


# Migrate to SAML from LDAP through the REST API

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Secure, single sign-on (SSO) authentication to the Command and Discover appliances is easy to configure. However, if you have configured your ExtraHop system for remote authentication through LDAP, TACACS+, or RADIUS, changing to SAML permanently deletes all existing remote users and their customizations, such as saved dashboards, activity maps, reports (for Command appliances), and record queries (for Explore appliances).

This guide provides a series of example scripts that show you how to safely migrate user customizations from remote users to SAML through the REST API. For each script, you must replace the script variables with information about your environment.

 **Important:** Customizations must be saved from the appliance where remote users have created them. For example, if a remote user has a critical dashboard on a Command appliance and a Discover appliance, you must complete these procedures on both appliances for that remote user.

If you prefer to engage a turn-key solution for migration, contact your ExtraHop sales representative.

## Procedure overview

Migrating to a new remote authentication method is a complex process. Be sure you understand all of the steps before you begin and be sure to schedule a maintenance window to avoid disrupting users.

### Before you begin

1. [Enable exception files on your Discover and Command appliances](#). If the ExtraHop system unexpectedly stops or restarts during the migration process, the exception file is written to disk. The exception file can help ExtraHop Support diagnose the issue that caused the failure.
2. [Create a backup of your Discover and Command appliances](#). Backup files include all users, customizations, and shared settings. Download and store the backup file off-appliance to a local machine.

Because changing the remote authentication method on the system effectively deletes all remote users, you must create SAML users on the system before you delete remote users. You can then transfer customizations owned by remote users to the SAML users as you delete the remote users.

Here is an explanation of each step:

1. [Retrieve sharing metadata](#) for customizations created by remote users.
2. (Optional for systems with a configured recordstore) [Save record queries](#) created by remote users to the setup user account.
3. Retrieve [remote users](#) and [user groups](#).
4. [Configure SAML](#) on the system. (All remote users and user groups are deleted.)
5. [Create SAML user accounts](#) for each remote user that was deleted. After the system is configured for SAML, you can create a remote account for your users before they log in to the ExtraHop system for the first time.
6. [Recreate local user groups](#) that were deleted.
7. [Delete remote user accounts](#) and [transfer customization sharing settings](#) from the remote user accounts to the new SAML user accounts. When your SAML users log in for the first time, their customizations will be available.

## Retrieve sharing metadata for remote user customizations

The following Python script retrieves a list of remote user customizations and associated sharing metadata and saves the information in JSON files. Run the script once for each type of customization after replacing the variables with information from your environment.

### Environmental variables

The following variables enable the script to communicate with an appliance:

#### HOST

The IP address or hostname of the Discover or Command appliance.

#### APIKEY

The [API key](#) generated from the Discover or Command appliance.

### Customization variables

The following variables specify a customization type. You must replace these variables each time that you run the script. For example, to retrieve dashboard metadata, specify `OBJECT_TYPE=dashboards` and `OBJECT_FILE=dashboards.json`:

#### OBJECT\_TYPE

The type of customization metadata to retrieve. The following values are valid:

- dashboards
- activitymaps

#### OUTPUT\_FILE

The name of the JSON file to save customization metadata in. Keep these files on your machine to input into scripts later in the migration.

- dashboards.json
- activity\_maps.json

```
#!/usr/bin/python3

import json
import requests

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'
OBJECT_TYPE = 'dashboards'
OUTPUT_FILE = 'dashboards.json'

headers = {'Authorization': 'ExtraHop apikey=%s' % API_KEY}

# Function that retrieves metadata for every object
def getObjects():
    url = HOST + '/api/v1/' + OBJECT_TYPE
    r = requests.get(url, headers=headers, verify=False)
    return r.json()

# Function that retrieves sharing settings for a specified object ID
def getSharing(object_id):
    url = HOST + '/api/v1/' + OBJECT_TYPE + '/' + str(object_id) + '/sharing'
    r = requests.get(url, headers=headers, verify=False)
    if r.status_code == 200:
        return r.json()
    else:
```

```

        print('Unable to retrieve sharing information for object ID ' +
              str(object_id))
        print(r.status_code)
        print(r.text)
        return None

eh_objects = getObject()
for eh_object in eh_objects:
    object_id = eh_object['id']
    eh_object['sharing'] = getSharing(object_id)

with open(OUTPUT_FILE, 'w') as outfile:
    json.dump(eh_objects, outfile)

