Red Hat OpenStack Platform 13

Integrate with Identity Service

Use Active Directory or Red Hat Identity Management as an external authentication back end

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OpenStack Team
rhos-docs@redhat.com

Abstract

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MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see our CTO Chris Wright's message .

Identity service

Identity Service (codename *keystone*) provides authentication and authorization for Red Hat OpenStack Platform 13.

This guide describes how to integrate Identity Service with Microsoft Active Directory Domain Service (AD DS), Red Hat Identity Management (IdM), and LDAP.

CHAPTER 1. ACTIVE DIRECTORY INTEGRATION

This chapter describes how to integrate Identity Service (keystone) with Active Directory Domain Services. In this use case, Identity Service authenticates certain Active Directory Domain Services (AD DS) users, while retaining authorization settings and critical service accounts in the Identity Service database. As a result, Identity Service has read-only access to AD DS for user account authentication, while retaining management over the privileges assigned to authenticated accounts.

NOTE

If you are using director, see Chapter 4, *Using domain-specific LDAP backends with director*. This is because the configuration files referenced below are managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process.

1.1. KEY TERMS

- *Authentication* - The process of using a password to verify that the user is who they claim to be.
- *Authorization* - Validating that authenticated users have proper permissions to the resources they are attempting to access.
- *Domain* - This term is not the same as an AD DS domain, and instead refers to the additional namespaces that are configured in Identity Service for partitioning users, groups, and projects. These separate domains can be configured to authenticate users in different LDAP or AD DS environments.

1.2. ASSUMPTIONS

This example deployment makes the following assumptions:

- Active Directory Domain Services is configured and operational.
- Red Hat OpenStack Platform is configured and operational.
- DNS name resolution is fully functional and all hosts are registered appropriately.
- AD DS authentication traffic is encrypted with LDAPS, using port 636.

1.3. IMPACT STATEMENT

These steps allow AD DS users to authenticate to OpenStack and access resources. OpenStack service accounts (such as keystone and glance), and authorization management (permissions, roles, projects) will remain in the Identity Service database. Permissions and roles are assigned to the AD DS accounts using Identity Service management tools.

1.3.1. High Availability options

This configuration creates a dependency on the availability of a single Active Directory Domain Controller; Project users will be affected if Identity Service is unable to authenticate to the AD Domain Controller. A number of options are available to manage this risk; for example, you might configure Identity Service to query a DNS alias or a load balancing appliance, rather than an individual AD Domain Controller. You can also configure keystone to query a different Domain Controller, should one become unavailable.

1.3.2. Outage requirements

- The Identity Service will need to be restarted to add the AD DS back end.
- The Compute services on all nodes will need to be restarted in order to switch over to keystone v3.
- Users will be unable to access the dashboard until their accounts have been created in AD DS. To reduce downtime, consider pre-staging the AD DS accounts well in advance of this change.

1.3.3. Firewall configuration

If firewalls are filtering traffic between AD DS and OpenStack, you will need to allow access through the following port:

Source	Destination	Type	Port
OpenStack Controller Node	Active Directory Domain Controller	LDAPS	TCP 636

1.4. CONFIGURE ACTIVE DIRECTORY DOMAIN SERVICES

This section describes the tasks that Active Directory administrators will need to complete:

Table 1.1. Configuration steps

Task	Details
Create a service account.	This can be named according to your naming convention for service accounts, for example: **svc-ldap**. This can be a regular domain user account. Administrator privileges are not required.
Create a user group.	If a user needs access to OpenStack, they must be a member of this group. This can be named according to your naming convention for user groups, for example: **grp-openstack**. Members of this group can be granted access to *Projects* in the dashboard, if they are also members of the Project groups.
Create the Project groups.	Each OpenStack Project will require a corresponding AD group. For example, **grp-openstack-demo** and **grp-openstack-admin** .
Configure the service account.	The service account **svc-ldap** must be a member of the **grp-openstack** group.
Export the LDAPS public key.	Export the public key (not the private key) in the following format: **DER-encoded x509 .cer** file.

Send the key to the OpenStack administrators.	The OpenStack administrators will use this key to encrypt LDAPS communications between OpenStack and Active Directory.
Retrieve the NetBIOS name of your AD DS domain.	The OpenStack administrators will use this name for the Keystone domain, allowing consistent domain naming between the environments.

For example, the procedure below shows the PowerShell commands that would be run on the Active Directory Domain Controller:

1. Create the LDAP lookup account. This account is used by Identity Service to query the AD DS LDAP service:

```
PS C:\> New-ADUser -SamAccountName svc-ldap -Name "svc-ldap" -GivenName LDAP -
Surname Lookups -UserPrincipalName svc-ldap@lab.local  -Enabled $false -
PasswordNeverExpires $true -Path 'OU=labUsers,DC=lab,DC=local'
```

2. Set a password for this account, and then enable it. You will be prompted to specify a password that complies with your AD domain's complexity requirements:

```
PS C:\> Set-ADAccountPassword svc-ldap -PassThru | Enable-ADAccount
```

3. Create a group for OpenStack users, called **grp-openstack**.

```
PS C:\> NEW-ADGroup -name "grp-openstack" -groupscope Global -path
"OU=labUsers,DC=lab,DC=local"
```

4. Create the Project groups:

```
PS C:\> NEW-ADGroup -name "grp-openstack-demo" -groupscope Global -path
"OU=labUsers,DC=lab,DC=local"
PS C:\> NEW-ADGroup -name "grp-openstack-admin" -groupscope Global -path
"OU=labUsers,DC=lab,DC=local"
```

5. Add the **svc-ldap** user to the **grp-openstack** group:

```
PS C:\> ADD-ADGroupMember "grp-openstack" -members "svc-ldap"
```

6. From an AD Domain Controller, use a **Certificates MMC** to export your LDAPS certificate's public key (not the private key) as a DER-encoded **x509** .cer file. Send this file to the OpenStack administrators.

7. Retrieve the NetBIOS name of your AD DS domain.

```
PS C:\> Get-ADDomain | select NetBIOSName
NetBIOSName
-----------
LAB
```

Send this value to the OpenStack administrators.

1.5. CONFIGURE THE LDAPS CERTIFICATE

NOTE

When using multiple domains for LDAP authentication, you might receive various errors, such as **Unable to retrieve authorized projects**, or **Peer's Certificate issuer is not recognized**. This can arise if keystone uses the incorrect certificate for a certain domain. As a workaround, merge all of the LDAPS public keys into a single **.crt** bundle, and configure all of your keystone domains to use this file.

Keystone uses LDAPS queries to validate user accounts. To encrypt this traffic, keystone uses the certificate file defined by **keystone.conf**. This procedure converts the public key received from Active Directory into the **.crt** format, and copies to a location where keystone will be able to reference it.

1. Copy the LDAPS public key to the node running OpenStack Identity (keystone), and convert the **.cer** to **.crt**. This example uses a source certificate file named **addc.lab.local.cer**:

```
# openssl x509 -inform der -in addc.lab.local.cer -out addc.lab.local.crt
# cp addc.lab.local.crt /etc/pki/ca-trust/source/anchors
```

NOTE

Optionally, if you need to run diagnostic commands, such as **ldapsearch**, you will also need to add the certificate to the RHEL certificate store:

1. Convert the **.cer** to **.pem**. This example uses a source certificate file named **addc.lab.local.cer**:

```
# openssl x509 -inform der -in addc.lab.local.cer -out addc.lab.local.pem
```

2. Install the **.pem** on your OpenStack controller. For example, in Red Hat Enterprise Linux:

```
# cp addc.lab.local.pem /etc/pki/ca-trust/source/anchors/
# update-ca-trust
```

1.6. CONFIGURE IDENTITY SERVICE

These steps prepare Identity Service (keystone) for integration with AD DS.

NOTE

If you are using director, note that the configuration files referenced below are managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. To apply these settings to director-based deployments, see Chapter 4, *Using domain-specific LDAP backends with director*.

1.6.1. Configure the controller

NOTE

If you intend to update any configuration files, you need to be aware that certain OpenStack services now run within containers; this applies to keystone, nova, and cinder, among others. As a result, there are certain administration practices to consider:

- Do not update any configuration file you might find on the physical node's host operating system, for example, **/etc/cinder/cinder.conf**. This is because the containerized service does not reference this file.
- Do not update the configuration file running within the container. This is because any changes are lost once you restart the container.
  Instead, if you need to add any changes to containerized services, you will need to update the configuration file that is used to generate the container. These are stored within **/var/lib/config-data/puppet-generated/**

  For example:
- keystone: **/var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf**
- cinder: **/var/lib/config-data/puppet-generated/cinder/etc/cinder/cinder.conf**
- nova: **/var/lib/config-data/puppet-generated/nova/etc/nova/nova.conf**
  Any changes will then be applied once you restart the container. For example: **sudo docker restart keystone**

Perform this procedure on each OpenStack node running the keystone service:

1. Configure SELinux:

```
# setsebool -P authlogin_nsswitch_use_ldap=on
```

   The output might include messages similar to this. They can be ignored:

```
Full path required for exclude: net:[4026532245].
```

2. Create the **domains** directory:

```
# mkdir /var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/
# chown 42425:42425 /var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/
```

3. Configure keystone to use multiple back ends:

   NOTE

   You might need to install **crudini** using **yum install crudini**.

```
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
identity domain_specific_drivers_enabled true
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
identity domain_config_dir /etc/keystone/domains
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
assignment driver sql
```

NOTE

If you are using director, note that **/var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf** is managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. As a result, you might need to re-add this configuration manually each time. For director-based deployments, see Chapter 4, *Using domain-specific LDAP backends with director* .

