



OpenStack Labs

Lab 02: Organizing People and Resources

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About This Document

- This document was developed by a team at the University of Tennessee at Chattanooga led by Dr. Mengjun Xie (mengjun-xie@utc.edu).
- The development of this document was supported by a National Centers of Academic Excellence in Cybersecurity Grant (#H98230-20-1-0351), housed at the National Security Agency.
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Introduction

In this lab, you will manage projects, users, and roles. In OpenStack, *projects* (sometimes known as *accounts*), are units used to organize users and resources. A project can contain many users, and any user can belong to multiple projects. *Roles* are assigned individually to user-project pairs, and they define the actions a user is allowed to perform within a particular project. Projects also own resources such as virtual machines and containers.

Objectives

- Create and delete projects with the *Horizon Dashboard*.
- Create and delete projects with the *OpenStack Unified CLI*.
- Manage users and roles with the *Horizon Dashboard*.
- Manage users and roles with the *OpenStack Unified CLI*.

Lab Settings

The information in the table below will be needed in order to complete the lab. The task sections below provide details on the use of this information.

Virtual Machine	IP Address	Account	Password
workstation	ens3: 192.168.1.21 ens4: 172.25.250.21	ubuntu	ubuntu
devstack	ens3: 192.168.20 ens4: 172.25.250.20	ubuntu	ubuntu

1 Creating and Deleting Projects with the Horizon Dashboard

In this task, you will create and delete a project with the *Horizon Dashboard*.

- 1.1. Log into the **workstation** machine as the **ubuntu** user with password **ubuntu**.

```
Ubuntu 18.04.6 LTS workstation tty1
workstation login: ubuntu
Password:
```

- 1.2. Launch the graphical user interface.

```
ubuntu@workstation:~$ startx
```

```
Welcome to Ubuntu 18.04.6 LTS (GNU/Linux 4.15.0-213-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

 System information as of Fri Jun  7 21:01:55 UTC 2024

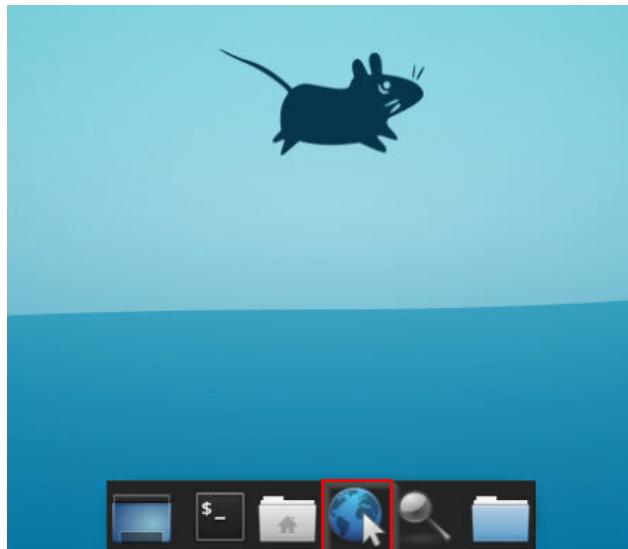
 System load:  0.6              Processes:      197
 Usage of /:   7.9% of 116.12GB  Users logged in:  0
 Memory usage: 13%            IP address for ens3: 192.168.1.21
 Swap usage:   0%            IP address for ens4: 172.25.250.21

Expanded Security Maintenance for Infrastructure is not enabled.

2 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

146 additional security updates can be applied with ESM Infra.
Learn more about enabling ESM Infra service for Ubuntu 18.04 at
https://ubuntu.com/18-04

ubuntu@workstation:~$ startx_
```

1.3. Open the web browser.

- 1.4.**
- Enter the IP address of the
- devstack**
- machine (
- 192.168.1.20**
-) into the address bar, and log into the OpenStack Horizon Dashboard. The username is
- admin**
- , and the password is
- secret**
- .

The screenshot shows the OpenStack Horizon login interface. At the top, there's a large red OpenStack logo followed by the word "openstack." Below it is a "Log in" button. The form has two input fields: "User Name" containing "admin" and "Password" containing "secret", both of which are enclosed in red boxes. At the bottom right of the form is a "Sign In" button, also enclosed in a red box.

- 1.5.** Create a project named **dev**. First, navigate to **Identity > Projects**, then click **Create Project**.

Project Name	Description	Project ID	Domain Name	Enabled	Actions
demo		39e851b14f864573aad60582c35e40dc	Default	Yes	<button>Manage Members</button>
alt_demo		3d65ee93169c4e4fc53ef87a7398e2e	Default	Yes	<button>Manage Members</button>
service		b66a24ad2cc49b79ca1e0c07b3b3258	Default	Yes	<button>Manage Members</button>
invisible_to_admin		bb23f57aff584133a0657ee0fc7ffd3f	Default	Yes	<button>Manage Members</button>
admin	Bootstrap project for initializing the cloud.	eb2dcd08d8ae46ffac3f16c3973ef61d	Default	Yes	<button>Manage Members</button>

- 1.6.** Enter **dev** in the *Name* field and **Dev Project** in the *Description* field. Click **Create Project**.

Create Project

Project Information *

Domain ID	default
Domain Name	Default
Name *	dev
Description	Dev Project
Enabled	<input checked="" type="checkbox"/>

Create Project

Note

Notice the **dev** project now appears in the *Horizon Dashboard*.

- 1.7.** Suppose that the **alt_demo** project is no longer needed and can be deleted. To delete this project, click the checkbox in the same row as **alt_demo**, then click **Delete Projects**.

Name	Description	Project ID	Domain Name	Enabled	Actions
demo		39e851b14f864573aad60582c35e40dc	Default	Yes	Manage Members
<input checked="" type="checkbox"/> alt_demo		3d65ee93169c4e4fb53ef87a7398e2e	Default	Yes	Manage Members
dev	Dev Project	710f8a9f6ded43189d6655e16cae77bc	Default	Yes	Manage Members
service		b66a24ad2cc49b79ca1e0c07b3b3258	Default	Yes	Manage Members
invisible_to_admin		bb23f57aff584133a0657ee0fc7ffd3f	Default	Yes	Manage Members
admin	Bootstrap project for initializing the cloud.	eb2cd08d8ae46ffac3f16c3973ef61d	Default	Yes	Manage Members

Tip

The above method allows selecting and deleting multiple projects at once. A single project can also be deleted by clicking the dropdown in the same row as the project in the **Actions** column and clicking **Delete Project**.

- 1.8.** In the **Confirm Delete Projects** popup box, click **Delete Projects**.

Confirm Delete Projects

You have selected: "alt_demo". Please confirm your selection. This action cannot be undone.