```



**Note:** If the script returns an error message that the SSL certificate verification failed, make sure that [a trusted certificate has been added to your ExtraHop system](#). Alternatively, you can add the `verify=False` option to bypass certificate verification. However, this method is not secure and is not recommended. The following code sends an HTTP GET request without certificate verification:

```
requests.get(url, headers=headers, verify=False)
```

## (Explore appliance only) Save record queries

In the following steps, you will learn how to preserve record queries saved by a remote user.

Because saved queries can be accessed by all system users, you can export all saved queries to a bundle and then upload them after migrating to SAML. Imported record queries are assigned to the user that uploads the bundle. (For example, if you import queries from a bundle while logged in as the setup user, all of the queries list setup as the query owner.) After migration, remote users can view the saved record queries and save a copy for themselves.

1. Log in to the ExtraHop system through `https://<extrahop-hostname-or-IP-address>` with the `setup` user account.
2. Click the System Settings icon and then select **Bundles**.
3. From the Bundles page, select **New**.
4. Type a name to identify the bundle.
5. Click the arrow next to Queries in the Contents table and select the checkboxes next to the saved queries you want to export.
6. Click **OK**. The bundle appears in the table on the Bundles page.
7. Select the bundle and click **Download**. The queries are saved to a JSON file.

### Next steps

After migration, [upload the bundle](#) to restore the saved record queries.

## Retrieve remote users

The following Python script retrieves a list of remote users and their associated metadata and then saves the information in a JSON file named `user_map.json`. Replace the variables with information from your environment before you run the script.

### Environment variables


The following variables enable the script to communicate with an appliance:

## HOST

The IP address or hostname of the Discover or Command appliance.

## APIKEY

The API key [generated](#) from the Discover or Command appliance.

-  **Important:** If an appliance includes duplicate LDAP user account names, the script will fail and list the duplicate names in the output. LDAP user account names are case sensitive, but SAML user account names are not. You must rename duplicate LDAP user account names before migrating them. For example, if you have LDAP user names `user_1` and `User_1`, you must rename one of those accounts before migrating to SAML.

```
#!/usr/bin/python3

import json
import requests
import sys

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'
OUTPUT_FILE = 'user_map.json'

headers = {'Authorization': 'ExtraHop apikey=%s' % API_KEY}

# Function that retrieves metadata for every user group
def getUsers():
    url = HOST + '/api/v1/users'
    r = requests.get(url, headers=headers)
    return r.json()

# Function that checks for duplicate usernames
def checkDuplicatess(u_list):
    checked = []
    duplicates = set()
    for user in u_list:
        for c in checked:
            if user.lower() == c.lower():
                duplicates.add(user)
                duplicates.add(c)
        checked.append(user)
    s = sorted(duplicates, key=str.lower)
    return s

users = getUsers()
user_map = []
u_list = []
for user in users:
    if user['type'] != 'local':
        user['remote_username'] = user['username']
        user_map.append(user)
        u_list.append(user['username'])

duplicates = checkDuplicatess(u_list)
if duplicates:
    print(Error: The following duplicate remote usernames were found:')
    for user in duplicates:
        print('    ' + user)
    print('Local and SAML user accounts cannot share usernames, regardless
of case. Rename or delete duplicates before continuing.')
    sys.exit()

with open(OUTPUT_FILE, 'w') as outfile:
```

```
json.dump(user_map, outfile)
```

## Retrieve local user groups

The following Python script retrieves a list of local user groups and members and then saves the information in a JSON file named `user_groups.json`. Replace the variables with information from your environment before you run the script.

### Environment variables

The following variables enable the script to communicate with an appliance:

#### HOST

The IP address or hostname of the Discover or Command appliance.