4. Enable multiple domains in dashboard. Add these lines to **/var/lib/config-data/puppet-generated/horizon/etc/openstack-dashboard/local_settings**:

```
OPENSTACK_API_VERSIONS = {
    "identity": 3
}
OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True
OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = 'Default'
```

NOTE

If you are using director, note that **/var/lib/config-data/puppet-generated/horizon/etc/openstack-dashboard/local_settings** is managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. As a result, you might need to re-add this configuration manually each time.

Restart the horizon container to apply the settings:

```
$ sudo docker restart horizon
```

5. Configure an additional back end:
In this example, **LAB** is the NetBIOS name to use as the Identity Service domain.

   a. Create the keystone domain for AD DS integration.
   Use the NetBIOS name value retrieved previously as the domain name. This approach allows you to present a consistent domain name to users during the login process. For example, if the NetBIOS name is **LAB**:

   ```
   $ openstack domain create LAB
   ```

   NOTE

   If this command is not available, check that you have enabled keystone v3 for your command line session by running **# source overcloudrc-v3**.

   b. Create the configuration file:
   To add the AD DS back end, enter the LDAP settings in a new file called **/var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/keystone.LAB.conf** (where **LAB** is the NetBIOS name retrieved previously). You will need to edit the sample settings below to suit your AD DS deployment:

```
[ldap]
url                   = ldaps://addc.lab.local:636
user                  = CN=svc-ldap,OU=labUsers,DC=lab,DC=local
password              = RedactedComplexPassword
suffix                = DC=lab,DC=local
user_tree_dn          = OU=labUsers,DC=lab,DC=local
user_objectclass      = person
user_filter           = (|(memberOf=cn=grp-openstack,OU=labUsers,DC=lab,DC=local)
(memberOf=cn=grp-openstack-admin,OU=labUsers,DC=lab,DC=local)
(memberOf=memberOf=cn=grp-openstack-demo,OU=labUsers,DC=lab,DC=local))
user_id_attribute     = sAMAccountName
user_name_attribute   = sAMAccountName
user_mail_attribute   = mail
user_pass_attribute   =
user_enabled_attribute  = userAccountControl
user_enabled_mask     = 2
user_enabled_default  = 512
user_attribute_ignore = password,tenant_id,tenants
group_objectclass     = group
group_tree_dn         = OU=labUsers,DC=lab,DC=local
group_filter          = (CN=grp-openstack*)
group_id_attribute    = cn
group_name_attribute  = name
use_tls               = False
tls_cacertfile        =/etc/pki/ca-trust/source/anchors/anchorsaddc.lab.local.pem

query_scope           = sub
chase_referrals       = false

[identity]
driver = ldap
```

Explanation of each setting:

Setting	Description
url	The AD Domain Controller to use for authentication. Uses LDAPS port **636**.
user	The *Distinguished Name* of an AD account to use for LDAP queries. For example, you can locate the *Distinguished Name* value of the *svc-ldap* account in AD using **Get-ADuser svc-ldap | select DistinguishedName**
password	The plaintext password of the AD account used above.
suffix	The *Distinguished Name* of your AD domain. You can locate this value using **Get-ADDomain | select DistinguishedName**

Setting	Description
user_tree_dn	The *Organizational Unit* (OU) that contains the OpenStack accounts.
user_objectclass	Defines the type of LDAP user. For AD, use the **person** type.
user_filter	Filters the users presented to Identity Service. As a result, only members of the **grp-openstack** group can have permissions defined in Identity Service. This value requires the full *Distinguished Name* of the group: **Get-ADGroup grp-openstack | select DistinguishedName**
user_id_attribute	Maps the AD value to use for user IDs.
user_name_attribute	Maps the AD value to use for *names*.
user_mail_attribute	Maps the AD value to use for user email addresses.
user_pass_attribute	Leave this value blank.
user_enabled_attribute	The AD setting that validates whether the account is enabled.
user_enabled_mask	Defines the value to check to determine whether an account is enabled. Used when booleans are not returned.
user_enabled_default	The AD value that indicates that an account is enabled.
user_attribute_ignore	Defines user attributes that Identity Service should disregard.
group_objectclass	Maps the AD value to use for *groups*.
group_tree_dn	The *Organizational Unit* (OU) that contains the user groups.
group_filter	Filters the groups presented to Identity Service.
group_id_attribute	Maps the AD value to use for group IDs.

Setting	Description
group_name_attribute	Maps the AD value to use for group names.
use_tls	Defines whether TLS is to be used. This needs to be disabled if you are encrypting with LDAPS rather than STARTTLS.
tls_cacertfile	Specifies the path to the *.crt* certificate file.
query_scope	Configures Identity Service to also search within nested child OUs, when locating users that are members of the **grp-openstack** group.
chase_referrals	Set to **false**, this setting prevents**python-ldap** from chasing all referrals with anonymous access.

6. Change ownership of the configuration file to the keystone user:

```
# chown 42425:42425 /var/lib/config-data/puppet-
generated/keystone/etc/keystone/domains/keystone.LAB.conf
```

7. Restart the keystone service to apply the changes:

```
# sudo docker restart keystone
```

8. Grant the **admin** user access to the domain:

NOTE

This does not grant the OpenStack admin account any permissions on the actual AD DS domain. In this case, the term *domain* refers to OpenStack's usage of the keystone domain.

a. Get the **ID** of the **LAB** domain:

```
# openstack domain show LAB
+---------+----------------------------------+
| Field   | Value                            |
+---------+----------------------------------+
| enabled | True                             |
| id      | 6800b0496429431ab1c4efbb3fe810d4 |
| name    | LAB                              |
+---------+----------------------------------+
```

b. Get the **ID** value of the *admin* user:

```
# openstack user list --domain default | grep admin
| 3d75388d351846c6a880e53b2508172a | admin      |
```

c. Get the **ID** value of the *admin* role:

```
# openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 544d48aaffde48f1b3c31a52c35f01f9 | SwiftOperator |
| 6d005d783bf0436e882c55c62457d33d | ResellerAdmin |
| 785c70b150ee4c778fe4de088070b4cf | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
+----------------------------------+---------------+
```

d. Use the returned domain and admin IDs to construct the command that adds the **admin** user to the **admin** role of the keystone **LAB** domain:

```
# openstack role add --domain 6800b0496429431ab1c4efbb3fe810d4 --user
3d75388d351846c6a880e53b2508172a 785c70b150ee4c778fe4de088070b4cf
```

e. View the list of users in the AD DS domain by adding the NetBIOS name to the command:

NOTE

It might take some time for the LDAP to become queryable after a reboot or service restart.

```
# openstack user list --domain LAB
```

f. View the service accounts in the local Identity Service database:

```
# openstack user list --domain default
```

1.6.2. Allow Active Directory group members to access Projects

To allow authenticated users access to OpenStack resources, the recommended method is to authorize certain Active Directory groups to grant access to Projects. This saves the OpenStack administrators from having to allocate each user to a role in a Project. Instead, the Active Directory groups are granted roles in Projects. As a result, Active Directory users that are members of these Active Directory groups will be able to access pre-determined Projects.

NOTE

If you would prefer to manually manage the authorization of individual Active Directory users, see Section 1.6.3, "Allow Active Directory users to access Projects" .

This section presumes that the Active Directory administrator has already completed these steps:

- Create a group named **grp-openstack-admin** in Active Directory.
- Create a group named **grp-openstack-demo** in Active Directory.

- Add your Active Directory users to one of the above groups, as needed.
- Add your Active Directory users to the **grp-openstack** group.
- Have a designated project in mind. This example uses a project called **demo**, created using **openstack project create --domain default --description "Demo Project" demo**.

These steps assign a role to an AD group. Group members will then have permission to access OpenStack resources.

