

IST198

OpenStack

Administration

Version 1: 2017-08-15

These exercises will guide the student through the concepts and topics learned in chapter 1, navigating OpenStack Mitaka installed on CentOS 7.

Navigating the OpenStack Dashboard.



This material is based upon work supported by the National Science Foundation under Grant No. (NSF 1601166). This work was created by Ron Sharman of Trident Technical College and is licensed under the Creative Commons Attribution 4.0 Unported License. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/> or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA.

Attributions:



This material is based upon work supported by the National Science Foundation under Grant No. (NSF 1601166).

 **openstack**® Portions of this document, in whole or part, were sourced from the OpenStack website at <https://OpenStack.org>



Contents

Attributions	1
Contents	2
Introduction	3
Lab Objectives	4
Prepare the OpenStack virtual machines	5
Lab Scenario and Settings	7
Run the lab setup script	8
Lab 1: Connect to the OpenStack Dashboard	12
Lab 2: Navigate the OpenStack Dashboard	15
Conclusion	41



Introduction

You have been hired as an intern with CLOUDTech Inc. CLOUDTech is a Cloud Computing consulting firm and Cloud Provider supporting thousands of clients in the region. The company provides a wide range of services to support migrating client Information Technology infrastructure to a Private, Hybrid or Public Cloud environment. You learned that the company has multiple departments and you will start your internship working with the Cloud hosting department customer support team.

The Cloud hosting department provides multiple platform and vendor Cloud hosting services for Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS) and many other as a service offerings. The support team is responsible for helping customers with any issues related to their Cloud infrastructure hosted at and provided by CLOUDTech.

You will perform hands-on exercises to learn about the OpenStack Cloud implementation CLOUDTech uses to host customer Cloud environments.



Lab Objectives

Learner will be able to:

- Access and navigate the OpenStack Dashboard

Labs 1 and 2

These labs will guide the student through navigating the OpenStack Dashboard.

(Note: This lab is designed to be completed on an NDG NETLAB System with the IST198_OpenStack_HXXX POD installed. The labs can also be completed on a physical machine with the appropriate software packages installed, or a PC that has VMware Workstation installed with the appropriate virtual machines configured).

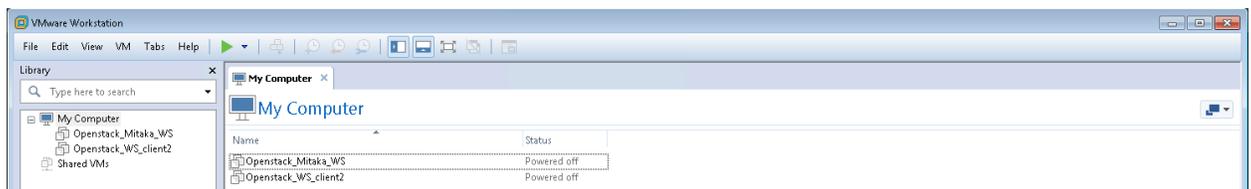
Note: If the Openstack VMware Workstation environment is not configured for you, please refer to the OpenStack VMware Workstation setup instructions included with the OVF files.



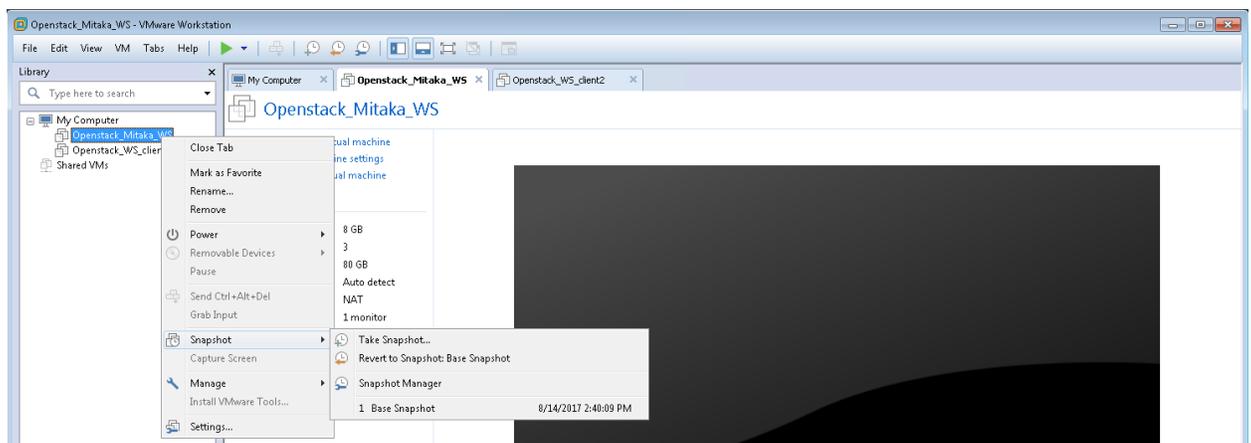
Prepare the OpenStack Virtual Machines



1. Launch the VMware Workstation Pro application

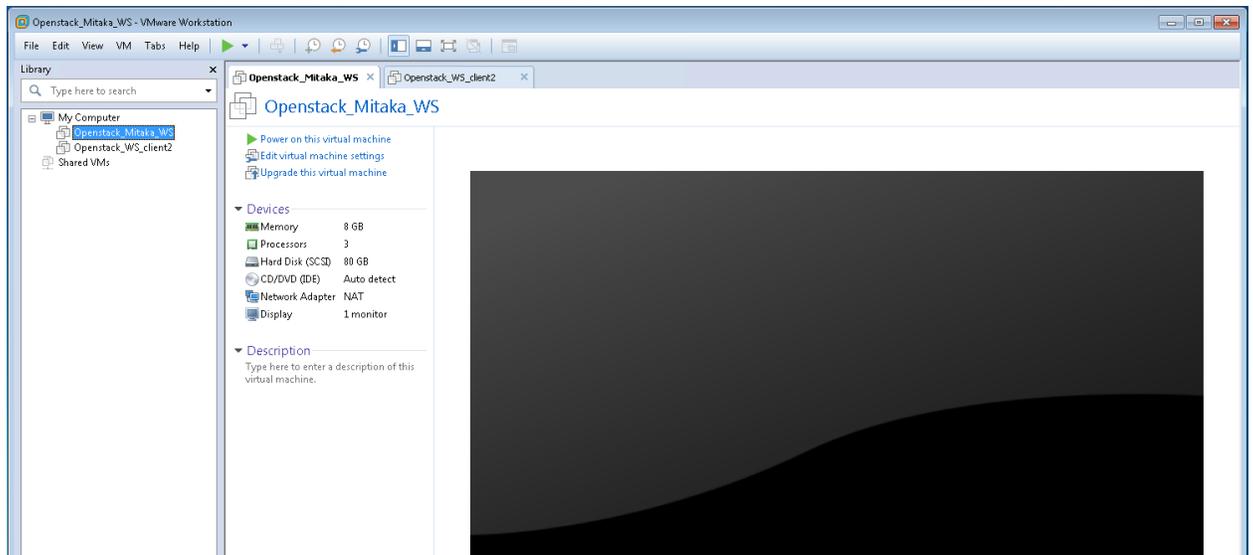


2. Workstation should have two virtual machines (VM) installed; Openstack_Mitaka_WS and Openstack_WS_client2.



3. Ensure that the Openstack_Mitaka_WS is at the correct starting point by reverting to the base snapshot. Right Click on Openstack_Mitaka_WS then Snapshot>Base Snapshot. Repeat for the Openstack_WS_client2 VM.

Module 1: OpenStack Dashboard



4. **Power on** both VMs by selecting one of the two VMs and **clicking on Power on this virtual machine**. Repeat for the other VM.

Lab Scenario

As part of your internship, CLOUDTech’s training department wants you to familiarize yourself with the OpenStack Dashboard so that you can accompany a customer support team on a field visit to a new customer, the XYZ Company, where the team will assist them in configuring their infrastructure and launching their Windows and Linux cloud servers that they contracted with CLOUDTech.

Lab Settings

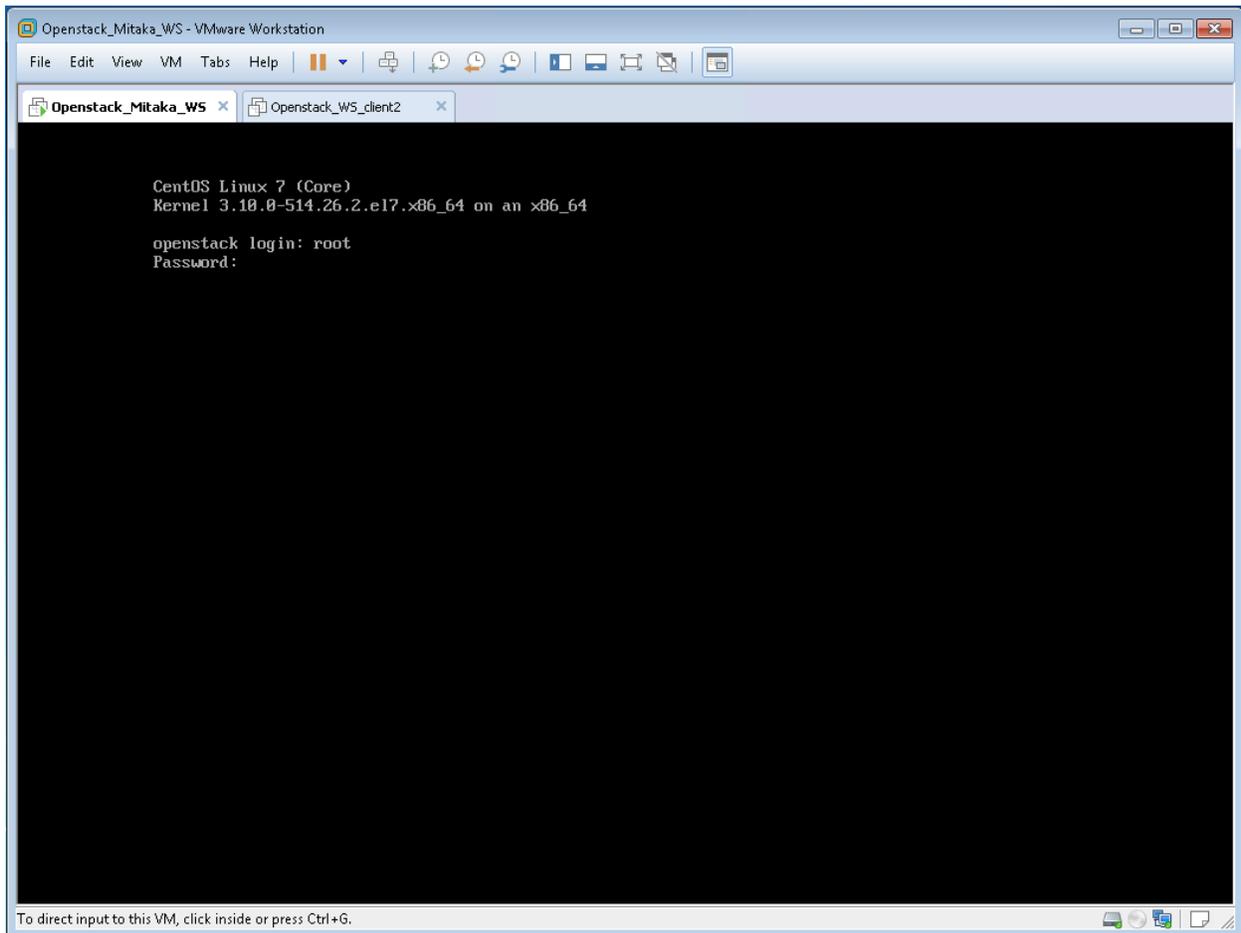
The information in the table below will be needed in order to complete the labs. The task sections that follow provide details on the use of this information

Virtual Machine (VM)	IP ADDRESS	Account	Password	VM Type
Client2	10.220.0.2	Student	P@ssword	Openstack_WS_client2
Server1	10.220.0.30	root	P@ssword	OpenStack WS Mitaka
OpenStack Dashboard	10.220.0.30	Student	P@ssword	Web Page Login credentials

Note: In this OpenStack VMware Workstation environment, the two VMs can be reverted back to their base snapshot at any time. This means that you can explore or experiment without fear of permanently damaging the Openstack environment. If you make a mistake that you can’t recover from, then stop and revert the appropriate VM to the base snapshot and everything will be back to a known good starting point.