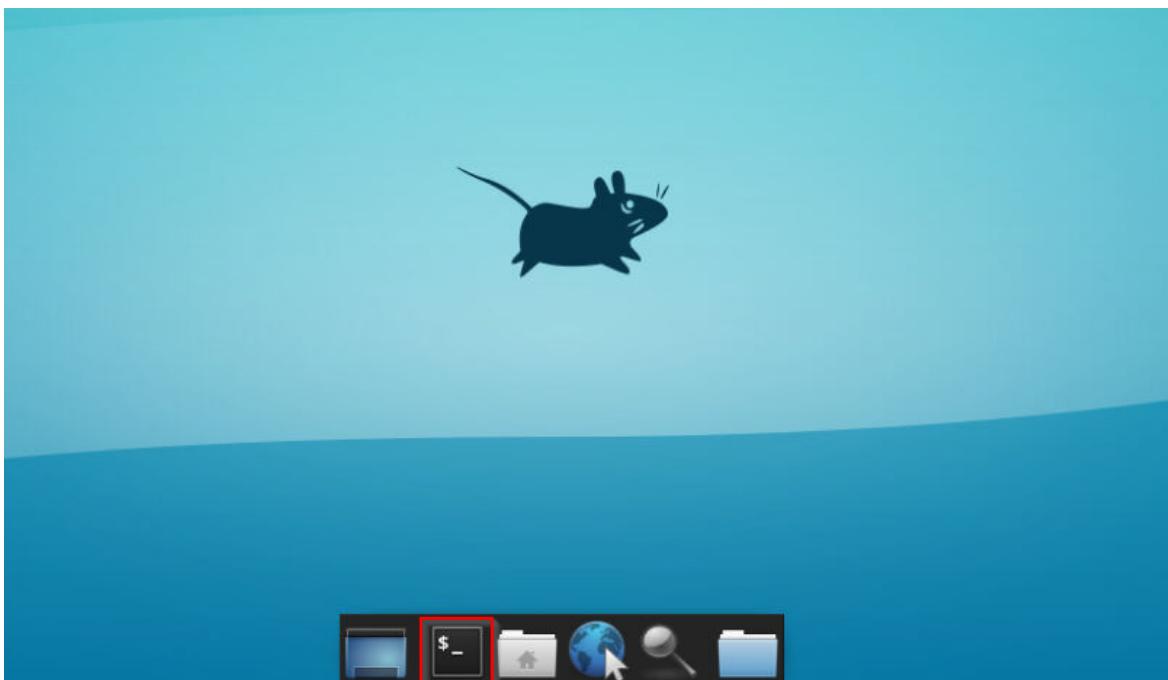
- 1.9.** Log out of the Horizon Dashboard by clicking on the **admin** dropdown at the top right and selecting **Sign Out**.

- 1.10.** Close the web browser and continue to the next task.

2 Creating and Deleting Projects with the OpenStack Unified CLI

In this task, you will use the *OpenStack Unified CLI* to create and delete a project from the command line.

- 2.1.** Open a terminal by clicking the terminal icon in the icon bar at the bottom of the screen. A terminal can also be opened by right-clicking the desktop and selecting **Open Terminal Here**, or by selecting **Applications** at the top left of the screen, then selecting **Terminal Emulator**.



- 2.2.** Use the **source** command with the **keystonerc-admin** argument to access OpenStack as the admin.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

2.3. List the existing OpenStack projects.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
+-----+-----+
| ID          | Name      |
+-----+-----+
| 39e851b14f864573aad60582c35e40dc | demo      |
| 710f8a9f6ded43189d6655e16cae77bc | dev       |
| b66a24ad2ccd49b79cale0c07b3b3258 | service   |
| bb23f57aff584133a0657ee0fc7ffd3f | invisible_to_admin |
| eb2dc08d8ae46ffac3f16c3973ef61d | admin     |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

2.4. Create a project named **testing**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project create \
> --description testing \
> testing
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project create \
> --description testing \
> testing
+-----+-----+
| Field      | Value      |
+-----+-----+
| description | testing    |
| domain_id  | default    |
| enabled     | True       |
| id          | c0f8cc0de4324e419524ba5df42a88f8 |
| is_domain   | False      |
| name        | testing    |
| options     | {}         |
| parent_id   | default    |
| tags        | []         |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

When typing the command make sure there is a space between **create** and ****, and press **Enter** to get the **>** and continue typing the rest of the command.

2.5. Verify that the project has been created.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
+-----+-----+
| ID          | Name   |
+-----+-----+
| 012e3f171c4a47be8019a612656a2df9 | testing
| 39e851b14f864573aad60582c35e40dc | demo
| 710f8a9f6ded43189d6655e16cae77bc | dev
| b66a24ad2ccd49b79cale0c07b3b3258 | service
| bb23f57aff584133a0657ee0fc7ffd3f | invisible_to_admin
| eb2dc08d8ae46ffac3f16c3973ef61d | admin
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

2.6. Show the project description that was added during the creation of the project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project show testing
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project show testing
+-----+-----+
| Field      | Value   |
+-----+-----+
| description | testing
| domain_id  | default
| enabled     | True
| id          | c0f8cc0de4324e419524ba5df42a88f8
| is_domain   | False
| name        | testing
| options     | {}
| parent_id   | default
| tags        | []
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

The **openstack <object> show** command prints the same information shown when the object was first created.

2.7. The **dev** project from the previous step will be used throughout the remainder of the lab. The **testing** project was only created for demonstration and can be safely deleted. Delete the **testing** project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project delete testing
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project delete testing
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.8. Verify that the **testing** project has been deleted by listing the projects again and noting that **testing** no longer appears.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
```

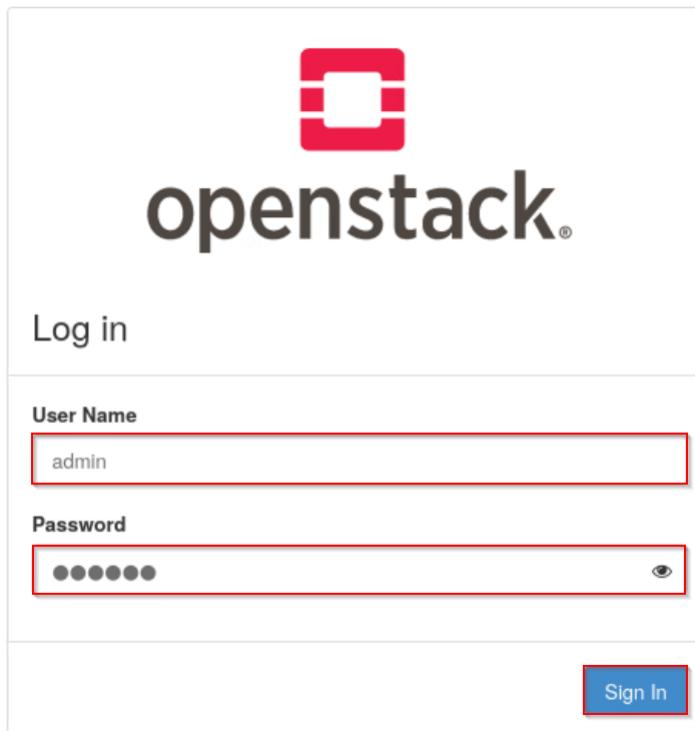
```
[ubuntu@workstation (keystone-admin)]:~$ openstack project list
+-----+-----+
| ID          | Name      |
+-----+-----+
| 39e851b14f864573aad60582c35e40dc | demo      |
| 710f8a9f6ded43189d6655e16cae77bc | dev       |
| b66a24ad2ccd49b79cale0c07b3b3258 | service   |
| bb23f57aff584133a0657ee0fc7ffd3f | invisible_to_admin |
| eb2dcd08d8ae46ffac3f16c3973ef61d | admin     |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 2.9. Leave the terminal window open and continue to the next task.