1. Retrieve a list of AD groups:

```
# openstack group list --domain LAB
+------------------------------------------------------------------+---------------------+
| ID                                                               | Name                |
+------------------------------------------------------------------+---------------------+
| 185277be62ae17e498a69f98a59b66934fb1d6b7f745f14f5f68953a665b8851 | grp-openstack       |
| a8d17f19f464c4548c18b97e4aa331820f9d3be52654aa8094e698a9182cbb88 | grp-openstack-admin |
| d971bb3bd5e64a454cbd0cc7af4c0773e78d61b5f81321809f8323216938cae8 | grp-openstack-demo  |
+------------------------------------------------------------------+---------------------+
```

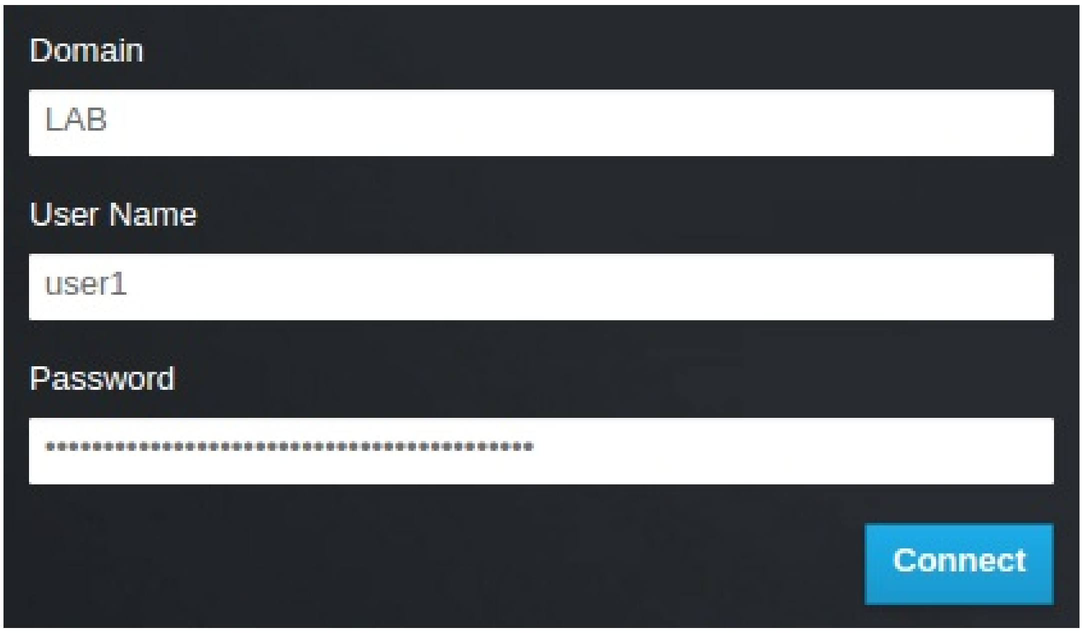
2. Retrieve a list of roles:

```
# openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 0969957bce5e4f678ca6cef00e1abf8a | ResellerAdmin |
| 1fcb3c9b50aa46ee8196aaaecc2b76b7 | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
| d3570730eb4b4780a7fed97eba197e1b | SwiftOperator |
+----------------------------------+---------------+
```

3. Grant the Active Directory groups access to Projects by adding them to one or more of these roles. For example, if you want users in the **grp-openstack-demo** group to be general users of the **demo** project, you must add the group to the **_member_** role:

```
# openstack role add --project demo --group
d971bb3bd5e64a454cbd0cc7af4c0773e78d61b5f81321809f8323216938cae8 _member_
```

As a result, members of **grp-openstack-demo** are able to log in to the dashboard by entering their AD DS username and password, when also entering **LAB** in the Domain field:



NOTE

If users receive the error **Error: Unable to retrieve container list.**, and expect to be able to manage containers, then they must be added to the **SwiftOperator** role.

1.6.3. Allow Active Directory users to access Projects

AD DS users that are members of the **grp-openstack** AD group can be granted permission to log in to a *Project* in the dashboard:

1. Retrieve a list of AD users:

```
# openstack user list --domain LAB
+------------------------------------------------------------------+----------------+
| ID                                                               | Name           |
+------------------------------------------------------------------+----------------+
| 1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e | user1          |
| 12c062faddc5f8b065434d9ff6fce03eb9259537c93b411224588686e9a38bf1 | user2          |
| afaf48031eb54c3e44e4cb0353f5b612084033ff70f63c22873d181fdae2e73c | user3          |
| e47fc21dcf0d9716d2663766023e2d8dc15a6d9b01453854a898cabb2396826e | user4
|
+------------------------------------------------------------------+----------------+
```

2. Retrieve a list of roles:

```
# openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 544d48aaffde48f1b3c31a52c35f01f9 | SwiftOperator |
| 6d005d783bf0436e882c55c62457d33d | ResellerAdmin |
| 785c70b150ee4c778fe4de088070b4cf | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
+----------------------------------+---------------+
```

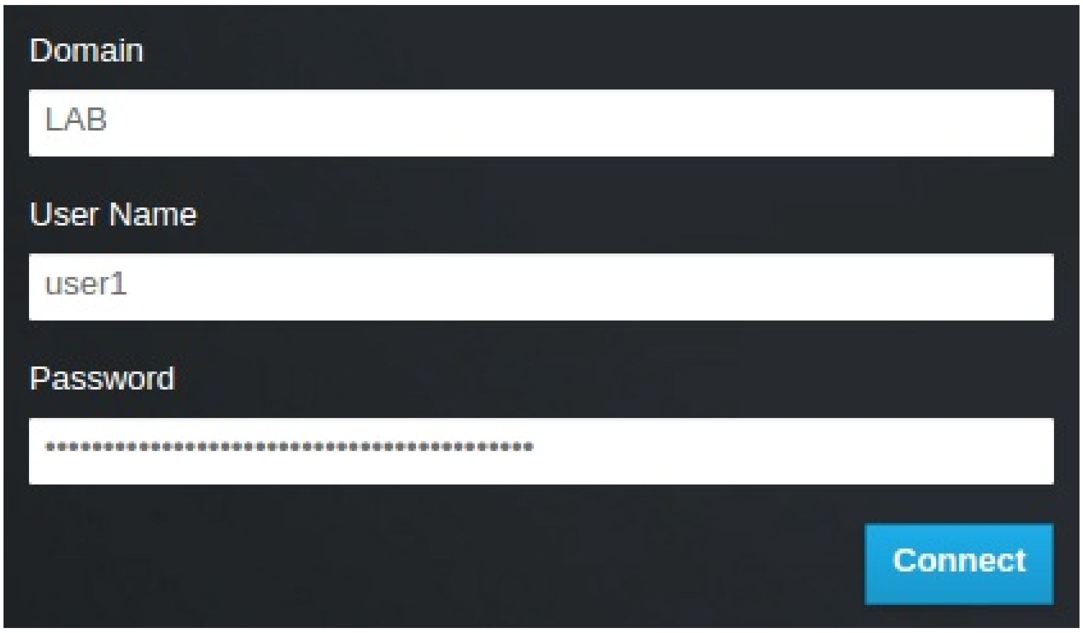
3. Grant users access to Projects by adding them to one or more of these roles. For example, if you want **user1** to be a general user of the **demo** project, you add them to the **member** role:

```
# openstack role add --project demo --user
1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e _member_
```

Or, if you want **user1** to be an administrative user of the **demo** project, you add them to the **admin** role:

```
# openstack role add --project demo --user
1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e admin
```

As a result, **user1** is able to log in to the dashboard by entering their AD DS username and password, when also entering **LAB** in the **Domain** field:


Domain

LAB

User Name

user1

Password

****

NOTE

If users receive the error **Error: Unable to retrieve container list.**, and expect to be able to manage containers, then they must be added to the **SwiftOperator** role.

1.7. GRANT ACCESS TO THE DOMAIN TAB

To allow the **admin** user to see the **Domain** tab, you will need to assign it the **admin** role in the **default** domain:

1. Find the **admin** user's UUID:

```
$ openstack user list | grep admin
| a6a8adb6356f4a879f079485dad1321b | admin     |
```

2. Add the **admin** role in the **default** domain to the **admin** user:

```
$ openstack role add --domain default --user a6a8adb6356f4a879f079485dad1321b admin
```

As a result, the **admin** user can now see the **Domain** tab.

1.8. CREATING A NEW PROJECT

After you have completed these integration steps, when you create a new project you will need to decide whether to create it in the **Default** domain, or in the keystone domain you've just created. This decision can be reached by considering your workflow, and how you administer user accounts. The *Default* domain can be be thought of as an internal domain, used to manage service accounts and the *admin* project. For separation purposes, you might want to keep your AD-backed users in a separate keystone domain.

1.9. CHANGES TO THE DASHBOARD LOG IN PROCESS

Configuring multiple domains in Identity Service enables a new *Domain* field in the dashboard login page. Users are expected to enter the domain that matches their login credentials. This field must be manually filled with one of the domains present in keystone. Use the *openstack* command to list the available entries.