Run the lab setup script

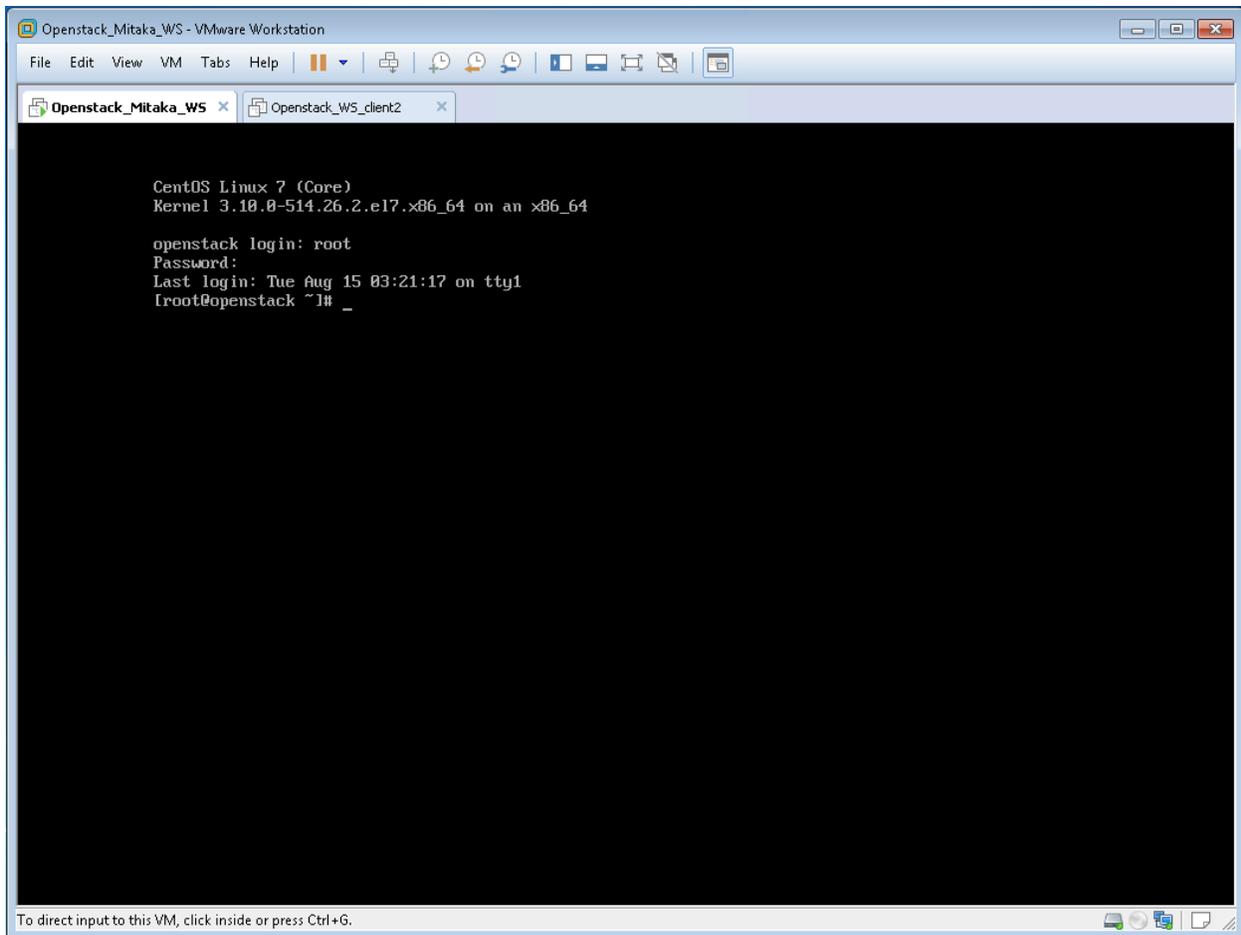


1. Log in as **root** with the Password: **P@ssword**

Note: The password is NOT visible as you type it



Module 1: OpenStack Dashboard



The screenshot shows a terminal window within a VMware Workstation environment. The window title is "Openstack_Mitaka_WS - VMware Workstation". The terminal output is as follows:

```
CentOS Linux 7 (Core)
Kernel 3.10.0-514.26.2.el7.x86_64 on an x86_64

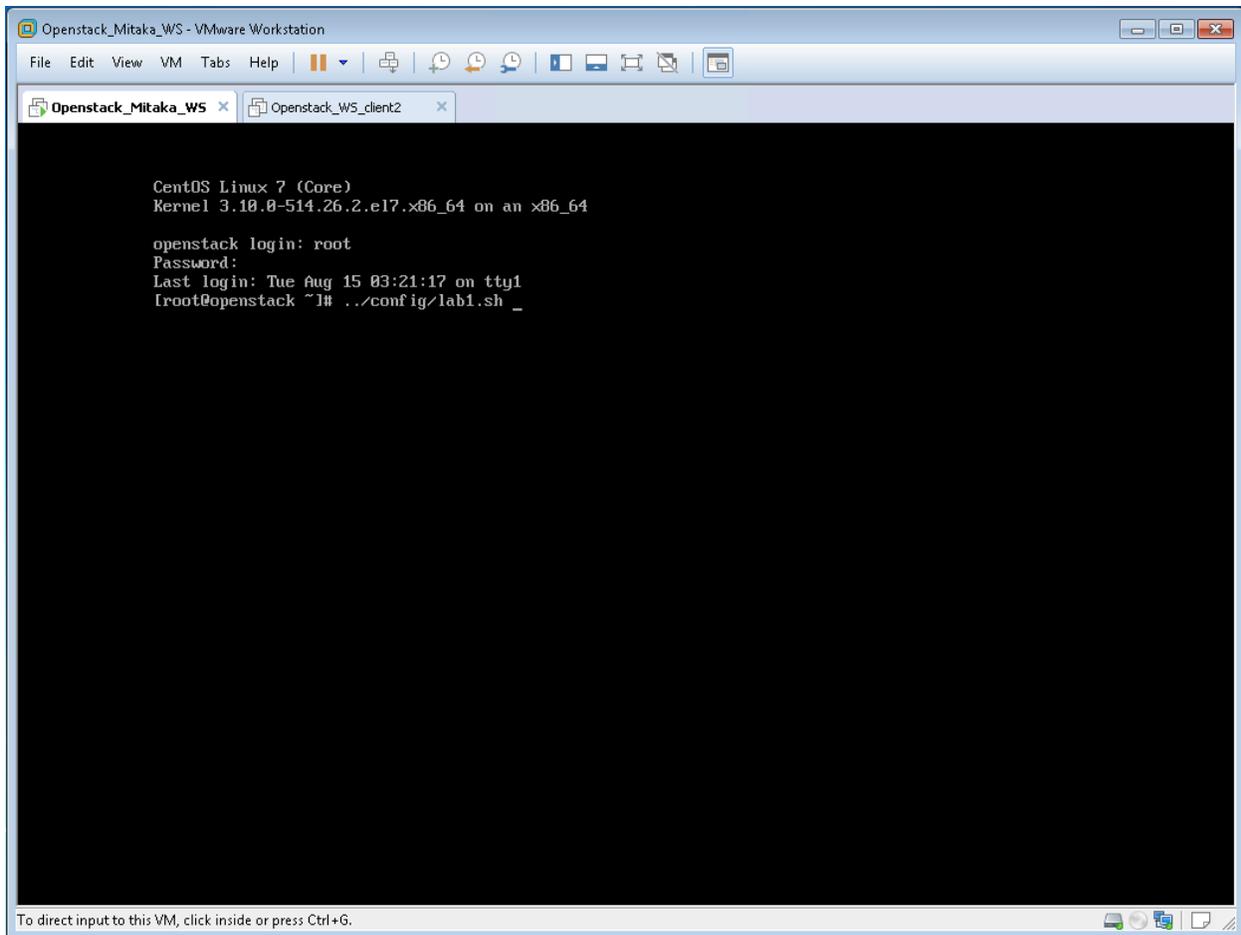
openstack login: root
Password:
Last login: Tue Aug 15 03:21:17 on tty1
[root@openstack ~]# _
```

At the bottom of the terminal window, there is a status bar that reads: "To direct input to this VM, click inside or press Ctrl+G."

2. After successfully logging in as root, you should see this screen. Continue to the next page



Module 1: OpenStack Dashboard



The screenshot shows a terminal window within a VMware Workstation. The window title is "Openstack_Mitaka_WS - VMware Workstation". The terminal output is as follows:

```
CentOS Linux 7 (Core)
Kernel 3.10.0-514.26.2.el7.x86_64 on an x86_64

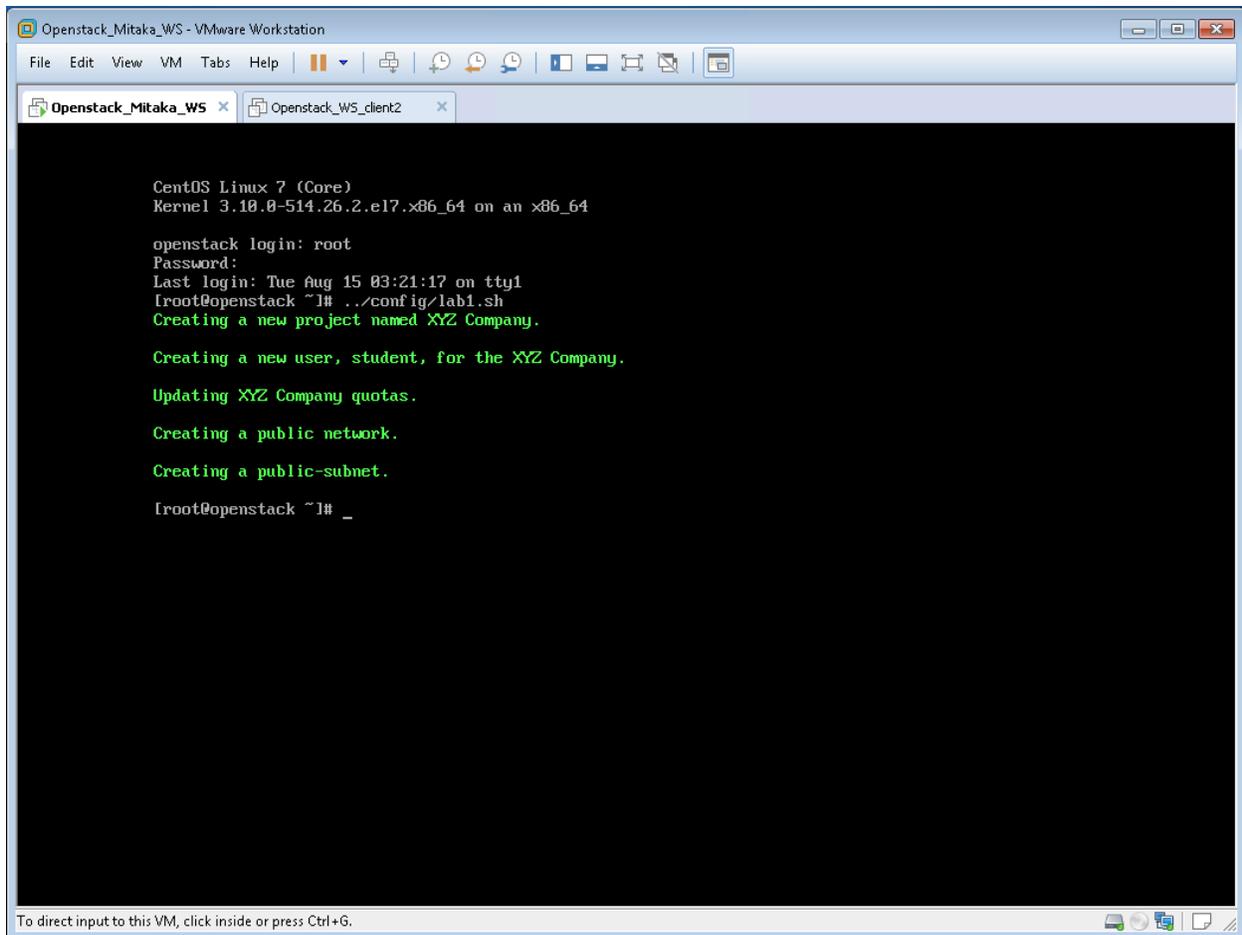
openstack login: root
Password:
Last login: Tue Aug 15 03:21:17 on tty1
[root@openstack ~]# ../config/lab1.sh _
```

At the bottom of the terminal window, there is a status bar that reads: "To direct input to this VM, click inside or press Ctrl+G."