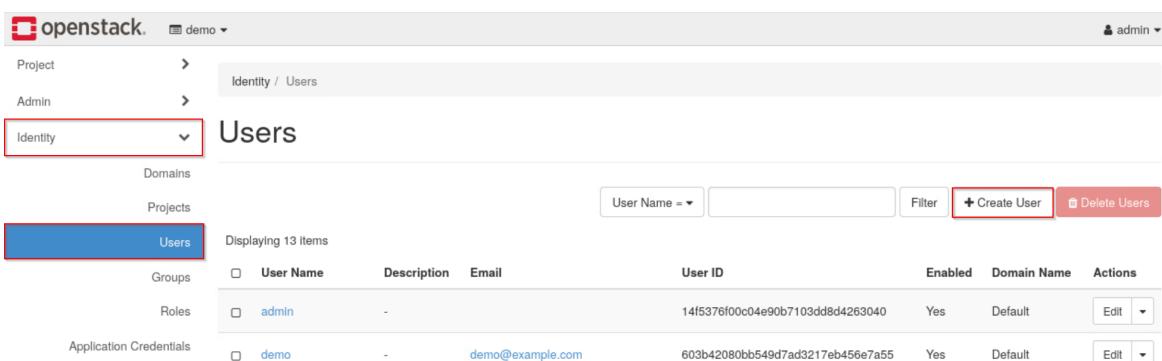
3 Managing Users and Roles with the Horizon Dashboard

In this task, you will use the *Horizon Dashboard* to manage users, assign user roles, and configure user privileges. You will create a user who is an administrator of the **dev** project, and that user will perform several admin actions in that project, such as creating user accounts, setting user passwords, and adding users to the project.

- 3.1. Open the web browser, navigate to the OpenStack login page at <http://192.168.1.20>, and log in with the username **admin** and the password **secret**.



- 3.2. Create the **cloud-admin** user with **admin** privileges in the **dev** project. This user will manage other users in the project and their roles. First, navigate to **Identity > Users** and click **Create User**.



User Name	Description	Email	User ID	Enabled	Domain Name	Actions
admin	-		14f5376f00c04e90b7103dd8d4263040	Yes	Default	Edit
demo	-	demo@example.com	603b42080bb549d7ad3217eb456e7a55	Yes	Default	Edit

- 3.3. In the dialog box, enter **cloud-admin** in the *User Name* field, and enter **secret** in the *Password* and *Confirm Password* fields. Select the **dev** project from the *Primary Project* dropdown, and select **admin** in the *Role* dropdown. Finally, leave the **Enabled** checkbox selected and click **Create User**.

Create User

Domain ID: default

Description:

Create a new user and set related properties including the Primary Project and Role.

User Name *: **cloud-admin**

Description:

Email:

Password *: *********

Confirm Password *: *********

Primary Project: dev

Role: admin

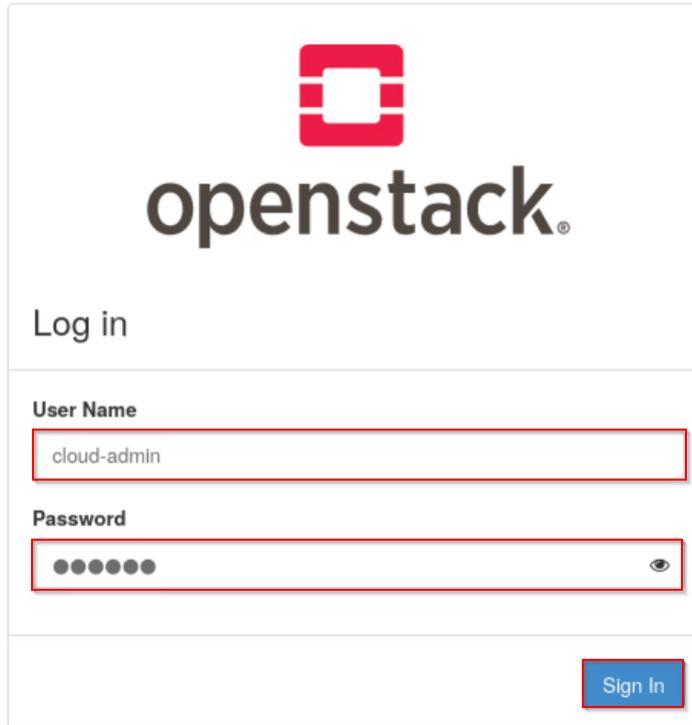
Enabled

Lock password

Tip

You may need to use the scroll bar on the right of the dialog to scroll down to see the projects and roles.

- 3.4.** Log out of the dashboard by clicking the **admin** dropdown in the top right corner, then clicking **Sign Out**, and log back in to the dashboard as the newly-created **cloud-admin** user with the password **secret**. Next, the **cloud-admin** user will create additional users and assign them to the **dev** project.



- 3.5.** Navigate to **Identity > Users** and click **Create User**.

- 3.6.** In the *Create User* dialog box, enter **cloud-test1** in the *User Name* field, and **secret** in the *Password* and *Confirm Password* fields.

Create User ×

Domain ID

Description:
Create a new user and set related properties including the Primary Project and Role.

Domain Name

User Name *

Description

Email

Password *

Confirm Password *

Tip

You may need to use the scroll bar on the right side of the dialog box to see the rest of the fields.

- 3.7.** After scrolling down if necessary, select the **dev** project from the *Primary Project* dropdown. Leave the *Role* set to **member**. Click **Create User**.