#### APIKEY

The [API key](#) generated from the Discover or Command appliance.

```
#!/usr/bin/python3

import json
import requests

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'

OUTPUT_FILE = 'user_groups.json'
headers = {'Authorization': 'ExtraHop apikey=%s' % API_KEY}

# Function that retrieves metadata for every user group
def getGroups():
    url = HOST + '/api/v1/usergroups'
    r = requests.get(url, headers=headers)
    return r.json()

# Function that retrieves members of the specified group
def getMembers(group_id):
    url = HOST + '/api/v1/usergroups/' + str(group_id) + '/members'
    r = requests.get(url, headers=headers)
    if r.status_code == 200:
        return r.json()
    else:
        print('Unable to retrieve members of group ' + str(group_id))
        print(r.status_code)
        print(r.text)
        return None

groups = getGroups()
final_groups = []
for group in groups:
    if not group['is_remote']:
        group_id = group['id']
        group['members'] = getMembers(group_id)
        final_groups.append(group)

with open(OUTPUT_FILE, 'w') as outfile:
    json.dump(final_groups, outfile)
```


## Configure SAML on the appliance

Depending on your environment, [configure SAML](#). Guides are available for both [Okta](#) and [Google](#). After you configure SAML on your ExtraHop system, you are able to create accounts on the appliance for your remote users, and transfer their customizations before they log in for the first time.

## Create SAML user accounts

The following Python script creates SAML user accounts for each deleted remote user account on an appliance.

The script must be located in the same directory as the `user_map.json` file that contains [the list of remote users](#). Replace the variables with information from your environment before you run the script.

 **Note:** Verify the required format for usernames that are entered in the Login ID field with the administrator of your Identity Provider. If the usernames do not match, the remote user will not be matched to the user created on the appliance.

### Environment variables


The following variables enable the script to communicate with an appliance:

#### HOST

The IP address or hostname of the Discover or Command appliance.

#### APIKEY

The [API key](#) generated from the Discover or Command appliance.

 **Note:** The script generates SAML usernames through the `generateName()` method. By default, the script creates new usernames by appending `@example.com` to the end of the remote username. You must configure the method to generate usernames according to your SAML user account naming standard. Verify how to format usernames with the administrator of your Identity Provider.

You can also specify SAML usernames in a CSV file. To configure the script to retrieve usernames from a CSV file, set the `READ_CSV_FILE` variable in the script to `True`. The CSV file must meet the following requirements:

- The CSV file must not contain a header row.
- Each row of the CSV file must contain the following two columns in the specified order:

ExtraHop username	SAML username
-------------------	---------------

- The CSV file must be named `remote_to_saml.csv` and be located in the same directory as the Python script.

```
#!/usr/bin/python3

import json
import requests
import csv
import sys

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'

USER_FILE = 'user_map.json'
READ_CSV_FILE = False
```

```

CSV_FILE = 'remote_to_saml.csv'

csv_mapping = {}
if READ_CSV_FILE:
    with open(CSV_FILE, 'rt', encoding='ascii') as f:
        reader = csv.reader(f)
        for row in reader:
            csv_mapping[row.pop()] = row.pop()

# Function that generates the name of the new user
# from the name of the user being copied
def generateName(name):
    if csv_mapping:
        if name in csv_mapping:
            return csv_mapping[name]
        else:
            print('Error: Specified user ' + name + ' not found in ' +
                  CSV_FILE)
            sys.exit()
    else:
        return name + '@extrahop.com'

# Function that creates a SAML account for the specified user
def createUser(new_name, user):
    url = HOST + '/api/v1/users'
    headers = {'Content-Type': 'application/json',
               'Accept': 'application/json',
               'Authorization': 'ExtraHop apikey=%s' % API_KEY}
    user_params = {'username': new_name,
                   'enabled': user['enabled'],
                   'name': user['name'],
                   'type': 'remote'}
    r = requests.post(url, headers=headers, data=json.dumps(user_params))
    return r

with open(USER_FILE) as json_file:
    user_map = json.load(json_file)

failed = []
for user in user_map:
    username = user['remote_username']
    new_name = generateName(username)
    r = createUser(new_name, user)
    if r.status_code == 201:
        user['saml_username'] = new_name
        print('Successfully created new user account for ' + username + ': '
              + new_name)
    else:
        failed.append([username, r.status_code, r.text])

if failed:
    print('')
    print('Failed to create duplicate local user accounts for the following
    users:')
    for error in failed:
        print('')
        for message in error:
            print(message)

with open(USER_FILE, 'w') as outfile:
    json.dump(user_map, outfile)

```

## Recreate local user groups

The following Python script restores membership for SAML users to local user groups.

