateOrProvinceName       = Karnataka
            organizationName          = support
            organizationalUnitName    = admin
            commonName                = support.com
        X509v3 extensions:
```

```
            X509v3 Basic Constraints:
                CA:FALSE
            Netscape Cert Type:
                SSL Server
            Netscape Comment:
                OpenSSL Generated Server Certificate
            X509v3 Subject Key Identifier:
                F6:23:8B:91:7A:D7:B2:62:E7:7A:DE:7A:B9:CC:A4:40:BB:8A:62:AE
            X509v3 Authority Key Identifier:
                keyid:DE:9F:4A:10:69:99:38:43:7A:46:AF:DE:E3:9F:F6:DE:21:48:A6:43
                DirName:/C=IN/ST=Karnataka/L=Bengaluru/O=support/CN=support.com
                serial:B5:8A:4C:1E:5D:11:7D:77
            X509v3 Key Usage: critical
                Digital Signature, Key Encipherment
            X509v3 Extended Key Usage:
                TLS Web Server Authentication
            X509v3 Subject Alternative Name:
                IP Address:10.15.106.18, DNS:support.com
Certificate is to be certified until May 23 05:31:34 2022 GMT (365 days)
Sign the certificate? [y/n]:y
1 out of 1 certificate requests certified, commit? [y/n]y
Write out database with 1 new entries
Data Base Updated
```

10. Verify the update values in `index.txt` and verify the issued certificate against our CA.

```
[root@server CA]# cat index.txt
V       220523053134Z           01      unknown
/C=IN/ST=Karnataka/O=support/OU=admin/CN=support.com
[root@server CA]# openssl verify -CAfile ca.cert.pem private/support.com.crt
private/support.com.crt: OK
```

11. Next check the content of your ldap server certificate to make sure it contains the list of `IP` and `DNS` which we provided earlier.

```
[root@server CA]# openssl x509  -noout -text -in private/support.com.crt  | grep
-A 1 "Subject Alternative Name"
            X509v3 Subject Alternative Name:
                IP Address:10.15.106.18, DNS:support.com
```

12. Configure LDAP server certificate using `TLS`. Now, we will copy both the certificate and the key file to `/etc/openldap/certs/`. We also copy the CA certificate to `/etc/openldap/cacerts/`. Later, we'll have to modify the openldap configuration accordingly.

```
[root@server CA]# cp -v private/support.com.crt private/support.com.key
/etc/openldap/certs/
‘private/support.com.crt’ -> ‘/etc/openldap/certs/support.com.crt’
```

```
‘private/support.com.key’ -> ‘/etc/openldap/certs/support.com.key’
[root@server CA]# cp -v ca.cert.pem /etc/openldap/cacerts/
‘ca.cert.pem’ -> ‘/etc/openldap/cacerts/ ca.cert.pem’
```

13. Now, we need to modify the values of the olcTLSCertificateFile and olcTLSCertificateKeyFile attributes.

- We will create the `tlsfile.ldif` with the following contents:

```
dn: cn=config
changetype: modify
replace: olcTLSCertificateFile
olcTLSCertificateFile: /etc/openldap/certs/support.com.crt

replace: olcTLSCertificateKeyFile
olcTLSCertificateKeyFile: /etc/openldap/certs/support.com.key
```

- Now, change the ownership of `/etc/openldap/certs` and `/etc/openldap/cacerts` directories.
- Run the `ldapmodify` command with this LDIF file.

```
[root@server CA]# vim tlsfile.ldif
[root@server CA]# chown -R ldap:ldap /etc/openldap/certs
[root@server CA]# chown -R ldap:ldap /etc/openldap/cacerts
[root@server CA]# ldapmodify -Y EXTERNAL -H ldapi:// -f tlsfile.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
modifying entry "cn=config"
```

14. Run the ldapmodify command with this LDIF file.

```
[root@server CA]# vim tlsfile1.ldif
[root@server CA]# ldapmodify -Y EXTERNAL -H ldapi:// -f tlsfile1.ldif
SASL/EXTERNAL authentication started
SASL username: gidNumber=0+uidNumber=0,cn=peercred,cn=external,cn=auth
SASL SSF: 0
modifying entry "cn=config"
```

15. You can validate the new values using `slapchat`.