Password *

Confirm Password *

Primary Project

dev

Role

member

Enabled

Lock password

Cancel Create User

- 3.8.** Repeat steps 5 through 7 to create the **cloud-test2** user account.
- 3.9.** Delete the **cloud-test1** user account. On the *Users* tab, click the dropdown in the *Actions* column in the row for the **cloud-test1** user account. Click **Delete User**, and confirm the deletion in the popup box that appears.

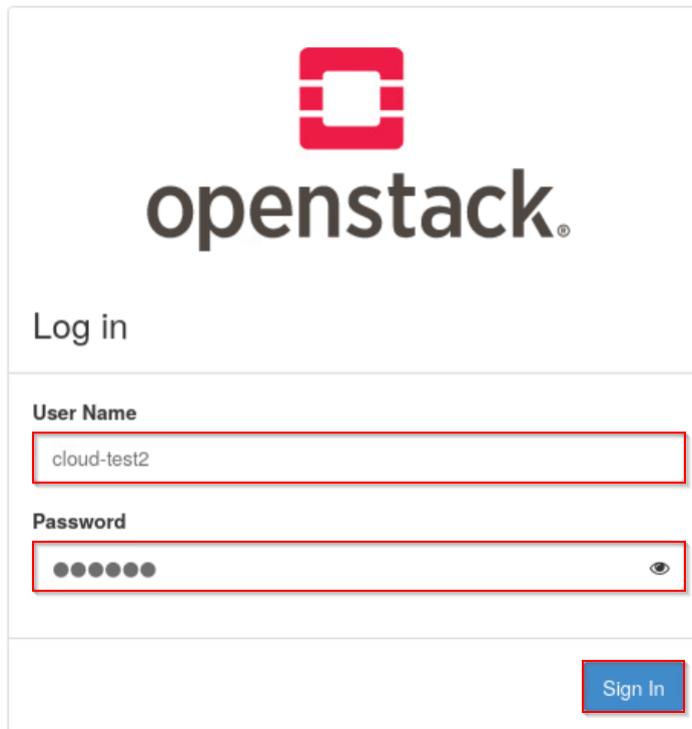
<input type="checkbox"/>	cloud-admin	-	0f3aaa1f2b014f1faaa1f296ffe041d6	Yes	Default	Edit
<input type="checkbox"/>	cloud-test1	-	3e0ecb2616124b7f985a1254e2097bbe	Yes	Default	Edit
<input type="checkbox"/>	cloud-test2	-	222393a1b60c44b4a1493d96ffc830cd	Yes	Default	Change Password Disable User Delete User

Displaying 16 items

Tip

To delete multiple users at once, select the checkboxes beside the users to be deleted, and click **Delete Users** at the top right of the page.

- 3.10.** Next, we will disable the **cloud-test2** user, which does not allow that user to log in. To show that the user is currently enabled and able to log in, first log out of the dashboard. Then, log back in with the username **cloud-test2** and the password **secret**.

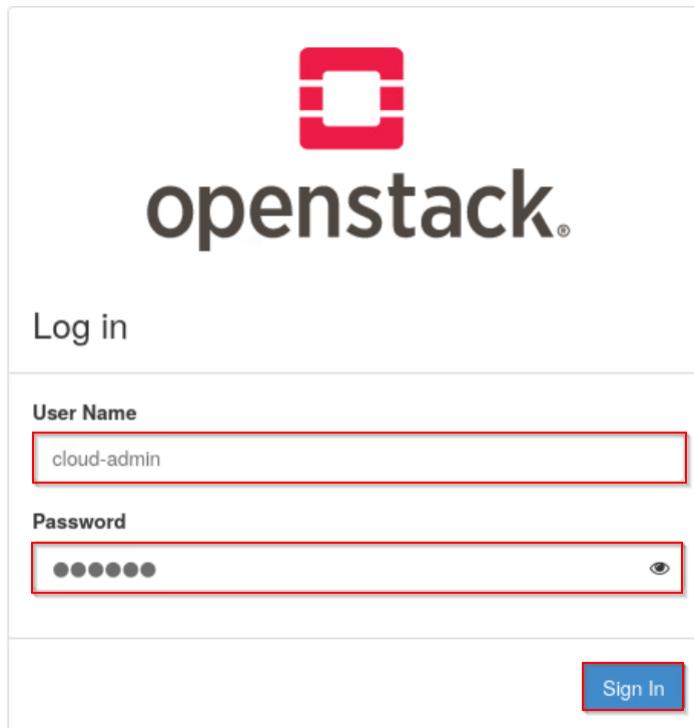


- 3.11.** Since the user is able to log in, it is enabled. For further proof, navigate to **Identity > Users** and note that the list of users is visible.

Note

Notice, also, that since **cloud-test2** has only member privileges, it cannot see other users, even other members of the **dev** project. Additionally, this user cannot see the **Admin** tab in the sidebar.

- 3.12. Log out of the dashboard, and log back in with the username **cloud-admin** and the password **secret**.



- 3.13. Navigate to **Identity > Users**. Disable the **cloud-test2** user account. On the *Users* tab, click the dropdown in the *Actions* column for the **cloud-test2** user account entry, and click **Disable User**.

Name	ID	Enabled	Default	Action
cloud-admin	0f3aaa1f2b014f1faaa1f296ffe041d6	Yes	Default	Edit
cloud-test2	222393a1b60c44b4a1493d96fc830cd	Yes	Default	Edit

Displaying 15 items

- 3.14. Log out one more time, and attempt to log in as **cloud-test2** with the password **secret**.

The screenshot shows the OpenStack Horizon login interface. At the top is the OpenStack logo. Below it, the word "openstack." is displayed in a large, lowercase, sans-serif font. Underneath this, the word "Log in" is centered. A red horizontal bar contains the text "Invalid credentials.". Below this bar are two input fields: "User Name" containing "cloud-test2" and "Password" containing five black dots. To the right of the password field is an "eye" icon for password visibility. At the bottom right of the form is a blue "Sign In" button.

Note

The account is now disabled, and the **cloud-test2** user will receive an invalid credentials error when it attempts to log in.

- 3.15. Log back in to the dashboard as **cloud-admin** with the password **secret**. Navigate to **Identity > Users**. Click the dropdown in the *Actions* column in the row for **cloud-test2**, and click **Change Password**.

<input type="checkbox"/> cloud-admin	-	0f3aaa1f2b014f1faaa1f296ffe041d6	Yes	Default	<button>Edit</button>
<input type="checkbox"/> cloud-test2	-	222393a1b60c44b4a1493d96ffcb30cd	Yes	Default	<button>Edit</button>
Displaying 15 items					

- 3.16.** Change the password for **cloud-test2** to **password**. Enter **password** into the *Password* and *Confirm Password* fields, then click **Save**.