The script must be located in the same directory as the `user_map.json` file that contains [the list of remote users](#) and the `user_groups.json` file that contains [the list of user groups](#). Replace the variables with information from your environment before you run the script.

### Environment variables

The following variables enable the script to communicate with an appliance:

#### HOST

The IP address or hostname of the Discover or Command appliance.

#### APIKEY

The [API key](#) generated from the Discover or Command appliance.

```
#!/usr/bin/python3

import json
import requests

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'

USER_MAP_FILE = 'user_map.json'
GROUPS_FILE = 'user_groups.json'
# Function that updates membership in a user group
def updateMembers(group, members):
    url = HOST + '/api/v1/usergroups/' + group['id'] + '/members'
    headers = {'Content-Type': 'application/json',
               'Accept': 'application/json',
               'Authorization': 'ExtraHop apikey=%s' % API_KEY}
    r = requests.put(url, headers=headers, data=json.dumps(members))
    if r.status_code == 204:
        return 'success'
    else:
        return r.json

# Function that updates group member object by replacing old remote
# usernames
# with new SAML usernames
def getSamlNames(members, user_map, remote_users):
    users = members['users']
    for user in users:
        if user in remote_users:
            userIndex = remote_users.index(user)
            saml_name = user_map[userIndex]['saml_username']
            members['users'][saml_name] = members['users'].pop(user)
    return members

# Create a list of deleted remote users
remote_users = []
with open(USER_MAP_FILE) as json_file:
    user_map = json.load(json_file)
    for user in user_map:
        remote_users.append(user['remote_username'])

with open(GROUPS_FILE) as json_file:
    groups = json.load(json_file)
```



```

# Create list of local groups with remote users
to_do = []
for group in groups:
    try:
        members = group['members']['users']
        for member in members:
            if member in remote_users:
                to_do.append(group)
                break
    except:
        continue
groups = to_do

# Update group membership
success = []
fail = []
for group in groups:
    members = group['members']
    updated = updateMembers(group, members['users'])
    if updated == 'success':
        success.append({'group': group,
                       'users': members['users']})
    else:
        fail.append([group, updated])

# Print out results of script
if success:
    print('Successfully updated membership of the following groups:')
    for update in success:
        print(update['group']['name'])
        print('    Members:')
        for user in update['users']:
            print('        ' + user)
        print('')

if fail:
    print('Failed to update ownership of the following groups:')
    for failure in fail:
        print('    ' + failure[0]['name'])
        print('    ' + str(failure[1]))
        print('')

if success:
    with open(GROUPS_FILE, 'w') as outfile:
        json.dump(groups, outfile)

```

## Delete remote user accounts

The following Python script deletes remote user accounts and transfers the customizations owned by those user accounts to SAML user accounts.

The script must be located in the same directory as the `user_map.json` file that contains [the list of remote users](#). Replace the variables with information from your environment before you run the script.

### Environment variables

The following variables enable the script to communicate with an appliance:

## HOST

The IP address or hostname of the Discover or Command appliance.

## APIKEY

The API key [generated](#) from the Discover or Command appliance.

```
#!/usr/bin/python3

import json
import requests

HOST = 'https://extrahop.example.com'
API_KEY = '123456789abcdefghijklmnop'

USER_MAP_FILE = 'user_map.json'
# Function that deletes a user
def deleteUser(remote_user, saml_user):
    url = HOST + '/api/v1/users/' + remote_user + '?dest_user=' + saml_user
    headers = {'Authorization': 'ExtraHop apikey=%s' % API_KEY}
    r = requests.delete(url, headers=headers)
    if r.status_code == 204:
        return 'success'
    else:
        return r.json()

# Create a list of remote users
remote_users = {}
with open(USER_MAP_FILE) as json_file:
    user_map = json.load(json_file)
    for user in user_map:
        remote_users[user['remote_username']] = user['saml_username']

# Delete remote user accounts
success = []
fail = []
for user in remote_users:
    updated = deleteUser(user, remote_users[user])
    if updated == 'success':
        success.append(user)
    else:
        fail.append([user, updated])

# Print out results of script
if success:
    print('Successfully deleted the following remote user accounts:')
    for update in success:
        print('    ' + update)

if fail:
    print('Failed to delete the following remote user accounts:')
    for failure in fail:
        print('    ' + failure[0])
        print('    ' + str(failure[1]))
    print('')
```