In this example, AD DS accounts will need to specify the **LAB** domain. The built-in keystone accounts, such as *admin*, must specify **Default** as their domain:

```
# openstack domain list
+----------------------------------+---------+---------+----------------------------------------------------------------------
-----+
| ID                               | Name    | Enabled | Description                                                          |
+----------------------------------+---------+---------+----------------------------------------------------------------------
-----+
| 6800b0496429431ab1c4efbb3fe810d4 | LAB     | True    |
|
| default                          | Default | True    | Owns users and tenants (i.e. projects) available on Identity
API v2. |
+----------------------------------+---------+---------+----------------------------------------------------------------------
-----+
```

1.10. CHANGES TO THE COMMAND LINE

For certain commands, you might need to specify the applicable domain. For example, appending **--domain LAB** in this command returns users in the LAB domain (that are members of the *grp-openstack* group):

```
# openstack user list --domain LAB
```

Appending **--domain Default** returns the built-in keystone accounts:

```
# openstack user list --domain Default
```

1.11. TEST AD DS INTEGRATION

This procedure validates AD DS integration by testing user access to dashboard features:

1. Create a test user in AD, and add the user to the **grp-openstack** AD DS group.
2. Add the user to the **_member_** role of the **demo** tenant.
3. Log in to the dashboard using the credentials of the AD test user.

4. Click on each of the tabs to confirm that they are presented successfully without error messages.

5. Use the dashboard to build a test instance.

NOTE

If you experience issues with these steps, perform steps 3-5 with the built-in *admin* account. If successful, this demonstrates that OpenStack is still working as expected, and that an issue exists somewhere within the AD ←→ Identity integration settings. See Section 1.13, “Troubleshooting”.

1.12. CREATE A RC FILE FOR A NON-ADMIN USER

You might need to create a RC file for a non-admin user. For example:

```
$ cat overcloudrc-v3-user1
# Clear any old environment that may conflict.
for key in $( set | awk '{FS="="}  /^OS_/ {print $1}' ); do unset $key ; done
export OS_USERNAME=user1
export NOVA_VERSION=1.1
export OS_PROJECT_NAME=demo
export OS_PASSWORD=RedactedComplexPassword
export OS_NO_CACHE=True
export COMPUTE_API_VERSION=1.1
export no_proxy=,10.0.0.5,192.168.2.11
export OS_CLOUDNAME=overcloud
export OS_AUTH_URL=https://10.0.0.5:5000/v3
export OS_AUTH_TYPE=password
export PYTHONWARNINGS="ignore:Certificate has no, ignore:A true
SSLContext object is not available"
export OS_IDENTITY_API_VERSION=3
export OS_PROJECT_DOMAIN_NAME=Default
export OS_USER_DOMAIN_NAME=LAB
```

1.13. TROUBLESHOOTING

1.13.1. Test LDAP connections

NOTE

This command expects to find the necessary certificate in your host operating system. See the *Configure the LDAPS certificate* section for more information.

Use **ldapsearch** to remotely perform test queries against the Active Directory Domain Controller. A successful result here indicates that network connectivity is working, and the AD DS services are up. In this example, a test query is performed against the server **addc.lab.local** on port **636**:

```
# ldapsearch -Z -x -H ldaps://addc.lab.local:636 -D "svc-ldap@lab.local" -W -b
"OU=labUsers,DC=lab,DC=local" -s sub "(cn=*)" cn
```

NOTE

ldapsearch is a part of the **openldap-clients** package. You can install this using **# yum install openldap-clients**

1.13.2. Test the Certificate Trust Configuration

If you receive the error **Peer's Certificate issuer is not recognized.** while testing with *ldapsearch*, confirm that your **TLS_CACERTDIR** path is correctly set. For example:

- */etc/openldap/ldap.conf*

```
TLS_CACERTDIR /etc/openldap/certs
```

NOTE

As a temporary workaround, you may want to consider disabling certificate validation.

This setting must not be permanently configured

- **/etc/openldap/ldap.conf**

```
TLS_REQCERT allow
```

If the **ldapsearch** query works after setting this value, you might need to review whether your certificate trusts are correctly configured.

1.13.3. Test port access

Use **nc** to check that LDAPS port **636** is remotely accessible. In this example, a probe is performed against the server **addc.lab.local**. Press ctrl-c to exit the prompt.

```
# nc -v addc.lab.local 636
Ncat: Version 6.40 ( http://nmap.org/ncat )
Ncat: Connected to 192.168.200.10:636.
^C
```

Failure to establish a connection could indicate a firewall configuration issue.

CHAPTER 2. IDENTITY MANAGEMENT INTEGRATION

When you plan your OpenStack Identity integration with Red Hat Identity Manager (IdM), ensure that both services are configured and operational and review the impact of the integration on user management and firewall settings. Red Hat Identity Manager IdM depends on SRV records to do load balancing. You should not put a load balancer in front of IdM.

Prerequisites

- Red Hat Identity Management is configured and operational.
- Red Hat OpenStack Platform is configured and operational.
- DNS name resolution is fully functional and all hosts are registered appropriately.

Permissions and roles

This integration allows IdM users to authenticate to OpenStack and access resources. OpenStack service accounts (such as keystone and glance), and authorization management (permissions and roles) will remain in the Identity Service database. Permissions and roles are assigned to the IdM accounts using Identity Service management tools.

High availability options

This configuration creates a dependency on the availability of a single IdM server: Project users will be affected if Identity Service is unable to authenticate to the IdM Server. It is not recommended to place a load balancer in front of IdM, however you can configure keystone to query a different IdM server, should one become unavailable.

Outage requirements

- The Identity Service will need to be restarted in order to add the IdM back end.
- Users will be unable to access the dashboard until their accounts have been created in IdM. To reduce downtime, consider pre-staging the IdM accounts well in advance of this change.

Firewall configuration

Communication between IdM and OpenStack consists of the following:

- Authenticating users
- IdM retrieval of the certificate revocation list (CRL) from the controllers every two hours
- Certmonger requests for new certificates upon expiration

NOTE

A periodic certmonger task will continue to request new certificates if the initial request fails.

If firewalls are filtering traffic between IdM and OpenStack, you will need to allow access through the following port:

+

Source	Destination	Type	Port

OpenStack Controller Node	Red Hat Identity Management	LDAPS	TCP 636

2.1. CONFIGURE THE IDM SERVER

Run these commands on the IdM server:

1. Create the LDAP lookup account. This account is used by Identity Service to query the IdM LDAP service:

   ```
   # kinit admin
   # ipa user-add
   First name: OpenStack
   Last name: LDAP
   User  [radministrator]: svc-ldap
   ```

   NOTE

   Review the password expiration settings of this account, once created.

2. Create a group for OpenStack users, called *grp-openstack*. Only members of this group can have permissions assigned in OpenStack Identity.

   ```
   # ipa group-add --desc="OpenStack Users" grp-openstack
   ```

3. Set the *svc-ldap* account password, and add it to the *grp-openstack* group:

   ```
   # ipa passwd svc-ldap
   # ipa group-add-member --users=svc-ldap grp-openstack
   ```

4. Login as *svc-ldap* user and perform the password change when prompted:

   ```
   # kinit svc-ldap
   ```

2.2. CONFIGURE THE LDAPS CERTIFICATE

NOTE

When using multiple domains for LDAP authentication, you might receive various errors, such as **Unable to retrieve authorized projects**, or **Peer's Certificate issuer is not recognized**. This can arise if keystone uses the incorrect certificate for a certain domain. As a workaround, merge all of the LDAPS public keys into a single **.crt** bundle, and configure all of your keystone domains to use this file.

1. In your IdM environment, locate the LDAPS certificate. This file can be located using */etc/openldap/ldap.conf*:

   ```
   TLS_CACERT /etc/ipa/ca.crt
   ```

2. Copy the file to the OpenStack node that runs the keystone service. For example, this command uses *scp* to copy ca.crt to the node named *node.lab.local*:

```
# scp /etc/ipa/ca.crt root@node.lab.local:/root/
```

3. On the OpenStack node, convert the .crt to .pem:

```
# openssl x509 -in ca.crt -out ca.pem -outform PEM
```

4. Copy the .crt to the certificate directory. This is the location that the keystone service will use to access the certificate:

```
# cp ca.crt /etc/pki/ca-trust/source/anchors
```

NOTE

Optionally, if you need to run diagnostic commands, such as **ldapsearch**, you will also need to add the certificate to the RHEL certificate store. For example:

```
# cp ca.pem /etc/pki/ca-trust/source/anchors/
# update-ca-trust
```

2.3. CONFIGURE IDENTITY SERVICE

These steps prepare Identity Service for integration with IdM.