3. Type the command; `../config/lab1.sh` and **press Enter** as shown in the screen capture above to run the Module 1 setup script



Module 1: OpenStack Dashboard



The screenshot shows a terminal window titled "Openstack_Mitaka_WS - VMware Workstation". The terminal output is as follows:

```
CentOS Linux 7 (Core)
Kernel 3.10.0-514.26.2.el7.x86_64 on an x86_64

openstack login: root
Password:
Last login: Tue Aug 15 03:21:17 on tty1
[root@openstack ~]# ./config/lab1.sh
Creating a new project named XYZ Company.

Creating a new user, student, for the XYZ Company.

Updating XYZ Company quotas.

Creating a public network.

Creating a public-subnet.

[root@openstack ~]# _
```

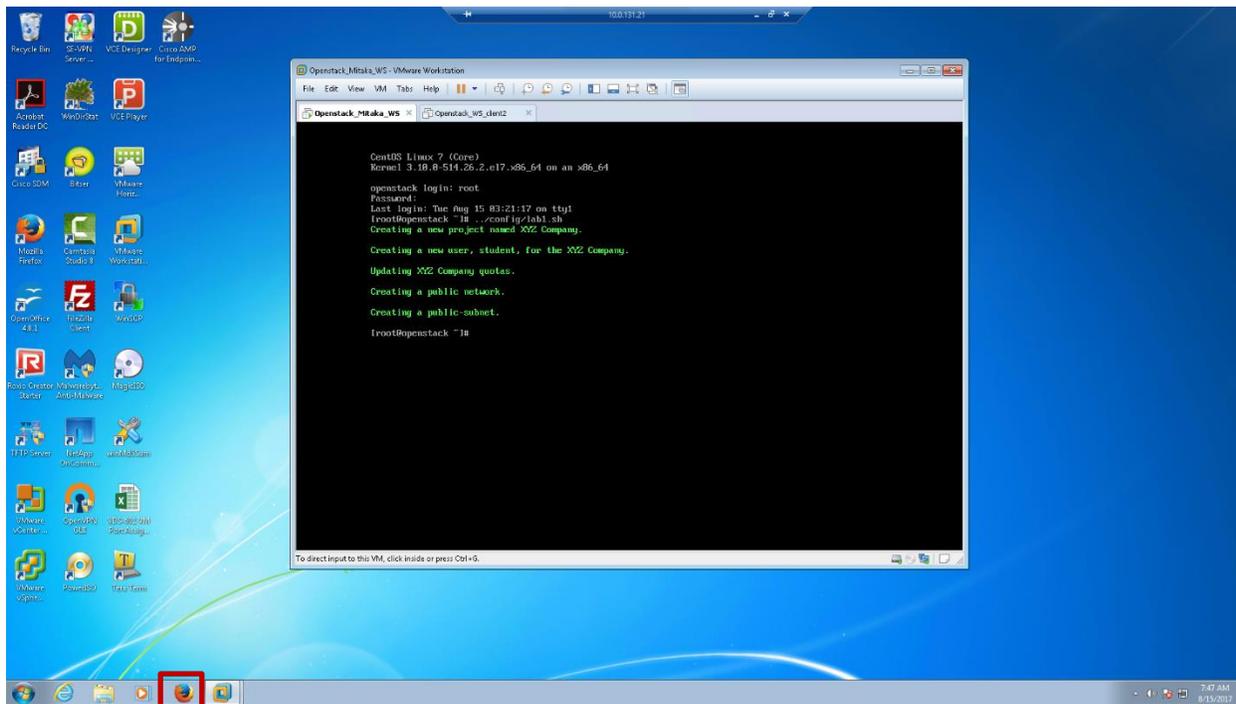
At the bottom of the terminal window, there is a status bar that reads: "To direct input to this VM, click inside or press Ctrl+G."

4. After the setup command completes, you can **minimize VMware Workstation**.

Note: The script is complete when the **[root@openstack ~]#** prompt returns



Lab 1: Access the OpenStack Dashboard

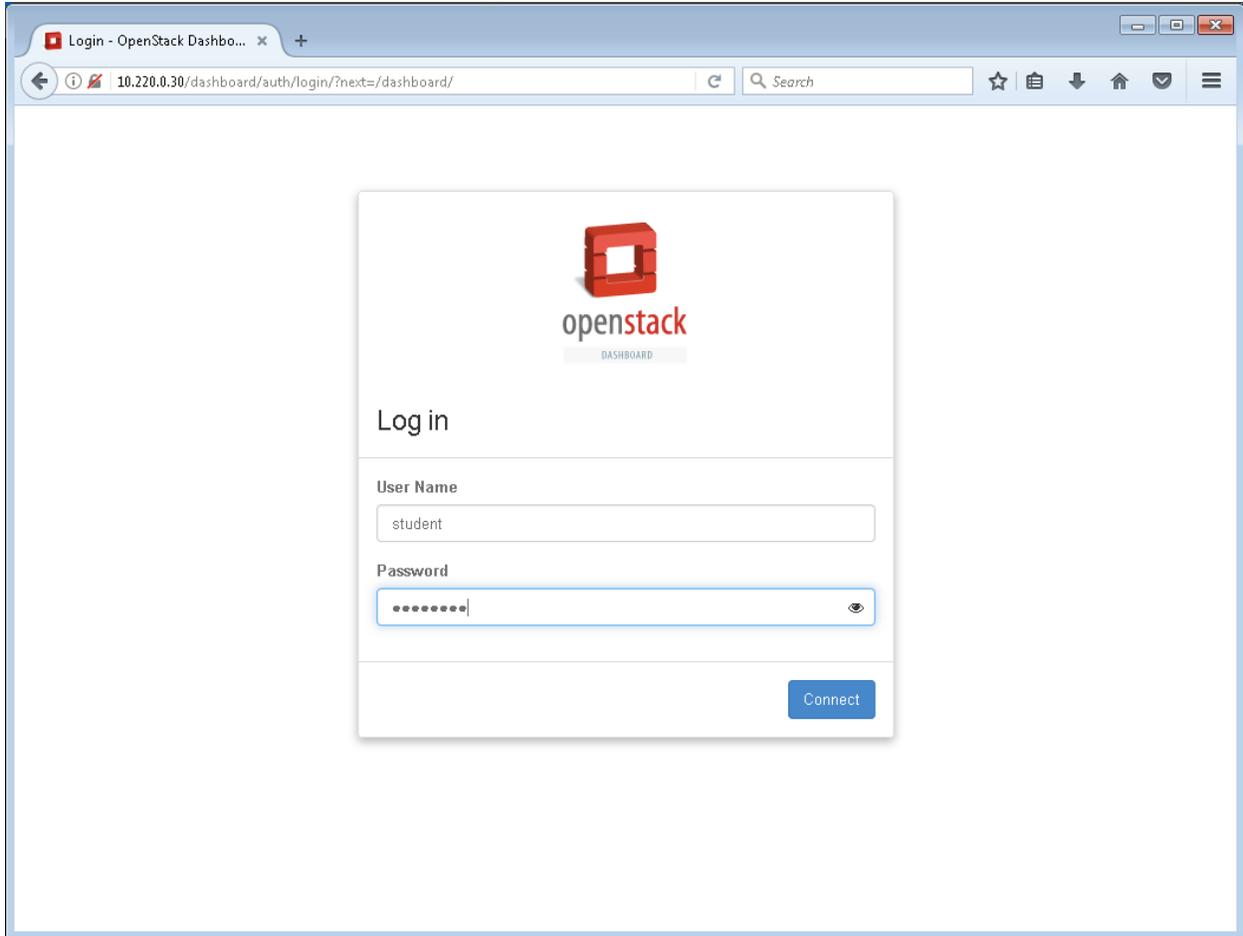


1. On your host PC, open an internet browser

Note: Openstack_WS_client2 is a CentOS 7 desktop VM that you can use as an alternate to the host PC to accomplish all of the labs, unless specifically noted in the instructions.



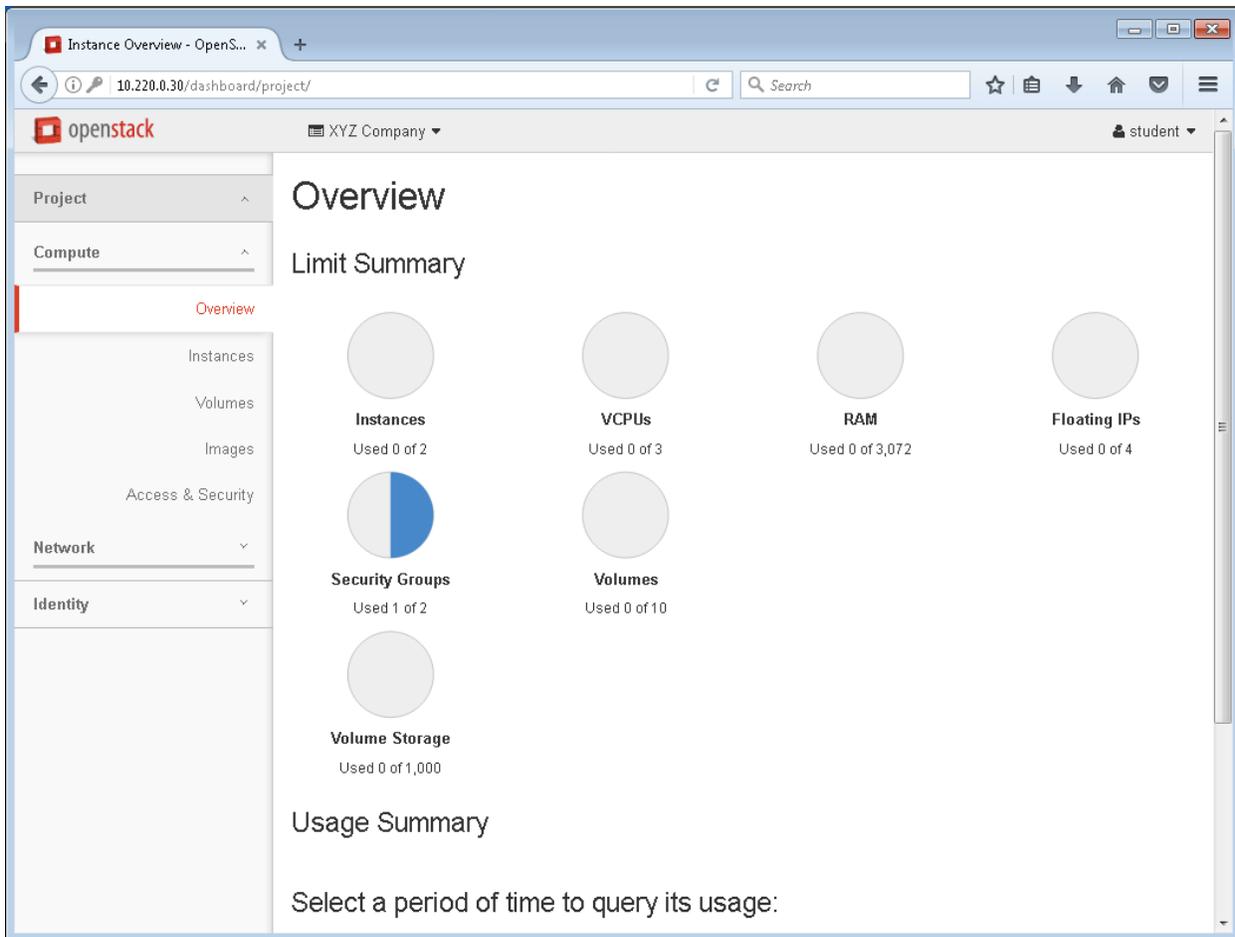
Module 1: OpenStack Dashboard



2. **Navigate to <http://10.220.0.30/dashboard>. Login to the OpenStack Dashboard with the username **Student** and **P@ssword** and press **enter** or **click Connect****

Note: User Name entries are not case sensitive, passwords are.

Module 1: OpenStack Dashboard



3. This is the homepage of the OpenStack Dashboard as seen from the XYZ Companies' customer perspective.

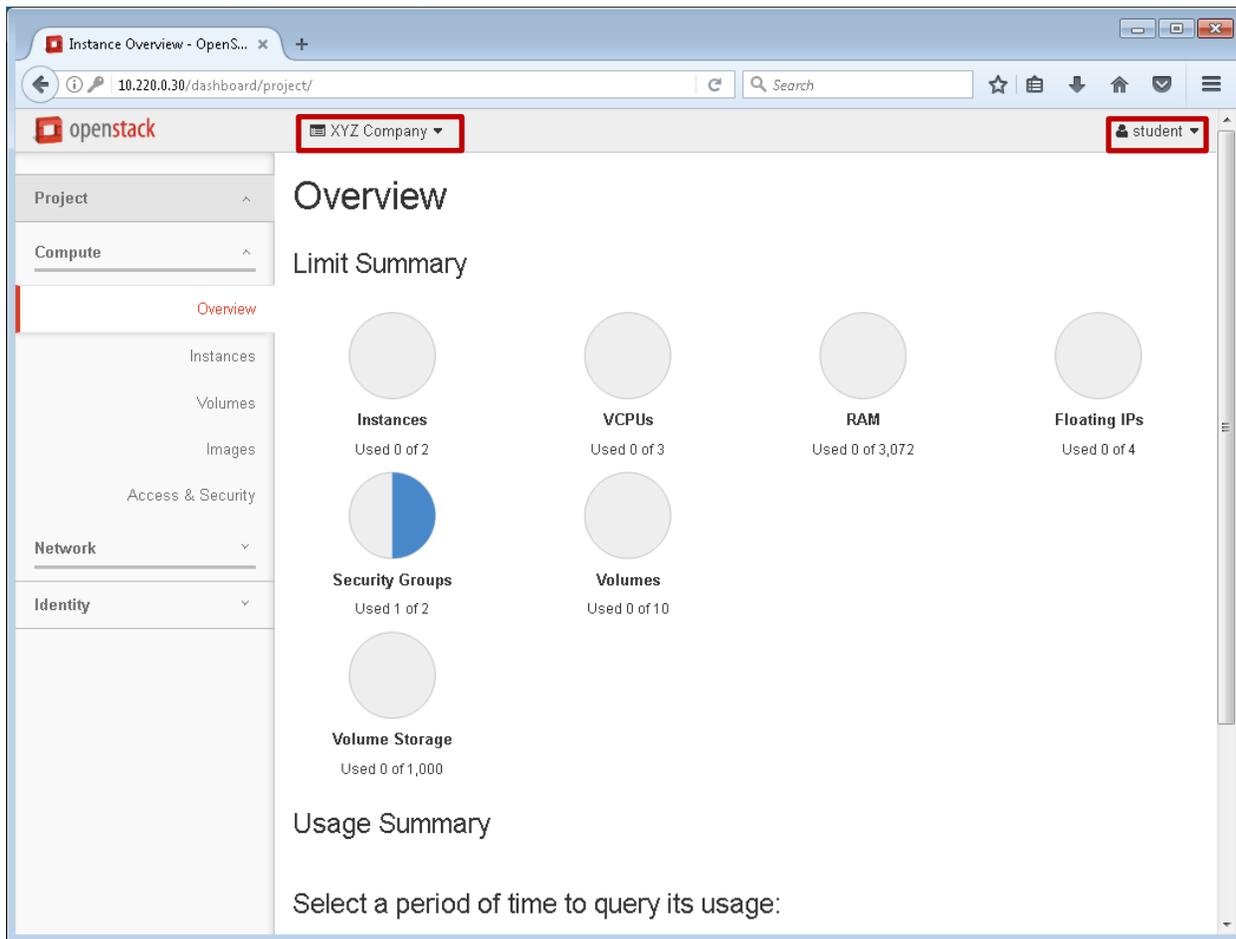
Continue to Lab 2.