Change Password X

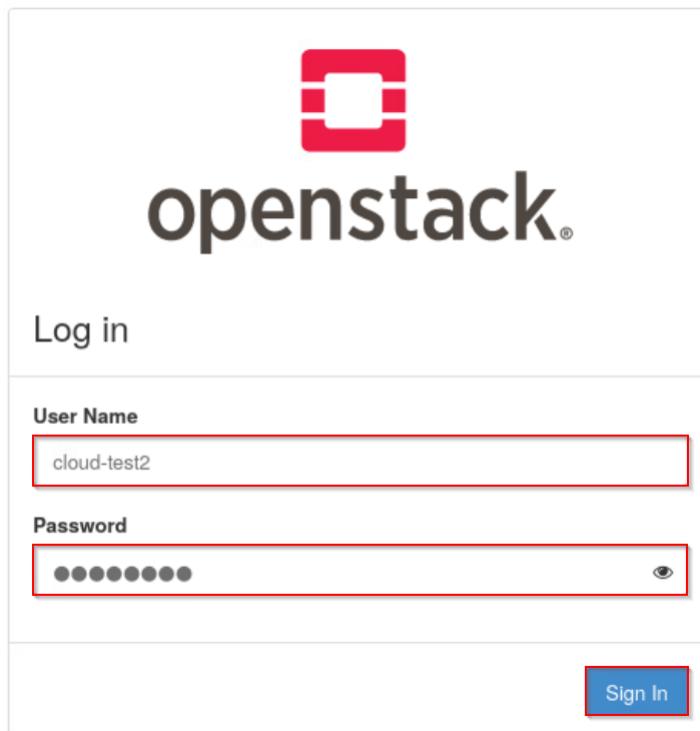
Password *	<input type="text" value="*****"/> (eye)
Confirm Password *	<input type="text" value="*****"/> (eye)
User Name	cloud-test2
Cancel Save	

- 3.17.** Back on the **Users** page, click the same dropdown as before, and click **Enable User** to allow **cloud-test2** to log in and perform actions.

<input type="checkbox"/>	cloud-admin	-	0f3aaa1ff2b014f1faaa1f296ffe041d6	Yes	Default	Edit ▾
<input type="checkbox"/>	cloud-test2	-	222393a1b60c44b4a1493d96ffc830cd	No	Default	Edit ▾
Displaying 15 items						

Change Password
Enable User
Delete User

- 3.18.** Log out of the dashboard and log back in as **cloud-test2** with the password **password** to verify that the user's password has been set and that the user can log in.

**Note**

The **cloud-test2** and **cloud-test3** users were not deleted in this section because they will be used in the following section to demonstrate deleting users from the command line.

- 3.19.** Log out of the dashboard and close the web browser. Continue to the next task.

4 Managing Users and Roles with the OpenStack Unified CLI

In this task, you will use the *OpenStack Unified CLI* to manage users, assign user roles, and configure user privileges.

- 4.1. Open a terminal if you do not already have one running, and navigate to the home directory.
- 4.2. Before sourcing any credentials, let us take a closer look at the keystone credentials file we have been using up to this point. We have not yet looked at the details of this file, but they will become relevant in this section. The **kestonerc-admin** file in the home directory defines several **OS_*** environment variables that allow you to use the OpenStack platform on the **devstack** server through the OpenStack Unified CLI. You can run **cat** on the file to view its contents. The file lists the username as **admin**, the password as **secret**, and the project as **demo**. The address for **OS_AUTH_URL** is the IP address of the **devstack** server, **192.168.1.20**.

```
ubuntu@workstation:~$ cat ~/kestonerc-admin
```

```
ubuntu@workstation:~$ cat ~/kestonerc-admin
unset OS_SERVICE_TOKEN
unset OS_TENANT_ID
unset OS_TENANT_NAME
export OS_USERNAME=admin
export OS_PASSWORD=secret
export OS_AUTH_URL=http://192.168.1.20/identity
export OS_REGION_NAME=RegionOne
export OS_PROJECT_NAME=demo
export OS_INTERFACE=public
export OS_IDENTITY_API_VERSION=3
export PS1='[\u033[01;32m]\u@\h \u033[01;36m](keystone-admin)\u033[00m]:\u033[01;34m]\w\u033[00m\$ '
ubuntu@workstation:~$
```

Note

When the **source** command is used on a keystone credentials file, it enables all the **OS_*** environment variables included in the file.

Note

The **export PS1=...** line at the end of the keystone credentials file modifies the shell prompt to show the OpenStack user whose credentials are keyed in.

Note

The same prompt without color can be achieved with the line **export PS1='[\u@\h (keystone-admin)]:\w\$'**. Here, **\u** stands for the current username, **\h** is the hostname, and **\w** is the current working directory. The other escape sequences specify the colors of the prompt. For example, **\u033[01;32m** sets the color to a light green, and **\u033[00m** resets the color to the default (white in this case).

- 4.3. Source the credentials for **admin** from the **keystonerc-admin** file.

```
ubuntu@workstation:~$ source ~/keystonerc-admin
```

```
ubuntu@workstation:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.4. Verify that the **OS_*** environment variables have been exported to the shell environment.

```
[ubuntu@workstation (keystone-admin)]:~$ env | grep OS_
```

```
[ubuntu@workstation (keystone-admin)]:~$ env | grep OS_
OS_AUTH_URL=http://192.168.1.20/identity
OS_REGION_NAME=RegionOne
OS_PROJECT_NAME=demo
OS_IDENTITY_API_VERSION=3
OS_INTERFACE=public
OS_PASSWORD=secret
OS_USERNAME=admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.5. With a better grasp of the keystone credentials file, we can proceed to managing users. First, list the existing OpenStack users.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
+-----+-----+
| ID      | Name   |
+-----+-----+
| 14f5376f00c04e90b7103dd8d4263040 | admin
| 603b42080bb549d7ad3217eb456e7a55 | demo
| a7cee45b0f484fc8980c71e2243d2e1 | demo_reader
| 8d21de784ae2493aa5c8cc73a82be6b3 | alt_demo
| 7e7596f02f1c45afad1fcd09de331781 | alt_demo_member
| 44ffe37cf07948c88958066614ef5d74 | alt_demo_reader
| 899fc9a9b17445b4aac553e4f5f192ec | system_member
| 604adb2150514649a41eaee6273ceb2a | system_reader
| ab546669b1cd44b3aa2305c303363425 | nova
| 82142039d42341718fb126134266ec80 | glance
| 0c5d50f813184b588f3bc0c91250c7d7 | cinder
| efc593f762a447dba12bf2fe870f1310 | neutron
| c79e26f993fb45ab939e7d0bbe12c263 | placement
| 0f3aaa1f2b014f1faaa1f296ffe041d6 | cloud-admin
| 222393a1b60c44b4a1493d96ffc830cd | cloud-test2
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.6. A user must have sufficient privileges to create roles and assign them to other users. The current user, **admin** has full administrator privileges and can create and assign roles to any user. Create the **cloud-test3** user on the **dev** project with the password **secret**.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user create \
> --project dev \
> --password secret \
> cloud-test3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user create \
> --project dev \
> --password secret \
> cloud-test3
+-----+-----+
| Field      | Value   |
+-----+-----+
| default_project_id | 93cdd0c9f35d451da331b9d6d92d9900 |
| domain_id    | default |
| enabled       | True    |
| id            | d137572cacf144d3b89634af733920df |
| name          | cloud-test3 |
| options        | {}      |
| password_expires_at | None   |
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