NOTE

If you are using director, note that the configuration files referenced below are managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. To apply these settings to director-based deployments, see Chapter 4, *Using domain-specific LDAP backends with director*.

2.3.1. Configure the controller

NOTE

If you intend to update any configuration files, you need to be aware that certain OpenStack services now run within containers; this applies to keystone, nova, and cinder, among others. As a result, there are certain administration practices to consider:

- Do not update any configuration file you might find on the physical node's host operating system, for example, **/etc/cinder/cinder.conf**. This is because the containerized service does not reference this file.
- Do not update the configuration file running within the container. This is because any changes are lost once you restart the container.
  Instead, if you need to add any changes to containerized services, you will need to update the configuration file that is used to generate the container. These are stored within **/var/lib/config-data/puppet-generated/**

  For example:
- keystone: **/var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf**
- cinder: **/var/lib/config-data/puppet-generated/cinder/etc/cinder/cinder.conf**
- nova: **/var/lib/config-data/puppet-generated/nova/etc/nova/nova.conf**
  Any changes will then be applied once you restart the container. For example: **sudo docker restart keystone**

Perform this procedure on the controller running the keystone service:

1. Configure SELinux:

```
# setsebool -P authlogin_nsswitch_use_ldap=on
```

   The output might include messages similar to this. They can be ignored:

```
Full path required for exclude: net:[4026532245].
```

2. Create the *domains* directory:

```
# mkdir /var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/
# chown 42425:42425 /var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/
```

3. Configure Identity Service to use multiple back ends:

   NOTE

   You might need to install **crudini** using **yum install crudini**.

```
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
identity domain_specific_drivers_enabled true
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
identity domain_config_dir /etc/keystone/domains
# crudini --set /var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf
assignment driver sql
```

–

NOTE

If you are using director, note that **/var/lib/config-data/puppet-generated/keystone/etc/keystone/keystone.conf** is managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. As a result, you might need to re-add this configuration manually each time. For director-based deployments, see Chapter 4, *Using domain-specific LDAP backends with director* .

4. Enable multiple domains in dashboard. Add these lines to */var/lib/config-data/puppet-generated/horizon/etc/openstack-dashboard/local_settings*:

```
OPENSTACK_API_VERSIONS = {
    "identity": 3
}
OPENSTACK_KEYSTONE_MULTIDOMAIN_SUPPORT = True
OPENSTACK_KEYSTONE_DEFAULT_DOMAIN = 'Default'
```

NOTE

If you are using director, note that **/var/lib/config-data/puppet-generated/horizon/etc/openstack-dashboard/local_settings** is managed by Puppet. Consequently, any custom configuration you add might be overwritten whenever you run the **openstack overcloud deploy** process. As a result, you might need to re-add this configuration manually each time.

Restart the horizon container to apply the settings:

```
$ sudo docker restart horizon
```

5. Configure an additional back end:

   a. Create the keystone domain for IdM integration. You will need to decide on a name to use for your new keystone domain, and then create the domain. For example, this command creates a keystone domain named **LAB**:

   ```
   $ openstack domain create LAB
   ```

   b. Create the configuration file:
   To add the IdM back end, enter the LDAP settings in a new file called **/var/lib/config-data/puppet-generated/keystone/etc/keystone/domains/keystone.LAB.conf** (where **LAB** is the domain name created previously). You will need to edit the sample settings below to suit your IdM deployment:

   ```
   [ldap]
   url =  ldaps://idm.lab.local
   user = uid=svc-ldap,cn=users,cn=accounts,dc=lab,dc=local
   user_filter = (memberOf=cn=grp-openstack,cn=groups,cn=accounts,dc=lab,dc=local)
   password = RedactedComplexPassword
   user_tree_dn = cn=users,cn=accounts,dc=lab,dc=local
   user_objectclass = inetUser
   user_id_attribute = uid
   ```

```
user_name_attribute = uid
user_mail_attribute = mail
user_pass_attribute =
group_tree_dn              = cn=groups,cn=accounts,dc=lab,dc=local
group_objectclass             = groupOfNames
group_id_attribute           = cn
group_name_attribute       =  cn
group_member_attribute  = member
group_desc_attribute        = description
use_tls                 = False
query_scope                 = sub
chase_referrals                 = false
tls_cacertfile =/etc/pki/ca-trust/source/anchors/anchorsca.crt

[identity]
driver = ldap
```

Explanation of each setting:

Setting	Description
url	The IdM server to use for authentication. Uses LDAPS port **636**.
user	The account in IdM to use for LDAP queries.
password	The plaintext password of the IdM account used above.
user_filter	Filters the users presented to Identity Service. As a result, only members of the **grp-openstack** group can have permissions defined in Identity Service.
user_tree_dn	The path to the OpenStack accounts in IdM.
user_objectclass	Defines the type of LDAP user. For IdM, use the **inetUser** type.
user_id_attribute	Maps the IdM value to use for user IDs.
user_name_attribute	Maps the IdM value to use for *names*.
user_mail_attribute	Maps the IdM value to use for user email addresses.
user_pass_attribute	Leave this value blank.

NOTE

Integration with an IdM group will only return direct members, and not nested groups. As a result, queries that rely on **LDAP_MATCHING_RULE_IN_CHAIN** or **memberof:1.2.840.113556.1.4.1941:** will not currently work with IdM.

6. Change ownership of the config file to the keystone user:

```
# chown 42425:42425 /var/lib/config-data/puppet-
generated/keystone/etc/keystone/domains/keystone.LAB.conf
```

7. Grant the admin user access to the domain:

NOTE

This does not grant the OpenStack admin account any permissions in IdM. In this case, the term domain refers to OpenStack's usage of the keystone domain.

a. Get the **ID** of the *LAB* domain:

```
$ openstack domain show LAB
+---------+----------------------------------+
| Field   | Value                            |
+---------+----------------------------------+
| enabled | True                             |
| id      | 6800b0496429431ab1c4efbb3fe810d4 |
| name    | LAB                              |
+---------+----------------------------------+
```

b. Get the **ID** value of the *admin* user:

```
$ openstack user list --domain default | grep admin

| 3d75388d351846c6a880e53b2508172a | admin      |
```

c. Get the **ID** value of the *admin* role:

```
# openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 544d48aaffde48f1b3c31a52c35f01f9 | SwiftOperator |
| 6d005d783bf0436e882c55c62457d33d | ResellerAdmin |
| 785c70b150ee4c778fe4de088070b4cf | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
+----------------------------------+---------------+
```

d. Use the returned domain and admin IDs to construct the command that adds the *admin* user to the *admin* role of the keystone LAB domain:

```
$ openstack role add --domain 6800b0496429431ab1c4efbb3fe810d4 --user
3d75388d351846c6a880e53b2508172a 785c70b150ee4c778fe4de088070b4cf
```

8. Restart the keystone service to apply the changes:

```
$ sudo docker restart keystone
```

9. View the list of users in the IdM domain by adding the keystone domain name to the command:

```
$ openstack user list --domain LAB
```

10. View the service accounts in the local keystone database:

```
$ openstack user list --domain default
```

2.3.2. Allow IdM group members to access Projects

To allow authenticated users access to OpenStack resources, the recommended method is to authorize certain IdM groups to grant access to Projects. This saves the OpenStack administrators from having to allocate each user to a role in a Project. Instead, the IdM groups are granted roles in Projects. As a result, IdM users that are members of these IdM groups will be able to access pre-determined Projects.

NOTE

If you would prefer to manually manage the authorization of individual IdM users, see the Section 2.3.3, "Allow IdM users to access Projects" .

This section presumes that the IdM administrator has already completed these steps:

- Create a group named **grp-openstack-admin** in IdM.
- Create a group named **grp-openstack-demo** in IdM.
- Add your IdM users to one of the above groups, as needed.
- Add your IdM users to the **grp-openstack** group.
- Have a designated project in mind. This example uses a project called **demo**, created using **openstack project create --domain default --description "Demo Project" demo**.

These steps assign a role to an IdM group. Group members will then have permission to access OpenStack resources.