```
[root@server CA]# slapcat -b "cn=config" | egrep "olcTLSCertificateFile|olc
TLSCertificateKeyFile|olcTLSCACertificateFile"
olcTLSCertificateFile: /etc/openldap/certs/support.com.crt
olcTLSCertificateKeyFile: /etc/openldap/certs/support.com.key
olcTLSCACertificateFile: /etc/openldap/cacerts/ca.cert.pem
```

16. Enable TLS in LDAP configuration file.

    1. Now we will edit the `/etc/sysconfig/slapd` file to add `ldaps:///` to the `SLAPD_URLS` parameter.

```
SLAPD_URLS="ldapi:/// ldap:/// ldaps:///"
```

    2. Change the below in `/etc/openldap/ldap.conf`.

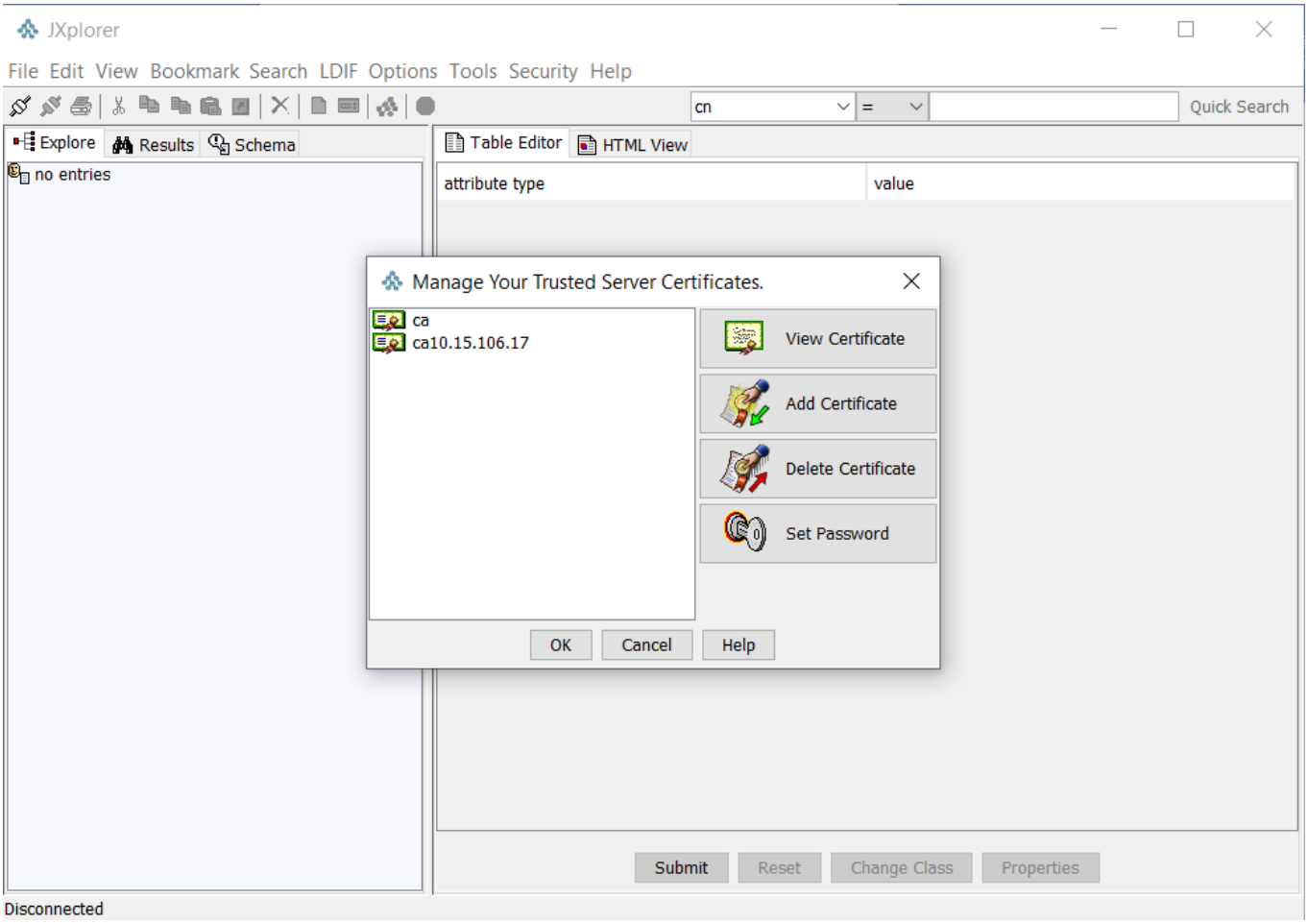
```
TLS_CACERTDIR /etc/openldap/certs
TLS_CACERT /etc/openldap/cacerts/ca.cert.pem
TLS_REQCERT allow
```

17. Restart the LDAP service.

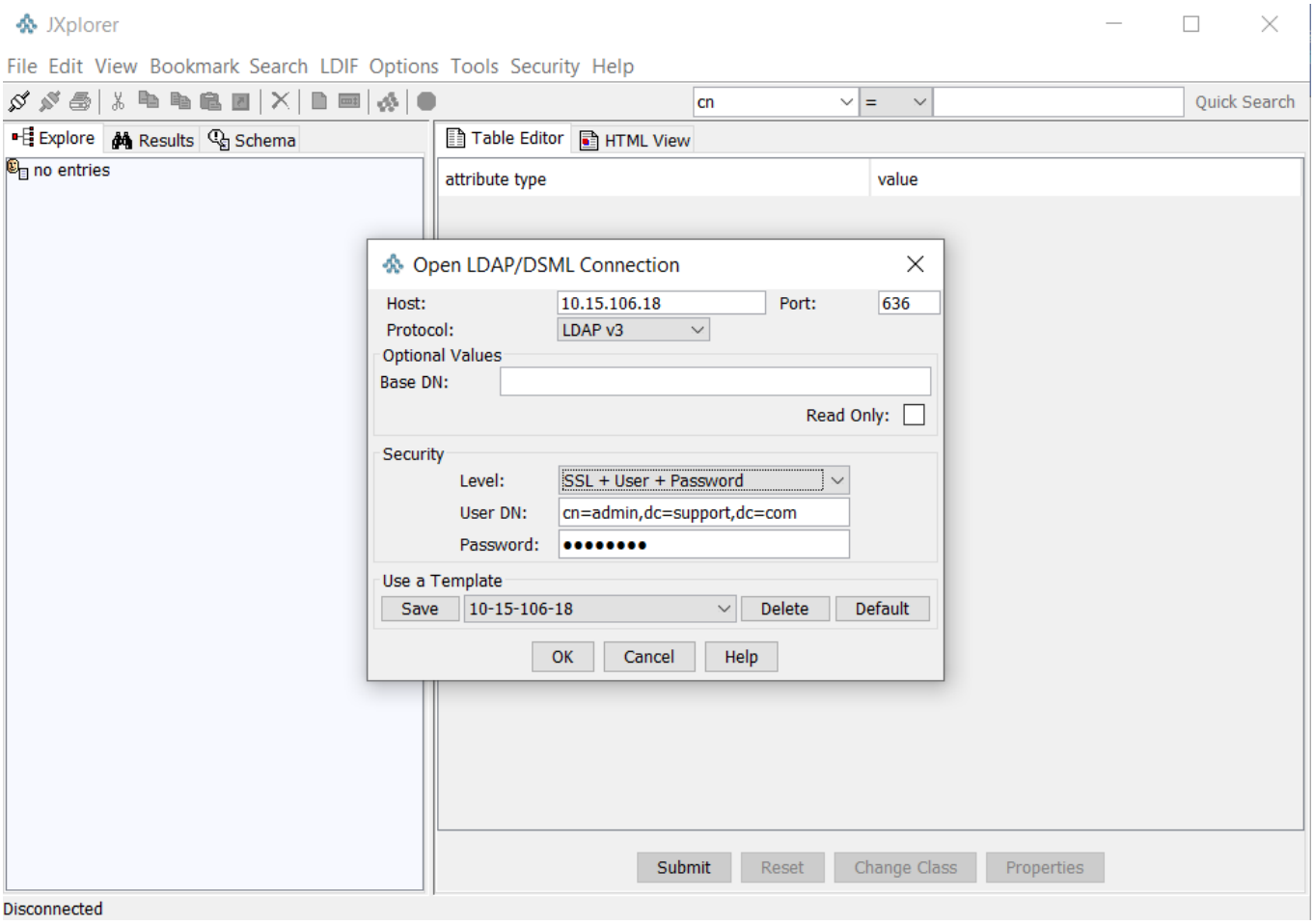
```
[root@server ~]# systemctl restart slapd
```