OpenStack dashboard

The OpenStack Dashboard is a web-based graphical user interface that enables cloud administrators and end users to manage OpenStack resources and services. The dashboard is also known as Horizon.

Accessing the OpenStack Dashboard requires a user name and a password. Depending on how the web site is configured, you can access the web page over http or https, for example: `http://<server_dns_name or IP Address>/dashboard`.

Lab 2: Navigate the OpenStack Dashboard



1. Note the following items at the top pane of OpenStack Dashboard, from left to right you should see **XYZ Company** and **Student**. The **XYZ Company** is the name of the **Project** and **Student** is the username that is currently logged on.

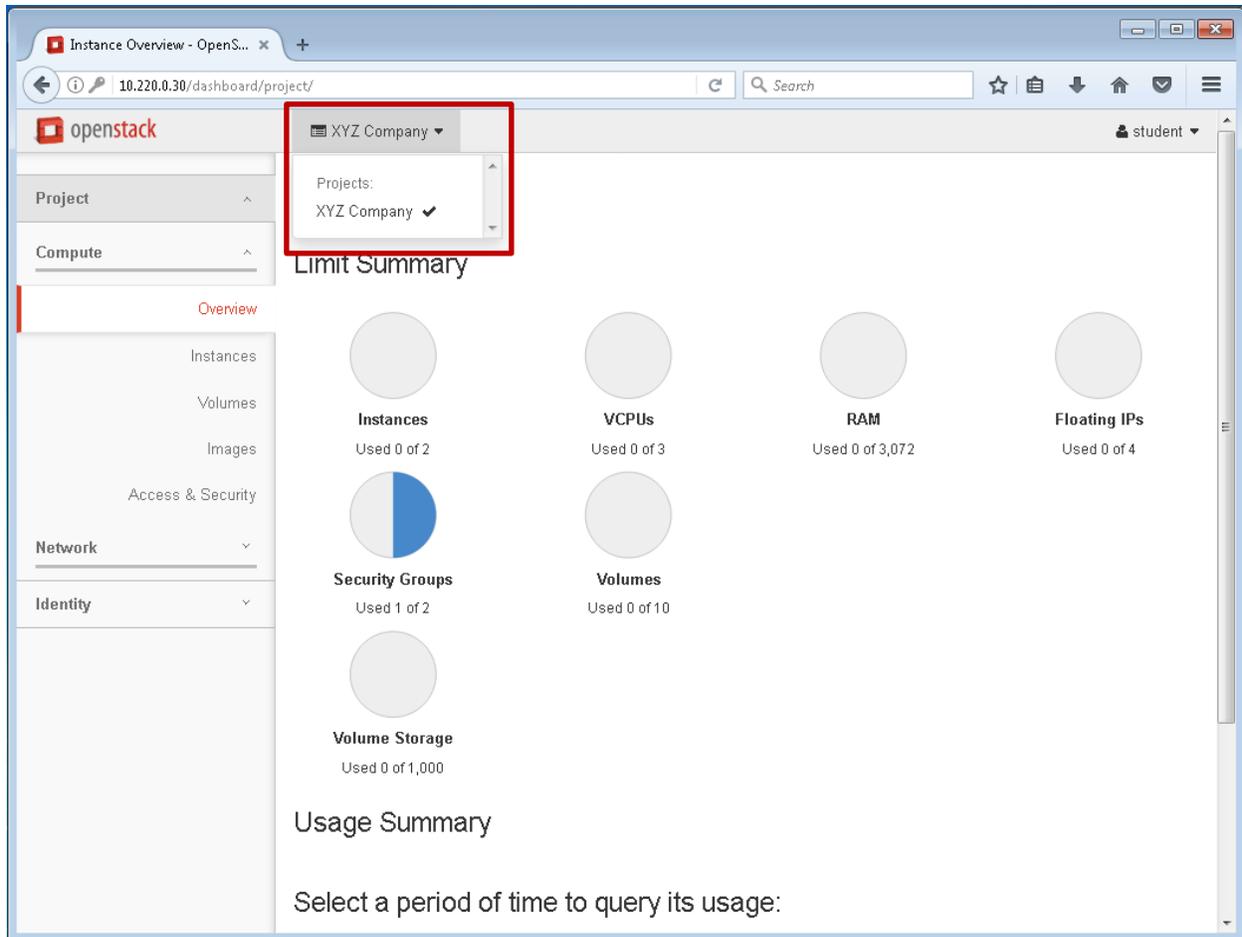
Projects, Users and Roles

As an administrator, you manage projects, users, and roles. Projects are organizational units in the cloud to which you can assign users. Projects are also known as *tenants* or *accounts*. Users can be members of one or more projects. Roles define which actions users can perform. You assign roles to user-project pairs.

You can manage projects, users, and roles independently from each other.

You can add, update, and delete projects and users, assign users to one or more projects, and change or remove the assignment. To enable or temporarily disable a project or user, update that project or user.

Module 1: OpenStack Dashboard



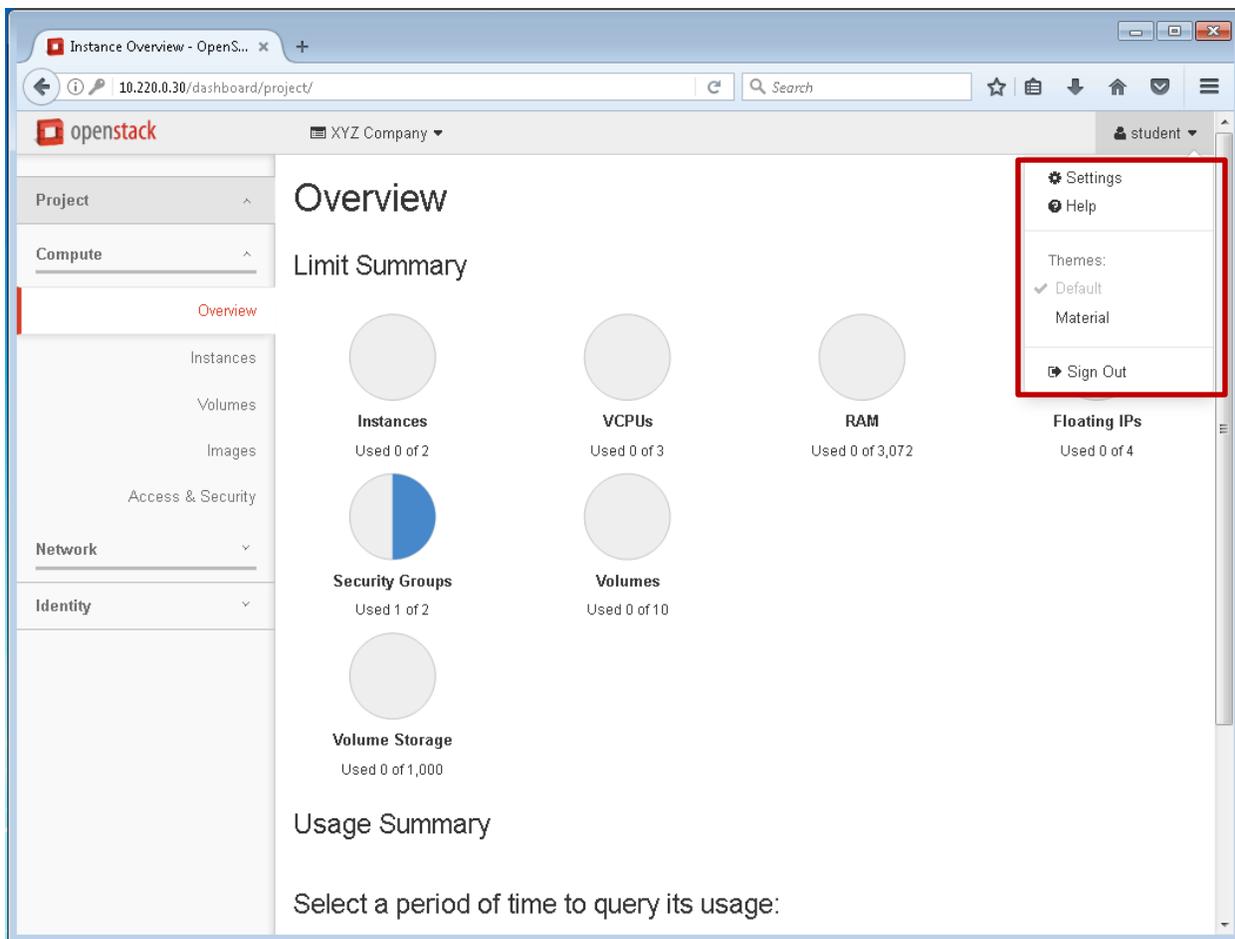
2. The **drop down menu**, next to **XYZ Company**, allows the user to switch between projects. In this case XYZ Company has only one project.

Projects

A project is a group of zero or more users. In Compute, a project owns virtual machines. In Object Storage, a project owns containers. Users can be associated with more than one project. Projects are also known as tenants. Each project and user pairing can have a role associated with it. Projects can be associated with an organization, account, customer, etc., and there are three projects that are installed with a default PackStack Installation: admin, services and demo.

Note: For the NETLAB PackStack installation, the demo user account and demo instance were removed.