1. Retrieve a list of IdM groups:

```
$ openstack group list --domain LAB
+------------------------------------------------------------------+---------------------+
| ID                                                               | Name                |
+------------------------------------------------------------------+---------------------+
| 185277be62ae17e498a69f98a59b66934fb1d6b7f745f14f5f68953a665b8851 | grp-openstack       |
| a8d17f19f464c4548c18b97e4aa331820f9d3be52654aa8094e698a9182cbb88 | grp-openstack-admin |
| d971bb3bd5e64a454cbd0cc7af4c0773e78d61b5f81321809f8323216938cae8 | grp-openstack-demo  |
+------------------------------------------------------------------+---------------------+
```

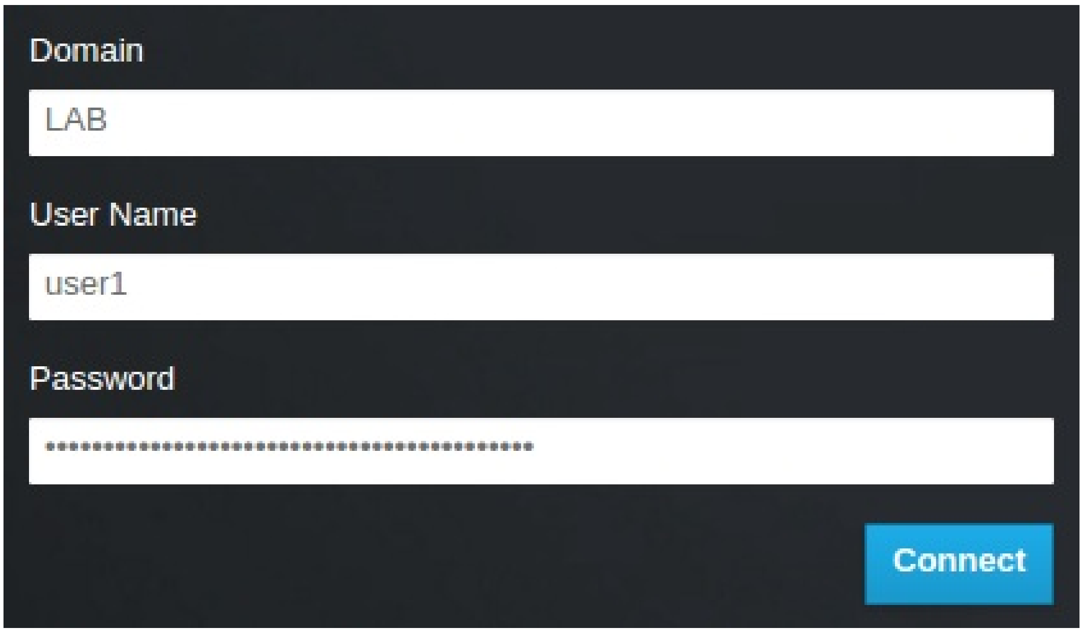
2. Retrieve a list of roles:

```
$ openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 0969957bce5e4f678ca6cef00e1abf8a | ResellerAdmin |
| 1fcb3c9b50aa46ee8196aaaecc2b76b7 | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
| d3570730eb4b4780a7fed97eba197e1b | SwiftOperator |
+----------------------------------+---------------+
```

3. Grant the IdM groups access to Projects by adding them to one or more of these roles. For example, if you want users in the **grp-openstack-demo** group to be general users of the **demo** project, you must add the group to the **_member_** role:

```
$ openstack role add --project demo --group
d971bb3bd5e64a454cbd0cc7af4c0773e78d61b5f81321809f8323216938cae8 _member_
```

As a result, members of **grp-openstack-demo** are able to log in to the dashboard by entering their IdM username and password, when also entering **LAB** in the Domain field:



Domain

LAB

User Name

user1

Password

••

NOTE

If users receive the error **Error: Unable to retrieve container list.**, and expect to be able to manage containers, then they must be added to the **SwiftOperator** role.

2.3.3. Allow IdM users to access Projects

IdM users that are members of the **grp-openstack** IdM group can be granted permission to log in to a *Project* in the dashboard:

1. Retrieve a list of IdM users:

```
# openstack user list --domain LAB
 +------------------------------------------------------------------+----------------+
| ID                                                               | Name           |
+------------------------------------------------------------------+----------------+
| 1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e | user1          |
| 12c062faddc5f8b065434d9ff6fce03eb9259537c93b411224588686e9a38bf1 | user2          |
| afaf48031eb54c3e44e4cb0353f5b612084033ff70f63c22873d181fdae2e73c | user3          |
| e47fc21dcf0d9716d2663766023e2d8dc15a6d9b01453854a898cabb2396826e | user4
|
+------------------------------------------------------------------+----------------+
```

2. Retrieve a list of roles:

```
# openstack role list
+----------------------------------+---------------+
| ID                               | Name          |
+----------------------------------+---------------+
| 544d48aaffde48f1b3c31a52c35f01f9 | SwiftOperator |
| 6d005d783bf0436e882c55c62457d33d | ResellerAdmin |
| 785c70b150ee4c778fe4de088070b4cf | admin         |
| 9fe2ff9ee4384b1894a90878d3e92bab | _member_      |
+----------------------------------+---------------+
```

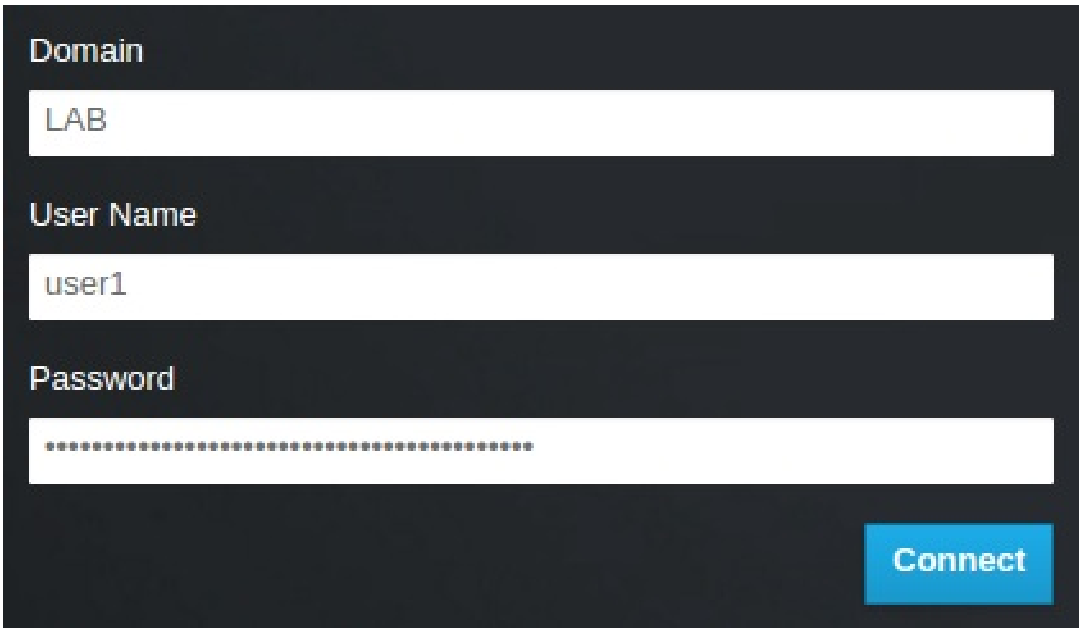
3. Grant users access to Projects by adding them to one or more of these roles. For example, if you want **user1** to be a general user of the **demo** project, you add them to the **member** role:

```
# openstack role add --project demo --user
1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e _member_
```

Or, if you want **user1** to be an administrative user of the **demo** project, you add them to the **admin** role:

```
# openstack role add --project demo --user
1f24ec1f11aeb90520079c29f70afa060d22e2ce92b2eba7784c841ac418091e admin
```

As a result, **user1** is able to log in to the dashboard by entering their IdM username and password, when also entering **LAB** in the **Domain** field:


Domain
LAB
User Name
user1
Password
••

NOTE

If users receive the error **Error: Unable to retrieve container list.**, and expect to be able to manage containers, then they must be added to the **SwiftOperator** role.

2.4. GRANT ACCESS TO THE DOMAIN TAB

To allow the **admin** user to see the **Domain** tab, you will need to assign it the **admin** role in the **default** domain:

1. Find the **admin** user's UUID:

```
$ openstack user list | grep admin
| a6a8adb6356f4a879f079485dad1321b | admin      |
```

2. Add the **admin** role in the **default** domain to the **admin** user:

```
$ openstack role add --domain default --user a6a8adb6356f4a879f079485dad1321b admin
```

As a result, the **admin** user can now see the **Domain** tab.

2.5. CREATING A NEW PROJECT

After you have completed these integration steps, when you create a new project you will need to decide whether to create it in the **Default** domain, or in the keystone domain you've just created. This decision can be reached by considering your workflow, and how you administer user accounts. The **Default** domain can be be thought of as an internal domain, used for service accounts and the **admin** project, so it might make sense for your AD-backed users to be placed within a different keystone domain; this does not strictly need to be the same keystone domain as the IdM users are in, and for separation purposes, there might be multiple keystone domains.

2.5.1. Changes to the dashboard log in process

Configuring multiple domains in Identity Service enables a new *Domain* field in the dashboard login page. Users are expected to enter the domain that matches their login credentials. This field must be manually filled with one of the domains present in keystone. Use the *openstack* command to list the available entries.