## Transfer customization sharing settings to SAML user accounts

The following Python script transfers customization sharing settings from deleted remote user accounts to SAML user accounts. Run the script once for each type of customization after replacing the variables with

information from your environment. For example, if you want to preserve shared settings for dashboards and activity maps, you will run the script once with the customization variables for dashboards and once with the customization variables for activity maps.

### Environment variables

The following variables enable the script to communicate with an appliance:

#### HOST

The IP address or hostname of the Discover or Command appliance.

#### APIKEY

The [API key](#) generated from the Discover or Command appliance.

### Customization variables

The following variables specify a customization type. You must replace these variables each time that you run the script. For example, to transfer dashboards ownership, specify `OBJECT_TYPE=dashboards` and `OBJECT_FILE=dashboards.json`:

#### OBJECT\_TYPE

The type of customization to transfer. The following values are valid:

- dashboards
- activitymaps
- reports

#### OBJECT\_FILE

The name of the JSON file that includes the [customization metadata](#). These files must be located in the same directory as the Python script along with the `user_map.json` file that contains [the list of remote users](#) and the `user_groups.json` file that contains [the list of user groups](#). The following values are valid:

- dashboards.json
- activity\_maps.json
- reports.json

```
#!/usr/bin/python3

import json
import requests
import sys

HOST = 'https://extrahop.example.com'
API_KEY = 'ac09e68cf6b5499697fe93d3930e41ed'
OBJECT_TYPE = 'dashboards'
OBJECT_FILE = 'dashboards.json'

USER_MAP_FILE = 'user_map.json'
# Function that checks to see if the specified object was shared with
# deleted users and if so, returns a sharing dictionary
# with the saml usernames
def sharedWithRemote(eh_object, remote_users, user_map):
    sharing = eh_object['sharing']
    updated = {'users': {}}
    if sharing != None:
        users_shared = sharing['users']
        for user in users_shared:
            if user in remote_users:
                user_index = remote_users.index(user)
                saml_name = user_map[user_index]['saml_username']
```

```

        updated['users'][saml_name] = sharing['users'][user]
    if updated['users']:
        return updated
    else:
        return None

# Function that updates sharing options for a specified object
def updateSharing(eh_object, remoteShares):
    url = HOST + '/api/v1/' + OBJECT_TYPE + '/' + str(eh_object['id']) + '/
sharing'
    headers = {'Content-Type': 'application/json',
               'Accept': 'application/json',
               'Authorization': 'ExtraHop apikey=%s' % API_KEY}
    r = requests.patch(url, headers=headers, data=json.dumps(remoteShares))
    if r.status_code == 204:
        return 'success'
    else:
        return r.json()

# Create a list of deleted remote users
remote_users = []
with open(USER_MAP_FILE) as json_file:
    user_map = json.load(json_file)
    for user in user_map:
        remote_users.append(user['remote_username'])

# Extract object metadata from JSON file
with open(OBJECT_FILE) as json_file:
    eh_objects = json.load(json_file)

success = []
fail = []
# Restore sharing options for deleted remote users
for eh_object in eh_objects:
    remoteShares = sharedWithRemote(eh_object, remote_users, user_map)
    if remoteShares:
        updated = updateSharing(eh_object, remoteShares)
        if updated == 'success':
            success.append({'eh_object': eh_object,
                           'remoteShares': remoteShares})
        else:
            fail.append([eh_object, updated])

# Print out results of script
if success:
    print('Successfully updated sharing options the following ' +
OBJECT_TYPE + ':')
    for update in success:
        print(update['eh_object']['name'])
        print(update['remoteShares'])
        print('')

if fail:
    print('Failed to update ownership of the following ' + OBJECT_TYPE +
':')
    for failure in fail:
        print('    ' + failure[0]['name'])
        print('    ' + str(failure[1]))
        print('')

```