18. Now, Login to JXplorer LDAP client application to interact with the OpenLDAP server.

- Download the CA certificate `ca.cert.pem` to the local machine.
- Add CA certificate into JXplorer LDAP client application (Go to `security -> Trusted Servers and CAs`).
- While adding CA, it will ask for the password and default password is `changeit`.



19. Now Connect to LDAP server.



After login, You can create new user/group as per the requirement.

20. Enable SSL for the connection to the OpenLDAP server in Sterling Integrator.

- Copy the `ca.cert.pem` to the local machine.
- To create and check in the truststore, navigate to `<SIInstallDirectory>/jdk/bin` directory and execute below command:

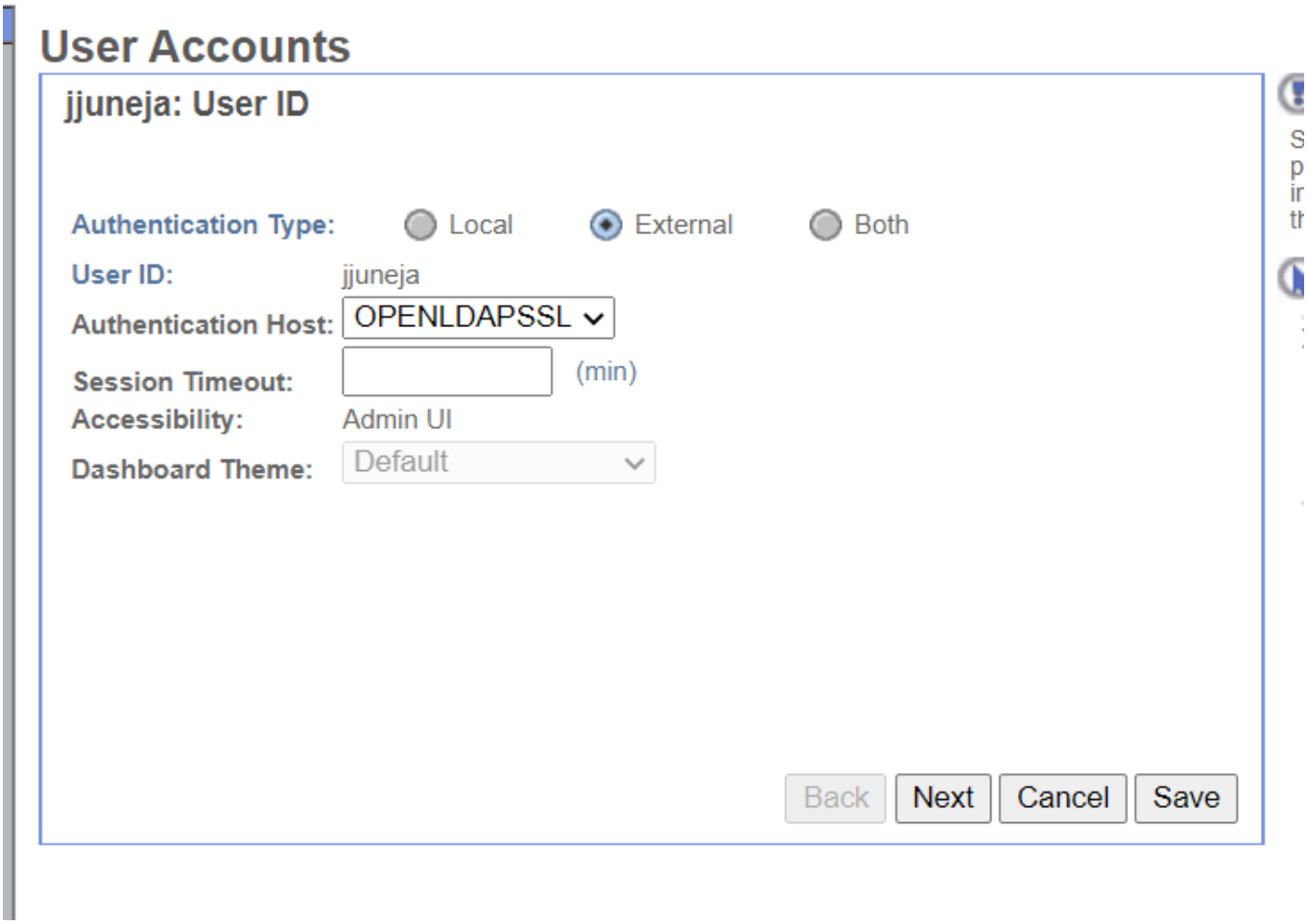
```
[root@server bin]# ./keytool -import -file /root/directory/ca.cert.pem -keystore
/root/directory/test.jks
```

21. Edit the customer_overrides.properties.