In this example, IdM accounts will need to specify the **LAB** domain. The built-in keystone accounts, such as *admin*, must specify **Default** as their domain:

```
$ openstack domain list
+----------------------------------+---------+---------+----------------------------------------------------------------
-----+
| ID                               | Name    | Enabled | Description                                                        |
+----------------------------------+---------+---------+----------------------------------------------------------------
-----+
| 6800b0496429431ab1c4efbb3fe810d4 | LAB     | True    |
|
| default                          | Default | True    | Owns users and tenants (i.e. projects) available on Identity
API v2. |
+----------------------------------+---------+---------+----------------------------------------------------------------
-----+
```

2.5.2. Changes to the command line

For certain commands, you might need to specify the applicable domain. For example, appending **--domain LAB** in this command returns users in the LAB domain (that are members of the *grp-openstack* group):

```
$ openstack user list --domain LAB
```

Appending **--domain Default** returns the built-in keystone accounts:

```
$ openstack user list --domain Default
```

2.5.3. Test IdM integration

This procedure validates IdM integration by testing user access to dashboard features:

1. Create a test user in IdM, and add the user to the **grp-openstack** IdM group.
2. Add the user to the **_member_** role of the **demo** tenant.
3. Log in to the dashboard using the credentials of the IdM test user.
4. Click on each of the tabs to confirm that they are presented successfully without error messages.
5. Use the dashboard to build a test instance.

NOTE

If you experience issues with these steps, perform steps 3-5 with the built-in *admin* account. If successful, this demonstrates that OpenStack is still working as expected, and that an issue exists somewhere within the IdM ←→ Identity integration settings. See Section 2.7, “Troubleshooting”.

2.6. CREATE A RC FILE FOR A NON-ADMIN USER

You might need to create a RC file for a non-admin user. For example:

```
$ cat overcloudrc-v3-user1
# Clear any old environment that may conflict.
for key in $( set | awk '{FS="="}  /^OS_/ {print $1}' ); do unset $key ; done
export OS_USERNAME=user1
export NOVA_VERSION=1.1
export OS_PROJECT_NAME=demo
export OS_PASSWORD=RedactedComplexPassword
export OS_NO_CACHE=True
export COMPUTE_API_VERSION=1.1
export no_proxy=,10.0.0.5,192.168.2.11
export OS_CLOUDNAME=overcloud
export OS_AUTH_URL=https://10.0.0.5:5000/v3
export OS_AUTH_TYPE=password
export PYTHONWARNINGS="ignore:Certificate has no, ignore:A true
SSLContext object is not available"
```

```
export OS_IDENTITY_API_VERSION=3
export OS_PROJECT_DOMAIN_NAME=Default
export OS_USER_DOMAIN_NAME=LAB
```

2.7. TROUBLESHOOTING

2.7.1. Test LDAP connections

Use *ldapsearch* to remotely perform test queries against the IdM server. A successful result here indicates that network connectivity is working, and the IdM services are up. In this example, a test query is performed against the server *idm.lab.local* on port 636:

```
# ldapsearch -D "cn=directory manager" -H ldaps://idm.lab.local:636 -b "dc=lab,dc=local" -s sub "
(objectclass=*)" -w RedactedComplexPassword
```

NOTE

ldapsearch is a part of the *openldap-clients* package. You can install this using **# yum install openldap-clients**.

2.7.2. Test port access

Use *nc* to check that the LDAPS port (636) is remotely accessible. In this example, a probe is performed against the server *idm.lab.local*. Press ctrl-c to exit the prompt.

```
# nc -v idm.lab.local 636
Ncat: Version 6.40 ( http://nmap.org/ncat )
Ncat: Connected to 192.168.200.10:636.
^C
```

Failure to establish a connection could indicate a firewall configuration issue.

CHAPTER 3. INTEGRATE WITH IDM USING NOVAJOIN

Novajoin allows you to enroll your nodes with Red Hat Identity Manager (IdM) as part of the deployment process. As a result, you can integrate IdM features with your OpenStack deployment, including identities, kerberos credentials, and access controls.

NOTE

IdM enrollment through novajoin is currently only available for the undercloud and overcloud nodes. Novajoin integration for overcloud instances is expected to be supported in a later release.

3.1. INSTALL AND CONFIGURE NOVAJOIN IN THE UNDERCLOUD

3.1.1. Add the undercloud to the CA

Before deploying the overcloud, you must add the undercloud to the Certificate Authority (CA):

1. On the undercloud node, install the **python-novajoin** package:

```
$ sudo yum install python-novajoin
```

2. On the undercloud node, run the **novajoin-ipa-setup** script, adjusting the values to suit your deployment:

```
$ sudo /usr/libexec/novajoin-ipa-setup \
    --principal admin \
    --password <IdM admin password> \
    --server <IdM server hostname> \
    --realm <overcloud cloud domain (in upper case)> \
    --domain <overcloud cloud domain> \
    --hostname <undercloud hostname> \
    --precreate
```

In the following section, you will use the resulting One-Time Password (OTP) to enroll the undercloud.

3.1.2. Add the undercloud to IdM

This procedure registers the undercloud with IdM and configures novajoin. Configure the following settings in **undercloud.conf** (within the **[DEFAULT]** section):

1. The novajoin service is disabled by default. To enable it:

```
[DEFAULT]
enable_novajoin = true
```

2. You need set a One-Time Password (OTP) to register the undercloud node with IdM:

```
ipa_otp = <otp>
```

3. Ensure the overcloud's domain name served by neutron's DHCP server matches the IdM domain (your kerberos realm in lowercase):

```
overcloud_domain_name = <domain>
```

4. Set the appropriate hostname for the undercloud:

```
undercloud_hostname = <undercloud FQDN>
```

5. Set IdM as the nameserver for the undercloud:

```
undercloud_nameservers = <IdM IP>
```

6. For larger environments, you will need to review the novajoin connection timeout values. In **undercloud.conf**, add a reference to a new file called **undercloud-timeout.yaml**:

```
hieradata_override = /home/stack/undercloud-timeout.yaml
```

   Add the following options to **undercloud-timeout.yaml**. You can specify the timeout value in seconds, for example, **5**:

```
nova::api::vendordata_dynamic_connect_timeout: <timeout value>
nova::api::vendordata_dynamic_read_timeout: <timeout value>
```

7. Save the **undercloud.conf** file.

8. Run the undercloud deployment command to apply the changes to your existing undercloud:

```
$ openstack undercloud install
```

Verification

1. Check the **keytab** files for a key entry for the undercloud:

```
[root@undercloud-0 ~]# klist -kt
Keytab name: FILE:/etc/krb5.keytab
KVNO Timestamp           Principal
---- ------------------- ------------------------------------------------------
   1 04/28/2020 12:22:06 host/undercloud-0.redhat.local@REDHAT.LOCAL
   1 04/28/2020 12:22:06 host/undercloud-0.redhat.local@REDHAT.LOCAL


[root@undercloud-0 ~]# klist -kt /etc/novajoin/krb5.keytab
Keytab name: FILE:/etc/novajoin/krb5.keytab
KVNO Timestamp           Principal
---- ------------------- ------------------------------------------------------
   1 04/28/2020 12:22:26 nova/undercloud-0.redhat.local@REDHAT.LOCAL
   1 04/28/2020 12:22:26 nova/undercloud-0.redhat.local@REDHAT.LOCAL
```

2. Test the system **/etc/krb.keytab** file with the host principle:

```
[root@undercloud-0 ~]# kinit -k
[root@undercloud-0 ~]# klist
```

```
 Ticket cache: KEYRING:persistent:0:0
 Default principal: host/undercloud-0.redhat.local@REDHAT.LOCAL

 Valid starting       Expires              Service principal
 05/04/2020 10:34:30  05/05/2020 10:34:30  krbtgt/REDHAT.LOCAL@REDHAT.LOCAL

 [root@undercloud-0 ~]# kdestroy
 Other credential caches present, use -A to destroy all
```

3. Test the novajoin **/etc/novajoin/krb.keytab** file with the nova principle:

```
 [root@undercloud-0 ~]# kinit -kt /etc/novajoin/krb5.keytab 'nova/undercloud-
0.redhat.local@REDHAT.LOCAL'
 [root@undercloud-0 ~]# klist
 Ticket cache: KEYRING:persistent:0:0
 Default principal: nova/undercloud-0.redhat.local@REDHAT.LOCAL

 Valid starting       Expires              Service principal
 05/04/2020 10:39:14  05/05/2020 10:39:14  krbtgt/REDHAT.LOCAL@REDHAT.LOCAL
```

3.2. INSTALL AND CONFIGURE NOVAJOIN IN THE OVERCLOUD

These sections describe how to register an overcloud node with IdM.