Module 1: OpenStack Dashboard



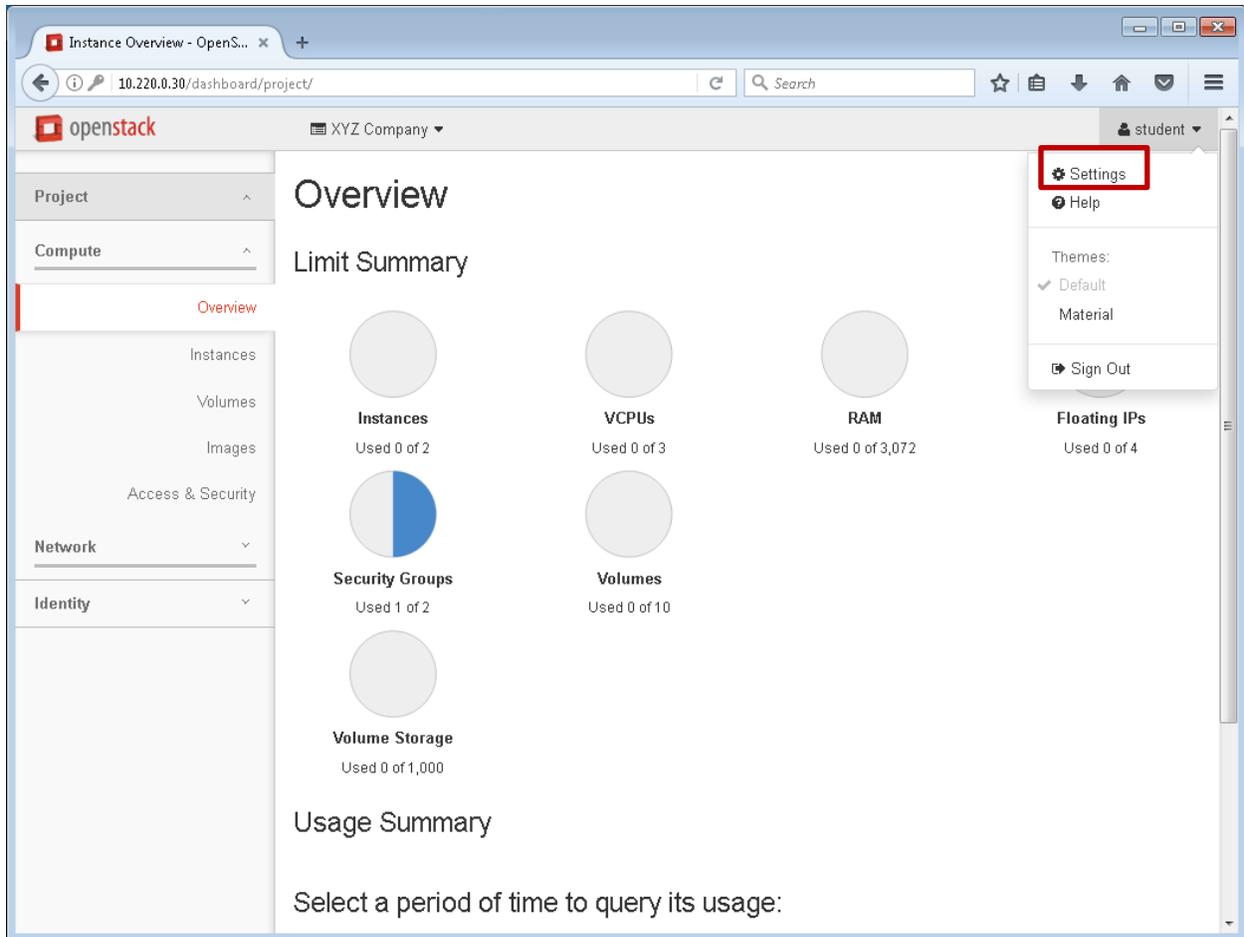
3. The user drop down menu, next to **Student**, allows the user to make changes to the **Settings**, access **Help**, switch between **Themes**, and **Sign Out**.

Users

Users associated in the admin role, can view, create, edit, and delete users, and change user passwords. The Users tab displays only if logged in as a user with administrative privileges. While creating users, the Role needs to be specified apart from username, password, email address, and primary project. The default OpenStack installation comes with three predefined roles: admin, member and demo. Adding a user with admin role makes the user an administrative super user.



Module 1: OpenStack Dashboard

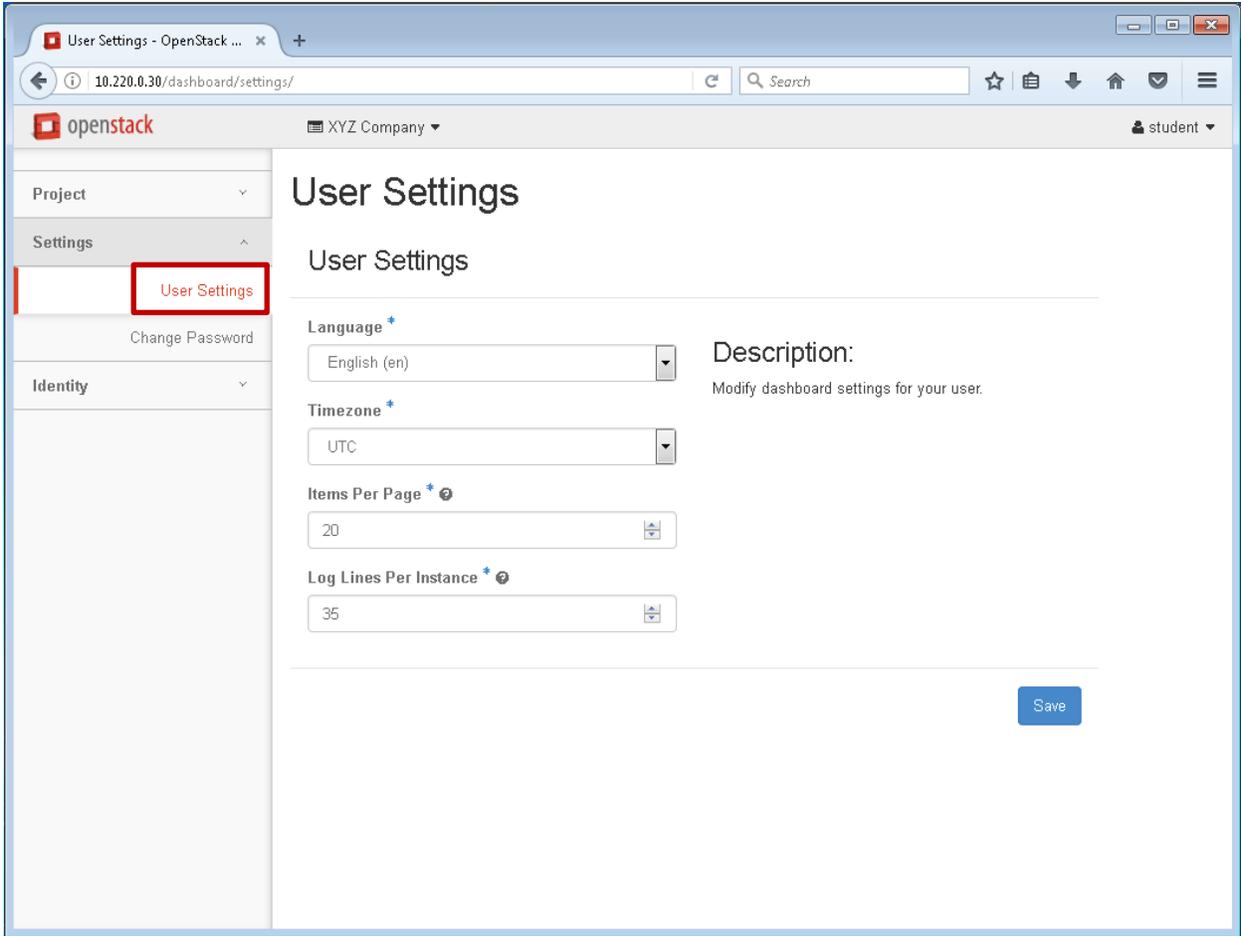


The screenshot shows the OpenStack dashboard interface. The browser address bar displays '10.220.0.30/dashboard/project/'. The dashboard header includes the OpenStack logo, 'XYZ Company', and a user profile 'student'. A left-hand navigation menu is visible with categories like Project, Compute, Network, and Identity. The main content area is titled 'Overview' and 'Limit Summary', featuring several circular progress indicators for resource usage: Instances (Used 0 of 2), VCPUs (Used 0 of 3), RAM (Used 0 of 3,072), Security Groups (Used 1 of 2), Volumes (Used 0 of 10), and Volume Storage (Used 0 of 1,000). A 'Usage Summary' section is partially visible at the bottom. On the right side, a user menu is open, with the 'Settings' option highlighted by a red rectangle. Other menu items include Help, Themes (Default, Material), and Sign Out.

4. Select the **Settings** tab

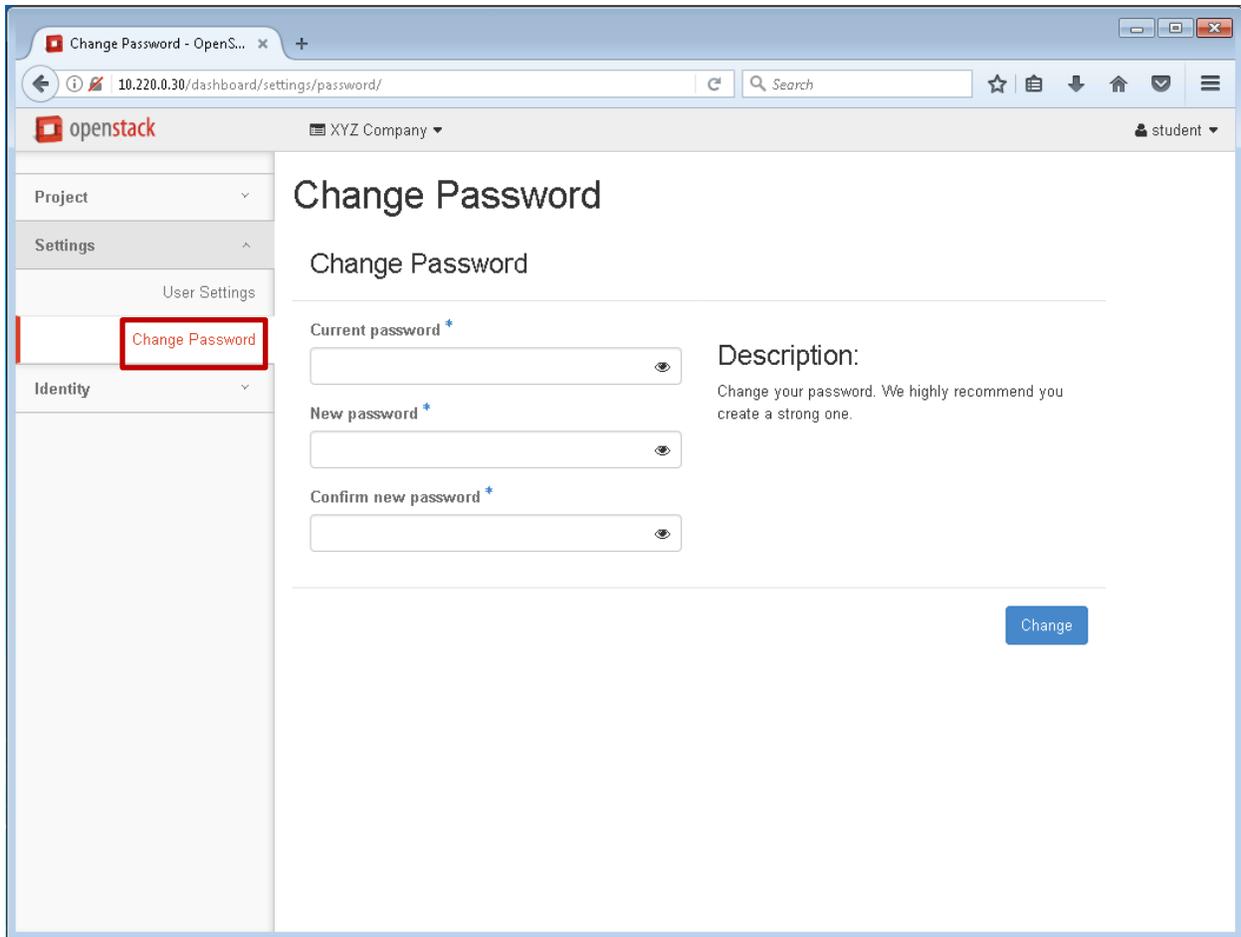


Module 1: OpenStack Dashboard



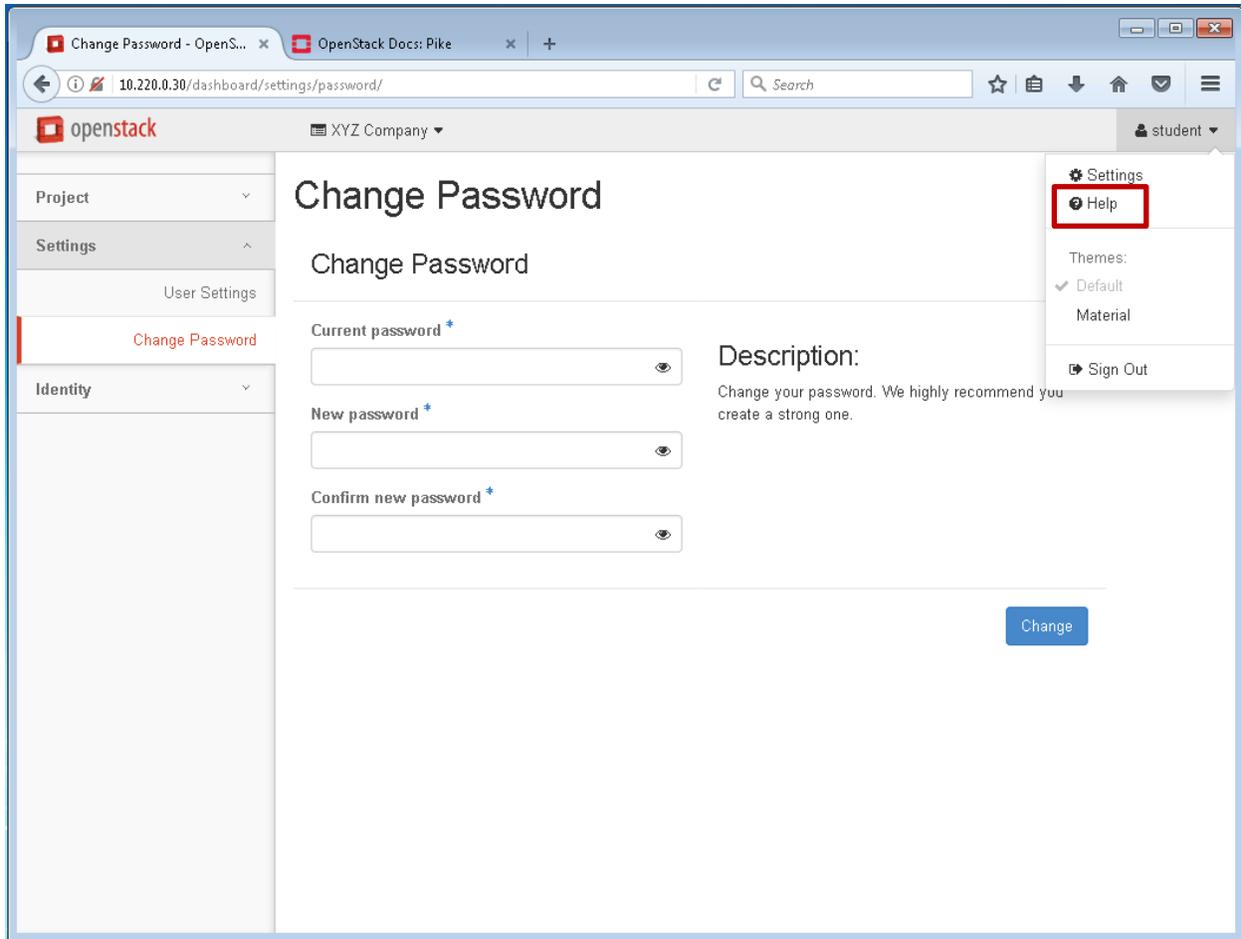
5. Selecting **User Settings** under the **Settings** tab will open the User **Settings** pane where you can make changes to the Language, Timezone, Items Per Page, and Log Lines Per Instance