```
authentication_policy.authentication_2.className=com.sterlingcommerce.woodst
ock.security.LDAPAuthentication
authentication_policy.authentication_2.display_name=OPENLDAPSSL
authentication_policy.authentication_2.enabled=true
authentication_policy.authentication_2.jndi_factory=com.sun.jndi.ldap.LdapCt
xFactory
authentication_policy.authentication_2.server=10.15.106.18
authentication_policy.authentication_2.port=636
authentication_policy.authentication_2.security_type=simple
authentication_policy.authentication_2.principle=cn=admin,dc=support,dc=com
authentication_policy.authentication_2.credentials=password
authentication_policy.authentication_2.password_attribute=userPassword
authentication_policy.authentication_2.search_root=dc=support,dc=com
authentication_policy.authentication_2.search_filter=(uid=<userid>)
authentication_policy.authentication_2.with_user_bind=false
authentication_policy.authentication_2.security_protocol=ssl
authentication_policy.LDAP_SECURITY_TRUSTSTORE=/root/directory/test.jks
authentication_policy.LDAP_SECURITY_TRUSTSTORE_PASSWORD=password
```

Restart the SI.

22. Login to Dashboard and edit/create new user account as per the requirement.



23. Login to dashboard using external credentials and In case the configuration was not successful, you can check the `authentication.log` in debug mode for troubleshooting.