3.2.1. Configure overcloud DNS

For automatic detection of your IdM environment, and easier enrollment, consider using IdM as your DNS server:

1. Connect to your undercloud:

```
$ source ~/stackrc
```

2. Configure the control plane subnet to use IdM as the DNS name server:

```
$ openstack subnet set ctlplane-subnet --dns-nameserver  <idm_server_address>
```

3. Set the **DnsServers** parameter in an environment file to use your IdM server:

```
parameter_defaults:
  DnsServers: ["<idm_server_address>"]
```

This parameter is usually defined in a custom **network-environment.yaml** file.

3.2.2. Configure overcloud to use novajoin

1. To enable IdM integration, create a copy of the **/usr/share/openstack-tripleo-heat-templates/environments/predictable-placement/custom-domain.yaml** environment file:

```
$ cp /usr/share/openstack-tripleo-heat-templates/environments/predictable-
placement/custom-domain.yaml \
  /home/stack/templates/custom-domain.yaml
```

2. Edit the **/home/stack/templates/custom-domain.yaml** environment file and set the **CloudDomain** and **CloudName*** values to suit your deployment. For example:

```
parameter_defaults:
  CloudDomain: lab.local
  CloudName: overcloud.lab.local
  CloudNameInternal: overcloud.internalapi.lab.local
  CloudNameStorage: overcloud.storage.lab.local
  CloudNameStorageManagement: overcloud.storagemgmt.lab.local
  CloudNameCtlplane: overcloud.ctlplane.lab.local
```

3. Include the following environment files in the overcloud deployment process:

   - **/usr/share/openstack-tripleo-heat-templates/environments/ssl/enable-internal-tls.yaml**
   - **/usr/share/openstack-tripleo-heat-templates/environments/ssl/tls-everywhere-endpoints-dns.yaml**
   - **/home/stack/templates/custom-domain.yaml**
     For example:

     ```
     openstack overcloud deploy \
       --templates \
        -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/enable-internal-tls.yaml \
        -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/tls-everywhere-endpoints-dns.yaml \
        -e /home/stack/templates/custom-domain.yaml \
     ```

     As a result, the deployed overcloud nodes will be automatically enrolled with IdM.

4. This only sets TLS for the internal endpoints. For the external endpoints you can use the normal means of adding TLS with the **/usr/share/openstack-tripleo-heat-templates/environments/ssl/enable-tls.yaml** environment file (which must be modified to add your custom certificate and key). Consequently, your **openstack deploy** command would be similar to this:

```
openstack overcloud deploy \
  --templates \
  -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/enable-internal-tls.yaml \
  -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/tls-everywhere-endpoints-dns.yaml \
  -e /home/stack/templates/custom-domain.yaml \
  -e /home/stack/templates/enable-tls.yaml
```

5. Alternatively, you can also use IdM to issue your public certificates. In that case, you need to use the **/usr/share/openstack-tripleo-heat-templates/environments/services/haproxy-public-tls-certmonger.yaml** environment file. For example:

```
openstack overcloud deploy \
  --templates \
   -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/enable-internal-tls.yaml \
   -e /usr/share/openstack-tripleo-heat-templates/environments/ssl/tls-everywhere-endpoints-dns.yaml \
```

```
  -e /home/stack/templates/custom-domain.yaml \
  -e /usr/share/openstack-tripleo-heat-templates/environments/services/haproxy-public-tls-
certmonger.yaml
```

3.3. VALIDATE A NODE IN IDM

1. Locate an overcloud node in IdM and confirm that the host entry includes **Keytab:True**:

```
$ ipa host-show overcloud-node-01
  Host name: overcloud-node-01.lab.local
  Principal name: host/overcloud-node-01.lab.local@LAB.LOCAL
  Principal alias: host/overcloud-node-01.lab.local@LAB.LOCAL
  SSH public key fingerprint: <snip>
  Password: False
  Keytab: True
  Managed by: overcloud-node-01.lab.local
```

2. SSH to the node and confirm that *sssd* can query IdM users. For example, to query an IdM user named **susan**:

```
$ getent passwd susan
uid=1108400007(susan) gid=1108400007(bob) groups=1108400007(susan)
```

3.4. CONFIGURE DNS ENTRIES FOR NOVAJOIN

If you use the **haproxy-public-tls-certmonger.yaml** template to issue public certificates for endpoints, then you will need to manually create DNS entries for the VIP endpoints used by Novajoin:

1. Identify the overcloud networks. You can expect to locate these in **/home/stack/virt/network/network-environment.yaml**:

```
parameter_defaults:
    ControlPlaneDefaultRoute: 192.168.24.1
    ExternalAllocationPools:
    -   end: 10.0.0.149
        start: 10.0.0.101
    InternalApiAllocationPools:
    -   end: 172.17.1.149
        start: 172.17.1.10
    StorageAllocationPools:
    -   end: 172.17.3.149
        start: 172.17.3.10
    StorageMgmtAllocationPools:
    -   end: 172.17.4.149
        start: 172.17.4.10
```

2. Create a list of virtual IP addresses (VIP) for each overcloud network. For example: /home/stack/virt/public_vip.yaml

```
parameter_defaults:
    ControlFixedIPs: [{'ip_address':'192.168.24.101'}]
    PublicVirtualFixedIPs: [{'ip_address':'10.0.0.101'}]
    InternalApiVirtualFixedIPs: [{'ip_address':'172.17.1.101'}]
    StorageVirtualFixedIPs: [{'ip_address':'172.17.3.101'}]
    StorageMgmtVirtualFixedIPs: [{'ip_address':'172.17.4.101'}]
    RedisVirtualFixedIPs: [{'ip_address':'172.17.1.102'}]
```

3. Add DNS entries to IdM for each of the VIPs. You may also need to create new zones. The following example demonstrates DNS record and zone creation for IdM:

```
ipa dnsrecord-add lab.local overcloud --a-rec 10.0.0.101
ipa dnszone-add ctlplane.lab.local
ipa dnsrecord-add ctlplane.lab.local overcloud --a-rec 192.168.24.101
ipa dnszone-add internalapi.lab.local
ipa dnsrecord-add internalapi.lab.local overcloud --a-rec 172.17.1.101
ipa dnszone-add storage.lab.local
ipa dnsrecord-add storage.lab.local overcloud --a-rec 172.17.3.101
ipa dnszone-add storagemgmt.lab.local
ipa dnsrecord-add storagemgmt.lab.local overcloud --a-rec 172.17.4.101
```

CHAPTER 4. USING DOMAIN-SPECIFIC LDAP BACKENDS WITH DIRECTOR

Red Hat OpenStack Platform director can configure keystone to use one or more LDAP backends. This approach results in the creation of a separate LDAP backend for each keystone domain.

4.1. SETTING THE CONFIGURATION OPTIONS

For deployments using Red Hat OpenStack Platform director, you need to set the **KeystoneLDAPDomainEnable** flag to **true** in your heat templates; as a result, this will configure the **domain_specific_drivers_enabled** option in keystone (within the **identity** configuration group).

NOTE

The default directory for domain configuration files is set to **/etc/keystone/domains/**. You can override this by setting the required path using the **keystone::domain_config_directory** hiera key and adding it as an **ExtraConfig** parameter within an environment file.

You must also add a specification of the LDAP backend configuration. This is done using the **KeystoneLDAPBackendConfigs** parameter in **tripleo-heat-templates**, where you can then specify your required LDAP options.

4.2. CONFIGURE THE DIRECTOR DEPLOYMENT

1. Create a copy of the **keystone_domain_specific_ldap_backend.yaml** environment file:

```
$ cp /usr/share/openstack-tripleo-heat-
templates/environments/services/keystone_domain_specific_ldap_backend.yaml
/home/stack/templates/
```

2. Edit the **/home/stack/templates/keystone_domain_specific_ldap_backend.yaml** environment file and set the values to suit your deployment. For example, these entries create a LDAP configuration for a keystone domain named **testdomain**:

```
parameter_defaults:
  KeystoneLDAPDomainEnable: true
  KeystoneLDAPBackendConfigs:
    testdomain:
      url: ldaps://192.0.2.250
      user: cn=openstack,ou=Users,dc=director,dc=example,dc=com
      password: RedactedComplexPassword
      suffix: dc=director,dc=example,dc=com
      user_tree_dn: ou=Users,dc=director,dc=example,dc=com
      user_filter: "(memberOf=cn=OSuser,ou=Groups,dc=director,dc=example,dc=com)"
      user_objectclass: person
      user_id_attribute: cn
```

3. You can also configure the environment file to specify multiple domains. For example:

```
KeystoneLDAPBackendConfigs:
  domain1:
      url: ldaps://domain1.example.com
      user: cn=openstack,ou=Users,dc=director,dc=example,dc=com
      password: RedactedComplexPassword
      ...
    domain2:
      url: ldaps://domain2.example.com
      user: cn=openstack,ou=Users,dc=director,dc=example,dc=com
      password: RedactedComplexPassword
      ...
```

This will result in two domains named **domain1** and **domain2**; each will have a different LDAP domain with its own configuration.