Module 1: OpenStack Dashboard



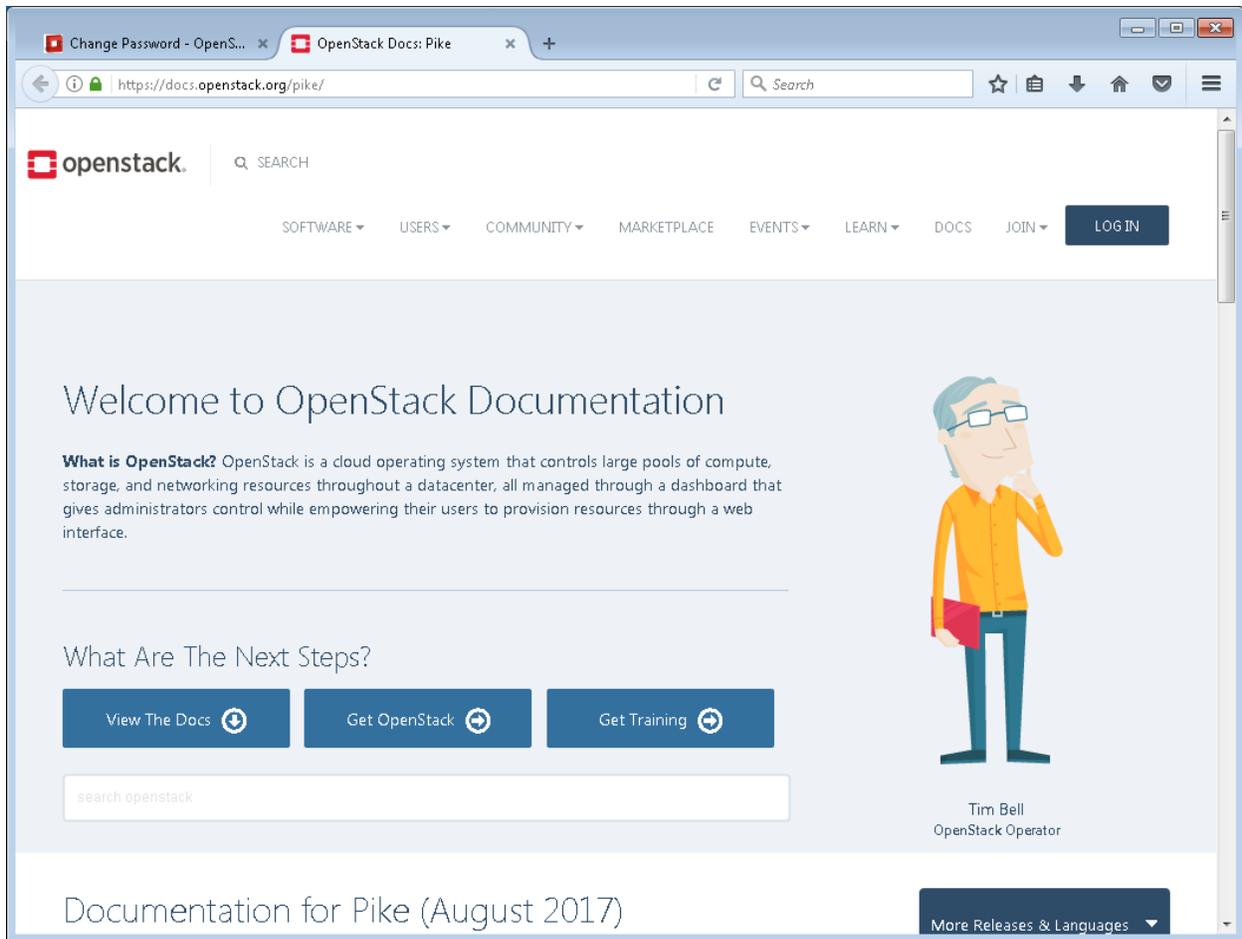
6. Selecting **Change Password** under the **Settings** tab will open the **Change Password** pane, where the user can change their password or, if they have administrator rights, they can change other user's passwords

Module 1: OpenStack Dashboard



7. The **Help** tab will open a new browser tab to the <https://docs.openstack.org> web page, if your workstation is configured to allow an internet connection available

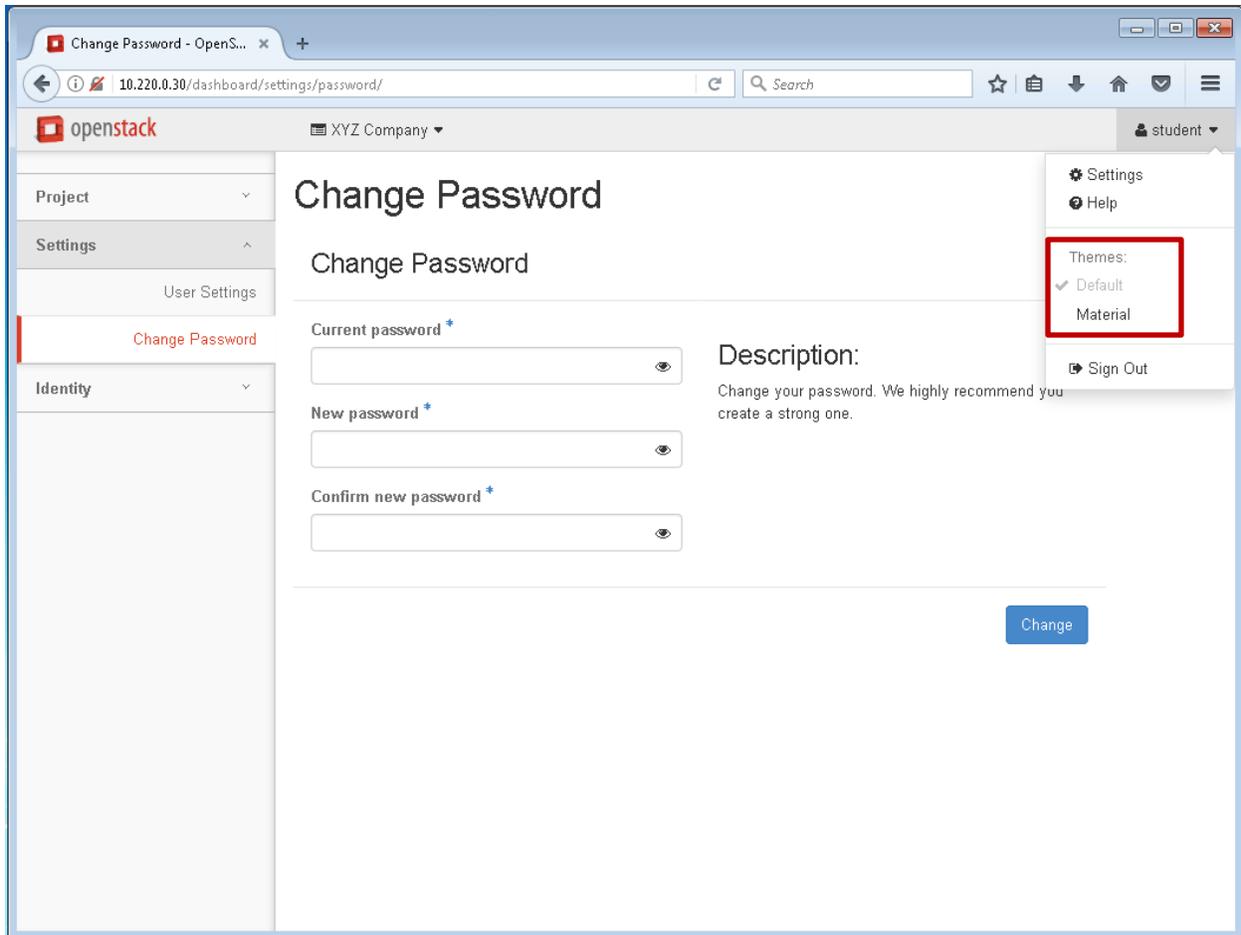
Module 1: OpenStack Dashboard



8. This is the Openstack.org homepage.

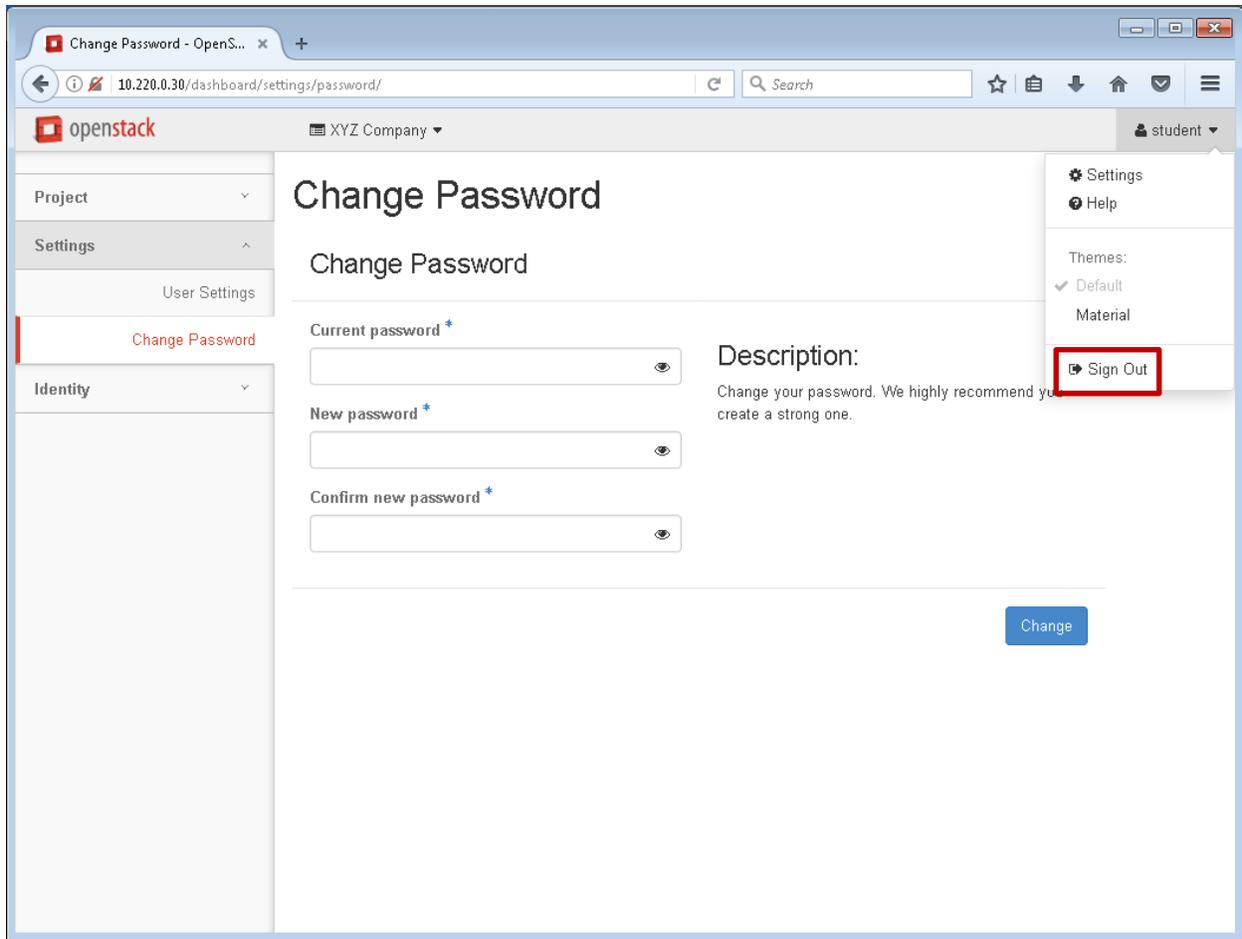


Module 1: OpenStack Dashboard



9. Changing between the **Default** and **Material Themes** will alter the web page's appearance (not shown). All screen captures in the instructions were taken with the default theme