```
[2021-06-04 20:51:58.538] DEBUG SecurityManager user:jjuneja attempting to
log in (SSO:false)
[2021-06-04 20:51:58.538] DEBUG LDAPAuthentication user:jjuneja is
identified as an EXTERNAL User
[2021-06-04 20:51:58.538] DEBUG LDAPAuthentication performing LDAP
search....
[2021-06-04 20:51:58.538] ALL LDAPAuthenticationLDAP
port:ldap://10.15.106.18:636
[2021-06-04 20:51:58.586] DEBUG LDAPAuthentication ...search filter:
(uid=jjuneja)
[2021-06-04 20:51:58.586] DEBUG LDAPAuthentication ...selected
attributes:userPassword
[2021-06-04 20:51:58.586] DEBUG LDAPAuthentication ...search
root:dc=support,dc=com
[2021-06-04 20:51:58.588] DEBUG LDAPAuthentication entry found ->
cn=jjuneja,ou=People,dc=support,dc=com
[2021-06-04 20:51:58.588] DEBUG LDAPAuthentication ...performing password
comparison directly
[2021-06-04 20:51:58.588] DEBUG LDAPAuthentication ......performing password
comparison...
[2021-06-04 20:51:58.588] DEBUG LDAPAuthentication has performed an LDAP
authentication for user:jjuneja and the user is  Authenticated
[2021-06-04 20:51:58.588] ALL LDAPAuthentication LDAP Authentication Policy
```

```
(authentication_2) has been used by jjuneja.
[2021-06-04 20:51:58.588] DEBUG LDAPAuthentication LDAP
Authentication:Enabled
[2021-06-04 20:51:58.588] DEBUG SecurityManager user:jjuneja authorization
SUCCEEDED (SSO:false)
```

References:

1. Configure LDAP with Sterling B2B Integrator
2. Configuring user authentication against a LDAP Server in IBM Sterling B2B Integrator
3. How to Install LDAP on CentOS 7
4. Simple steps to configure LDAPS with TLS certificates CentOS 7 Linux