4.7. Verify that the user was created.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
+-----+-----+
| ID          | Name      |
+-----+-----+
| 14f5376f00c04e90b7103dd8d4263040 | admin     |
| 603b42080bb549d7ad3217eb456e7a55 | demo      |
| a7cee45b0f484fca8980c71e2243d2e1 | demo_reader |
| 8d21de784ae2493aa5c8cc73a82be6b3 | alt_demo   |
| 7e7596f02f1c45afad1fc09de331781 | alt_demo_member |
| 44ffe37cf07948c88958066614ef5d74 | alt_demo_reader |
| 899fc9a9b17445b4aac553e4f5f192ec | system_member |
| 604adb2150514649a41eaee6273ceb2a | system_reader |
| ab546669b1cd44b3aa2305c303363425 | nova      |
| 82142039d42341718fb126134266ec80 | glance    |
| 0c5d50f813184b588f3bc0c91250c7d7 | cinder    |
| efc593f762a447dba12bf2fe870f1310 | neutron   |
| c79e26f993fb45ab939e7d0bbe12c263 | placement |
| 0f3aaal1f2b014f1faaa1f296ffe041d6 | cloud-admin |
| 222393a1b60c44b4a1493d96ffc830cd | cloud-test2 |
| d137572cacf144d3b89634af733920df | cloud-test3 |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

When searching for a particular value in a long list, it is often helpful to pipe the command's output to **grep** or another string searching tool. For example, this command would show only the line containing **cloud-test3**:

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list | \
> grep cloud-test3
```

However, these labs will almost always show the full output of the **list** commands to show a snapshot of what the current state should be as you follow the instructions.

- 4.8. When created through the OpenStack Unified CLI, users are not automatically assigned a role, and there is no option to assign a role in the **openstack user create** command. This is because roles are scoped to projects, not to users. Therefore, the **cloud-test3** user will need to be assigned a role on the **dev** project before being able to perform any actions within it. List the available roles to choose an appropriate one.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role list
+-----+-----+
| ID          | Name      |
+-----+-----+
| 06a95c82ba3d4100a1d0f60bb905103c | reader    |
| 2c3b8113b193450aae853366edde59cf | member    |
| 3e87224510c64534ab79f89dale4bc30 | service   |
| 7fead54bd7254e19953681eff51bb8d7 | manager   |
| 8dcf33f6eba64391b67ef08c5fae8c80 | ResellerAdmin |
| 8ecccc9d106748ba9c3f69a594a035ee | admin     |
| c885d097a99c4311842278b3c65e54ce | anotherrole |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

To verify that a user is not assigned a role by default, you can run the following command and note the empty output:

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role list assignment
list \
> --user cloud-test3
```

- 4.9. Assign **cloud-test3** the **member** role on the **dev** project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role add \
> --project dev \
> --user cloud-test3 \
> member
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role add \
> --project dev \
> --user cloud-test3 \
> member
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.10. Verify that **cloud-test3** has the **member** user role for the **dev** project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role assignment list \
> --user cloud-test3 \
> --project dev \
> --names
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role assignment list \
> --user cloud-test3 \
> --project dev \
> --names
+-----+-----+-----+-----+
| Role | User           | Group | Project      | Domain | Inherited |
+-----+-----+-----+-----+
| member | cloud-test3@Default |       | dev@Default |        | False    |
+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.11. it:copy-keystone Copy the existing `~/kestonerc-admin` file to `~/kestonerc-cloud-test3`.

```
[ubuntu@workstation (keystone-admin)]:~$ cp ~/kestonerc-admin \
> ~/kestonerc-cloud-test3
```

```
[ubuntu@workstation (keystone-admin)]:~$ cp ~/kestonerc-admin \
> ~/kestonerc-cloud-test3
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.12. it:edit-keystone Edit the `~/kestonerc-cloud-test3` file and change the **OS_USERNAME** from **admin** to **cloud-test3** and the **OS_PROJECT_NAME** from **demo** to **dev**. Additionally, change the line beginning with **export PS1=...** so that **(keystone-admin)** becomes **(keystone-cloud-test3)**. Modify the file so that the content matches below. When you are finished, press **CTRL+X**, then **Y** to accept the file changes. Press **Enter** to save and exit **nano**.

```
[ubuntu@workstation (keystone-admin)]:~$ nano ~/kestonerc-cloud-test3
```

```
GNU nano 2.9.3                               /home/ubuntu/kestonerc-cloud-test3
unset OS_SERVICE_TOKEN
unset OS_TENANT_ID
unset OS_TENANT_NAME
export OS_USERNAME=cloud-test3
export OS_PASSWORD=secret
export OS_AUTH_URL=http://192.168.1.20/identity
export OS_REGION_NAME=RegionOne
export OS_PROJECT_NAME=dev
export OS_INTERFACE=public
export OS_IDENTITY_API_VERSION=3
export PS1='[\[\033[01;32m\]\u@\h \[\033[01;36m\](keystone-cloud-test3)\[\033[00m\]]:\[\033[01;34m\]\w\[\033[00m\]\$ '
```

- 4.13. Non-privileged users are limited in the commands they can run and the actions they can perform. To demonstrate this, source the `~/keystonerc-cloud-test3` keystone credentials for the **cloud-test3** user and attempt to list the users. You should receive an HTTP 403 (Forbidden) error, which indicates that the user has valid credentials but lacks the privileges to perform the action.

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack user list
```

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack user list
You are not authorized to perform the requested action: identity:list_users. (HTTP 403) (Request-ID: req-7a64f751-3f4c-419e-bb8c-a375c62cc0ba)
[ubuntu@workstation (keystone-cloud-test3)]:~$ █
```

- 4.14. A user with the member role can list and create resources such as flavors and instances. As a simple example, list the available flavors.

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack flavor list
```