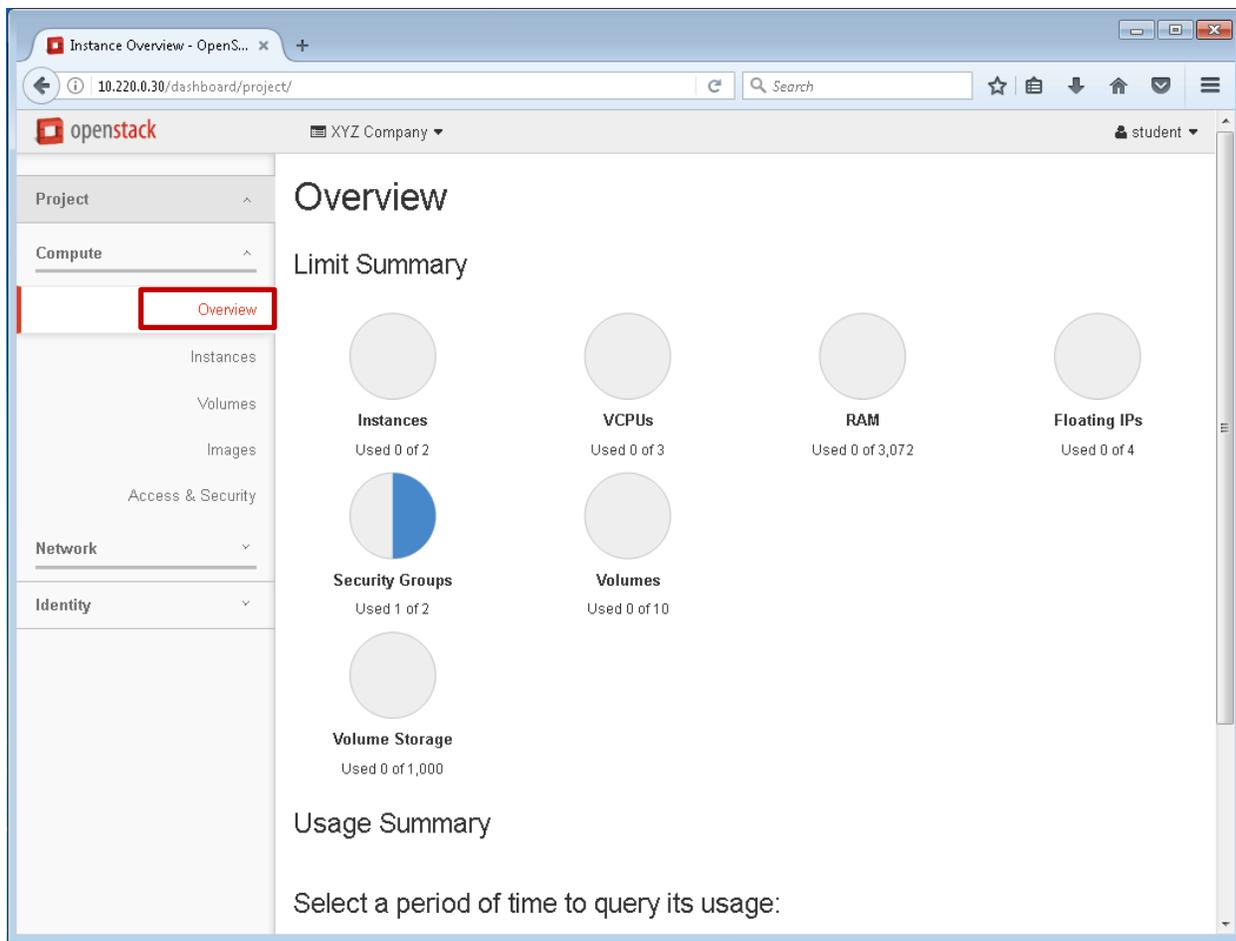
Module 1: OpenStack Dashboard



10. The **Sign Out** tab logs the user out of the Dashboard web page



Module 1: OpenStack Dashboard

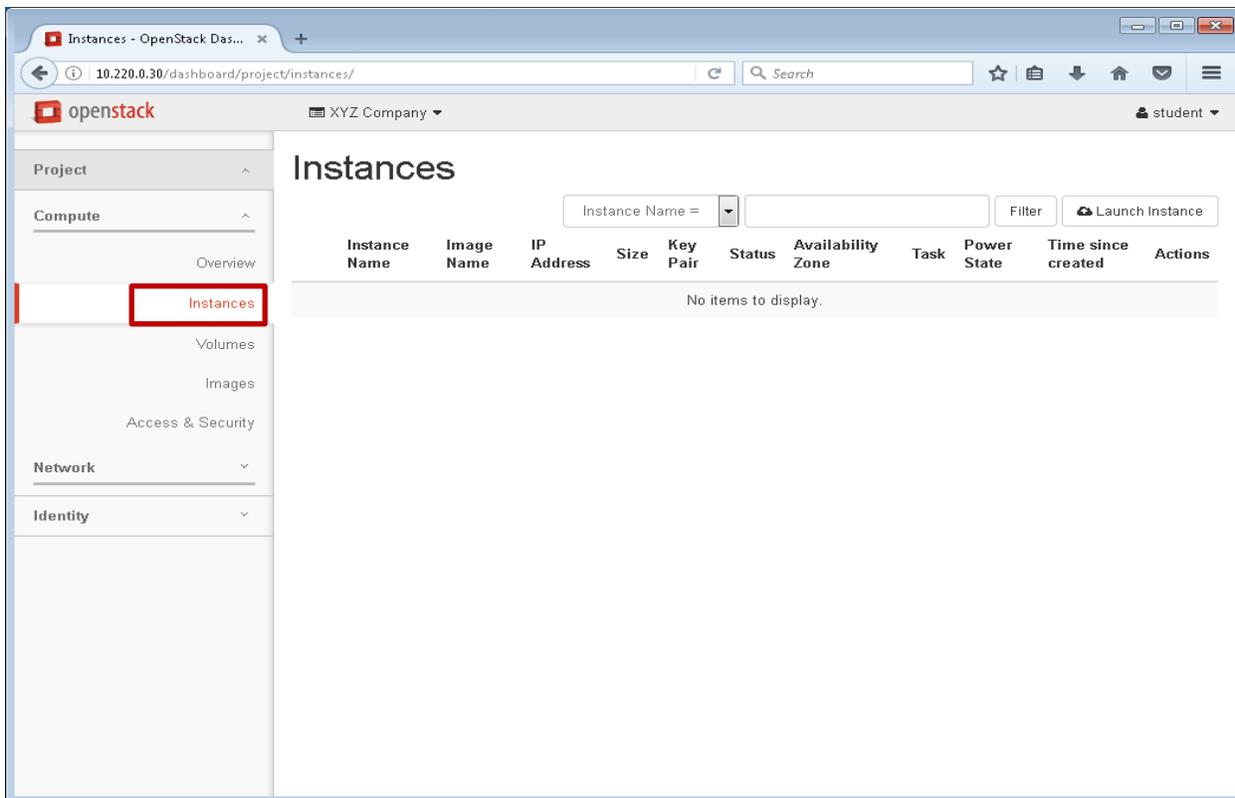


11. The **Overview** pane has several icons which represent the resources that the customer purchased. As they start deploying their cloud instances, the icons will change colors to indicate what has been used and what remains.

Note 1: In a real world deployment, the customer would be able to use the **“Select a period of time to query its usage:”** In the VMware Workstation environment the VMs are reverted to a snapshot, therefore this feature will not function.

Note 2: Resources are allocated by the provider, so what this Overview is showing is a very limited set of resources. These resources are configured based on customer needs and would be negotiated in the contract. The contract may include the ability for customers to request more resources at an additional cost.

Module 1: OpenStack Dashboard



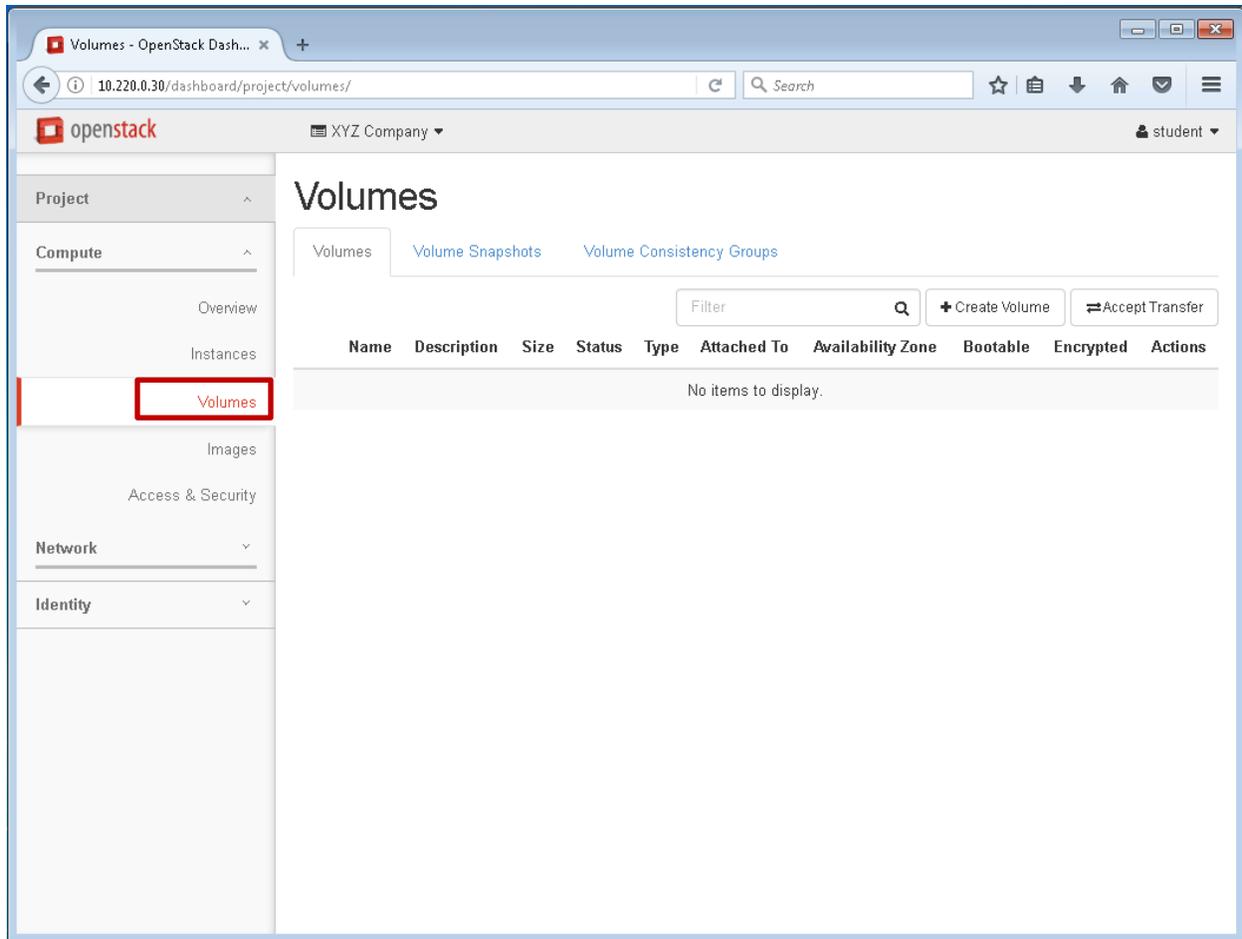
12. **Click** on the **Instances** tab and you should see that there are currently no items displayed in the center pane. This pane will be populated with instances after the customer has launched their image(s). As part of the CLOUDTech customer support team, you will assist XYZ Company in launching their cloud servers in subsequent labs.

Instances

Instances are virtual machines that run inside the cloud. Users can launch multiple instances from the same image. Every instance runs from a copy of the base image. Any changes made to the instance have no effect on the base image. You can launch an instance from the following sources:

- Images uploaded to the Image service.
- Image that you have copied to a persistent volume. The instance launches from the volume, which is provided by the cinder-volume API through iSCSI.
- Instance snapshot that you took.