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack flavor list
+---+-----+-----+-----+-----+-----+-----+
| ID | Name      | RAM   | Disk   | Ephemeral | VCPUs | Is Public |
+---+-----+-----+-----+-----+-----+-----+
| 1  | m1.tiny    | 512   | 1      | 0         | 1     | True       |
| 2  | m1.small   | 2048  | 20     | 0         | 1     | True       |
| 3  | m1.medium  | 4096  | 40     | 0         | 2     | True       |
| 4  | m1.large   | 8192  | 80     | 0         | 4     | True       |
| 42 | m1.nano   | 128   | 1      | 0         | 1     | True       |
| 5  | m1.xlarge  | 16384 | 160   | 0         | 8     | True       |
| 84 | m1.micro   | 192   | 1      | 0         | 1     | True       |
| c1 | cirros256 | 256   | 1      | 0         | 1     | True       |
| d1 | ds512M    | 512   | 5      | 0         | 1     | True       |
| d2 | ds1G       | 1024  | 10     | 0         | 1     | True       |
| d3 | ds2G       | 2048  | 10     | 0         | 2     | True       |
| d4 | ds4G       | 4096  | 20     | 0         | 4     | True       |
+---+-----+-----+-----+-----+-----+-----+
[ubuntu@workstation (keystone-cloud-test3)]:~$ █
```

- 4.15. Source the credentials for the **admin** user, and disable the **cloud-test3** account.

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --disable \
> cloud-test3
```

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --disable \
> cloud-test3
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.16. To verify that the **cloud-test3** account is disabled, source the `~/keystonerc-cloud-test3` keystone credentials file for the **cloud-test3** user. Then, try listing the available flavors. You should receive an HTTP 401 (Unauthorized) error, which indicates that the user has invalid credentials.

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack flavor list
```

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack flavor list
The request you have made requires authentication. (HTTP 401) (Request-ID: req-0
1ff5fad-c8db-4c39-bb22-1ec4813e9c93)
[ubuntu@workstation (keystone-cloud-test3)]:~$ █
```

- 4.17. Source the keystone credentials file of the **admin** user so that further changes can be made to the **cloud-test3** user account. Then, change the password for the **cloud-test3** user to **password**.

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --password password \
> cloud-test3
```

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --password password \
> cloud-test3
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.18. Enable the **cloud-test3** user account.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --enable \
> cloud-test3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --enable \
> cloud-test3
[ubuntu@workstation (keystone-admin)]:~$ █
```

Tip

Multiple user settings can be changed with one command. For example, this command sets the password and enables the user:

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user set \
> --password password \
> --enable \
> cloud-test3
```

- 4.19.** In the keystone credentials file for **cloud-test3**, change the password to **password**. Modify the file so that the content matches below. When you are finished, press **CTRL+X**, then **Y** to accept the file changes. Press **Enter** to save and exit **nano**.

```
[ubuntu@workstation (keystone-admin)]:~$ nano ~/keystonerc-cloud-test3
```

```
GNU nano 2.9.3                               /home/ubuntu/keystonerc-cloud-test3                         Modified
unset OS_SERVICE_TOKEN
unset OS_TENANT_ID
unset OS_TENANT_NAME
export OS_USERNAME=cloud-test3
export OS_PASSWORD=password
export OS_AUTH_URL=http://192.168.1.20/identity
export OS_REGION_NAME=RegionOne
export OS_PROJECT_NAME=dev
export OS_INTERFACE=public
export OS_IDENTITY_API_VERSION=3
export PS1=[\[\033[01;32m\]\u@\h \[\033[01;36m\](keystone-cloud-test3)\[\033[00m\]]:\[\033[01;34m\]\w\[\033[00m\]\$\]
```

- 4.20.** Source the **~/keystonerc-cloud-test3** keystone credentials file for the **cloud-test3** user.

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
```

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-test3
[ubuntu@workstation (keystone-cloud-test3)]:~$ █
```

- 4.21.** Now that the **cloud-test3** user has been enabled, verify that the **openstack flavor list** command returns a list of available flavors.

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ openstack flavor list
```

ID	Name	RAM	Disk	Ephemeral	VCPUs	Is Public
1	m1.tiny	512	1	0	1	True
2	m1.small	2048	20	0	1	True
3	m1.medium	4096	40	0	2	True
4	m1.large	8192	80	0	4	True
42	m1.nano	128	1	0	1	True
5	m1.xlarge	16384	160	0	8	True
84	m1.micro	192	1	0	1	True
c1	cirros256	256	1	0	1	True
d1	ds512M	512	5	0	1	True
d2	ds1G	1024	10	0	1	True
d3	ds2G	2048	10	0	2	True
d4	ds4G	4096	20	0	4	True

- 4.22.** Source the keystone credentials file for the **admin** user.

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
```

```
[ubuntu@workstation (keystone-cloud-test3)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.23. Delete the **cloud-test2** and **cloud-test3** user accounts since they are no longer needed.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user delete cloud-test2
[ubuntu@workstation (keystone-admin)]:~$ openstack user delete cloud-test3
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user delete cloud-test2
[ubuntu@workstation (keystone-admin)]:~$ openstack user delete cloud-test3
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.24. Verify that the users have been deleted.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
+-----+-----+
| ID          | Name      |
+-----+-----+
| 14f5376f00c04e90b7103dd8d4263040 | admin
| 603b42080bb549d7ad3217eb456e7a55 | demo
| a7cee45b0f484fc8980c71e2243d2e1 | demo_reader
| 8d21de784ae2493aa5c8cc73a82be6b3 | alt_demo
| 7e7596f02f1c45afad1fcd09de331781 | alt_demo_member
| 44ffe37cf07948c88958066614ef5d74 | alt_demo_reader
| 899fc9a9b17445b4aac553e4f5f192ec | system_member
| 604adb2150514649a41eaee6273ceb2a | system_reader
| ab546669b1cd44b3aa2305c303363425 | nova
| 82142039d42341718fb126134266ec80 | glance
| 0c5d50f813184b588f3bc0c91250c7d7 | cinder
| efc593f762a447dba12bf2fe870f1310 | neutron
| c79e26f993fb45ab939e7d0bbe12c263 | placement
| 0f3aaa1f2b014f1faaa1f296ffe041d6 | cloud-admin
+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- 4.25. The lab is now complete.

A What Happens if a User Deletes Itself?

The remainder of the lab will demonstrate the process of creating and using an admin user, and it will explore what happens when a user deletes itself.

- A.1.** Create the user **cloud-admin2** with the password **secret**, and make it a member of the **dev** project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user create \
> --password secret \
> --project dev \
> cloud-admin2
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user create \
> --password secret \
> --project dev \
> cloud-admin2
+-----+-----+
| Field | Value |
+-----+-----+
| default_project_id | 93cdd0c9f35d451da331b9d6d92d9900 |
| domain_id | default |
| enabled | True |
| id | 7c2ffa568a948108543dff5cb37596e |
| name | cloud-admin2 |
| options | {} |
| password_expires_at | None |
+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

- A.2.** Assign the **admin** user role to the **cloud-admin2** user.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role add \
> --user cloud-admin2 \
> --project dev \
> admin
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role add \
> --user cloud-admin2 \
> --project dev \
> admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

A.3. Verify that **cloud-admin2** has the **admin** user role for the **dev** project.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role assignment list \
> --user cloud-admin2 \
> --project dev \
> --names
```

```
[ubuntu@workstation (keystone-admin)]:~$ openstack role assignment list \
> --user cloud-admin2 \
> --project dev \
> --names
+-----+-----+-----+-----+
| Role | User           | Group | Project      | Domain | Inherited |
+-----+-----+-----+-----+
| admin | cloud-admin2@Default |       | dev@Default |        | False    |
+-----+-----+-----+-----+
[ubuntu@workstation (keystone-admin)]:~$ █
```

A.4. The **cloud-admin2** user should now be able to perform admin actions, such as deleting users, in the **dev** project. To act as this user through the command line, first copy the existing **~/kestonerc-admin** file to **~/kestonerc-cloud-admin2**.

```
[ubuntu@workstation (keystone-admin)]:~$ cp ~/kestonerc-admin \
> ~/kestonerc-cloud-admin2
```

```
[ubuntu@workstation (keystone-admin)]:~$ cp ~/kestonerc-admin \
> ~/kestonerc-cloud-admin2
[ubuntu@workstation (keystone-admin)]:~$ █
```

A.5. Edit the **~/kestonerc-cloud-admin2** file and change the **OS_USERNAME** from **admin** to **cloud-admin2** and the **OS_PROJECT_NAME** from **demo** to **dev**. Additionally, change the line beginning with **export PS1=...** so that **(keystone-admin)** becomes **(keystone-cloud-admin2)**. Modify the file so that the content matches below. When you are finished, press **CTRL+X**, then **Y** to accept the file changes. Press **Enter** to save and exit **nano**.

```
[ubuntu@workstation (keystone-admin)]:~$ nano ~/kestonerc-cloud-admin2
```

```
GNU nano 2.9.3                               /home/ubuntu/kestonerc-cloud-admin2

unset OS_SERVICE_TOKEN
unset OS_TENANT_ID
unset OS_TENANT_NAME
export OS_USERNAME=cloud-admin2
export OS_PASSWORD=secret
export OS_AUTH_URL=http://192.168.1.20/identity
export OS_REGION_NAME=RegionOne
export OS_PROJECT_NAME=dev
export OS_INTERFACE=public
export OS_IDENTITY_API_VERSION=3
export PS1='[\u033[01;32m]\u033[01;36m](keystone-cloud-admin2)[\u033[00m]:[\u033[01;34m]\u033[00m]\$ '
```

- A.6.** Source the `~/keystonerc-cloud-admin2` keystone credentials file for the `cloud-admin2` user.

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-admin2
```

```
[ubuntu@workstation (keystone-admin)]:~$ source ~/keystonerc-cloud-admin2
[ubuntu@workstation (keystone-cloud-admin2)]:~$ █
```

- A.7.** List the current OpenStack users to see the list of users that can be deleted.

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ openstack user list
```

ID	Name
14f5376f00c04e90b7103dd8d4263040	admin
603b42080bb549d7ad3217eb456e7a55	demo
a7cee45b0f484fca8980c71e2243d2e1	demo_reader
8d21de784ae2493aa5c8cc73a82be6b3	alt_demo
7e7596f02f1c45afad1fc09de331781	alt_demo_member
44ffe37cf07948c88958066614ef5d74	alt_demo_reader
899fc9a9b17445b4aac553e4f5f192ec	system_member
604adb2150514649a41eaeee6273ceb2a	system_reader
ab546669b1cd44b3aa2305c303363425	nova
82142039d42341718fb126134266ec80	glance
0c5d50f813184b588f3bc0c91250c7d7	cinder
efc593f762a447dba12bf2fe870f1310	neutron
c79e26f993fb45ab939e7d0bbe12c263	placement
0f3aaa1f2b014f1faaa1f296ffe041d6	cloud-admin
7c2ffa568a948108543dff5cb37596e	cloud-admin2

- A.8.** If a user has sufficient privileges, it can delete itself. To test this, delete the `cloud-admin2` user, the current user whose keystone credentials are being used.

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ openstack user delete \
> cloud-admin2
```

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ openstack user delete \
> cloud-admin2
[ubuntu@workstation (keystone-cloud-admin2)]:~$ █
```

- A.9.** Since the **cloud-admin2** user has been deleted, the keystone credentials no longer authenticates the user. Verify this by attempting to list the OpenStack users. You should receive an HTTP 401 (Unauthorized) error, which indicates that the user has invalid credentials.

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ openstack user list
```

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ openstack user list
The request you have made requires authentication. (HTTP 401) (Request-ID: req-e
a9fa44b-1745-495f-87ba-86cff65c8f56)
[ubuntu@workstation (keystone-cloud-admin2)]:~$ █
```

- A.10.** Source the `~/keystonerc-admin` keystone credentials file for the **admin** user.

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ source ~/keystonerc-admin
```

```
[ubuntu@workstation (keystone-cloud-admin2)]:~$ source ~/keystonerc-admin
[ubuntu@workstation (keystone-admin)]:~$ █
```

- A.11.** Verify that the **cloud-admin2** user has been deleted.

```
[ubuntu@workstation (keystone-admin)]:~$ openstack user list
```

ID	Name
14f5376f00c04e90b7103dd8d4263040	admin
603b42080bb549d7ad3217eb456e7a55	demo
a7cee45b0f484fc8980c71e2243d2e1	demo_reader
8d21de784ae2493aa5c8cc73a82be6b3	alt_demo
7e7596f02f1c45afad1fcd09de331781	alt_demo_member
44ffe37cf07948c88958066614ef5d74	alt_demo_reader
899fc9a9b17445b4aac553e4f5f192ec	system_member
604adb2150514649a41eaee6273ceb2a	system_reader
ab546669b1cd44b3aa2305c303363425	nova
82142039d42341718fb126134266ec80	glance
0c5d50f813184b588f3bc0c91250c7d7	cinder
efc593f762a447dba12bf2fe870f1310	neutron
c79e26f993fb45ab939e7d0bbe12c263	placement
0f3aaa1f2b014f1faaa1f296ffe041d6	cloud-admin