Module 1: OpenStack Dashboard



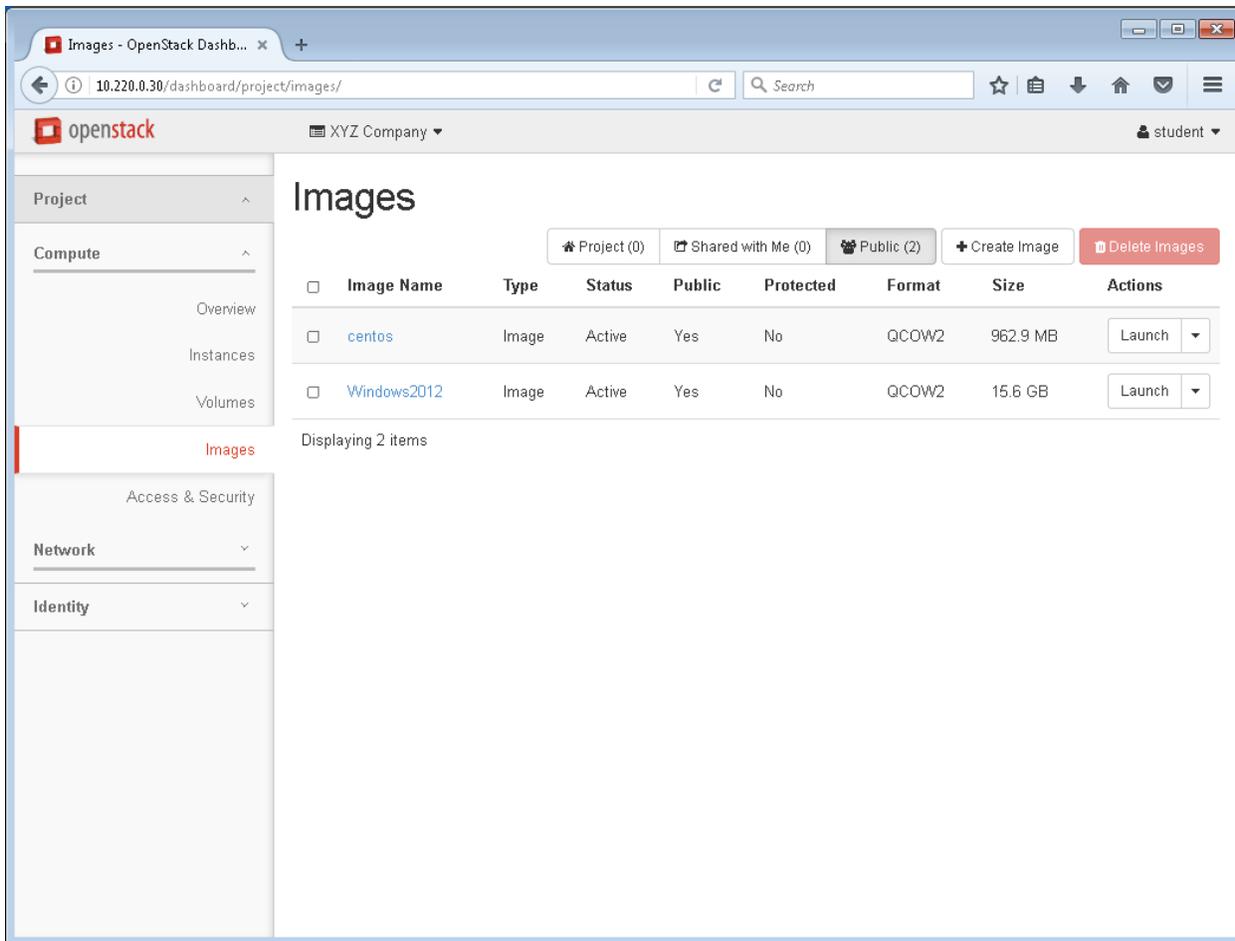
13. Click on the Volumes tab and you should see that there are no volumes present. Volumes can be created as part of instance or as a standalone volume that can be attached to an instance. You will see these as you complete later labs.

Volumes

Volumes are the Block Storage devices that you attach to instances to enable persistent storage. Users can attach a volume to a running instance or detach a volume and attach it to another instance at any time.

As an administrative user, you can manage volumes and volume types for users in various projects. You can create and delete volume types, and you can view and delete volumes.

Module 1: OpenStack Dashboard

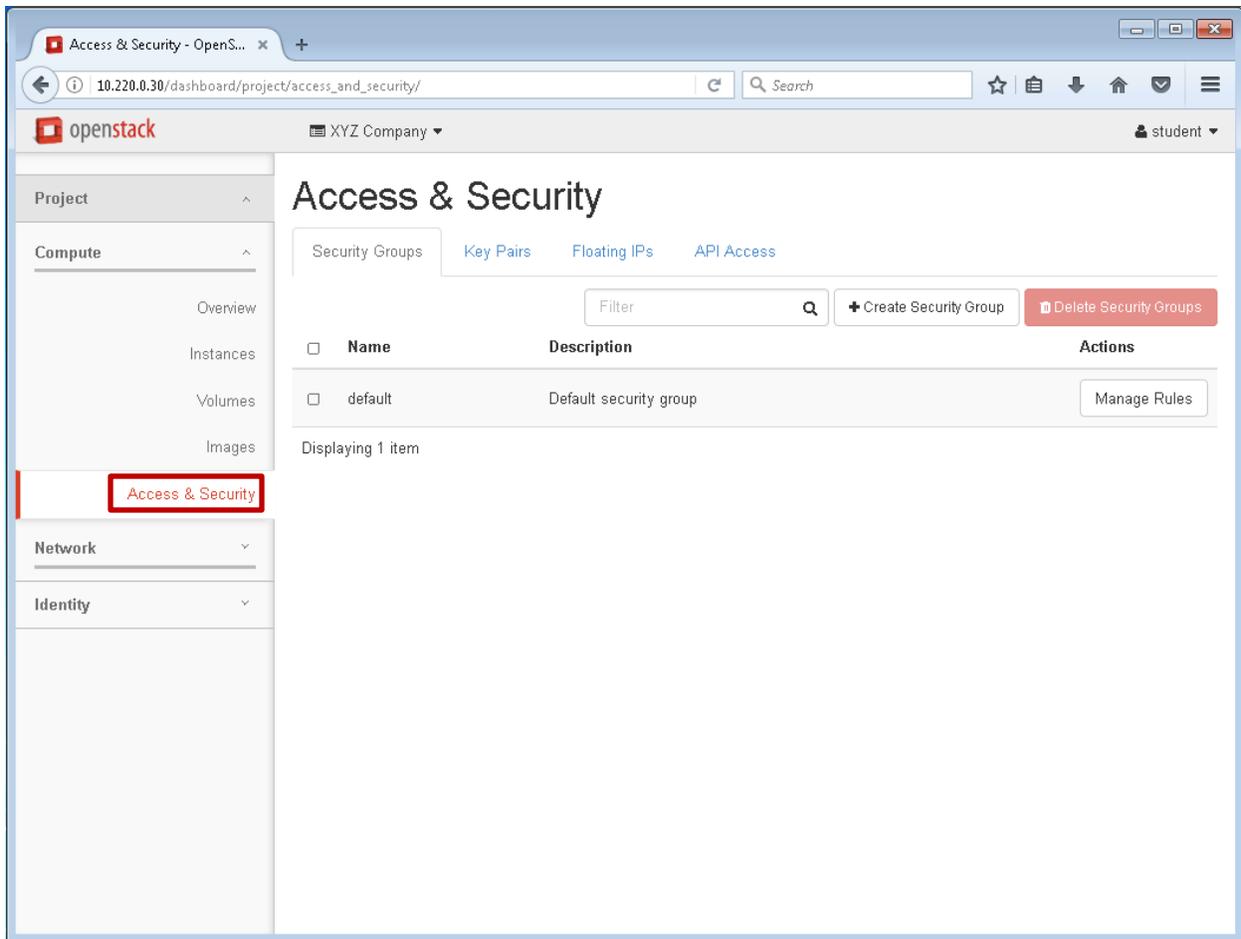


14. Click on the **Images** tab and you should see that there are two images, CentOS 7 and Server 2012 R2, which was included in XYZ Companies' contract with the CLOUDTech.

Images

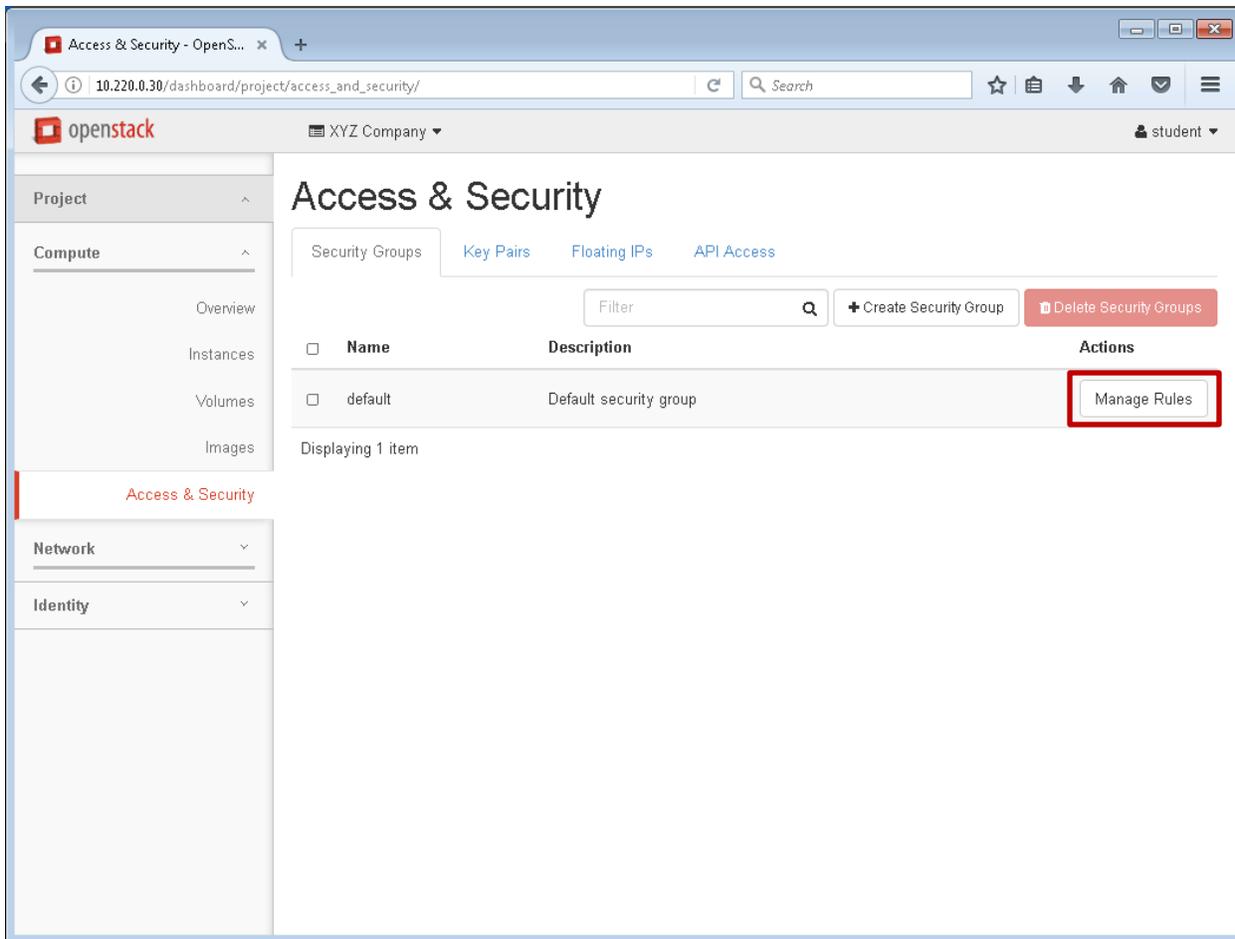
A virtual machine image, referred to simply as an image, is a single file that contains a virtual disk that has a bootable operating system installed on it. Images are used to create virtual machine instances within the cloud. Depending on your role, you may have permission to upload and manage virtual machine images. If you have the appropriate privileges, you can use the dashboard to upload and manage images in a given project. There are pre-built images that can be downloaded from various software vendors and open source web sites. Images are available in multiple formats (RAW, QCOW2, ISO, VMDK, VHD, ARI, AKI and AMI). Users can also create new images.

Module 1: OpenStack Dashboard



15. Click on the **Access & Security** tab, and you should see access & Security in the center pane with four tabs; **Security Groups**, **Key Pairs**, **Floating IPs** and **API Access**. You will use these functions during your field visit to XYZ Company.

Module 1: OpenStack Dashboard



16. In the **Security Groups** tab, you should see the Default security group and the **Manage Rules** tab. Together, these allow the user to view, create, edit, and delete security groups and manage security group rules. **Click Manage Rules**

Security groups

Before you launch an instance, you should add security group rules to enable users to ping and use SSH to connect to the instance. Security groups are sets of IP filter rules that define networking access and are applied to all instances within a project. To do so, you either add rules to the default security group or add a new security group with your desired rules.

Module 1: OpenStack Dashboard

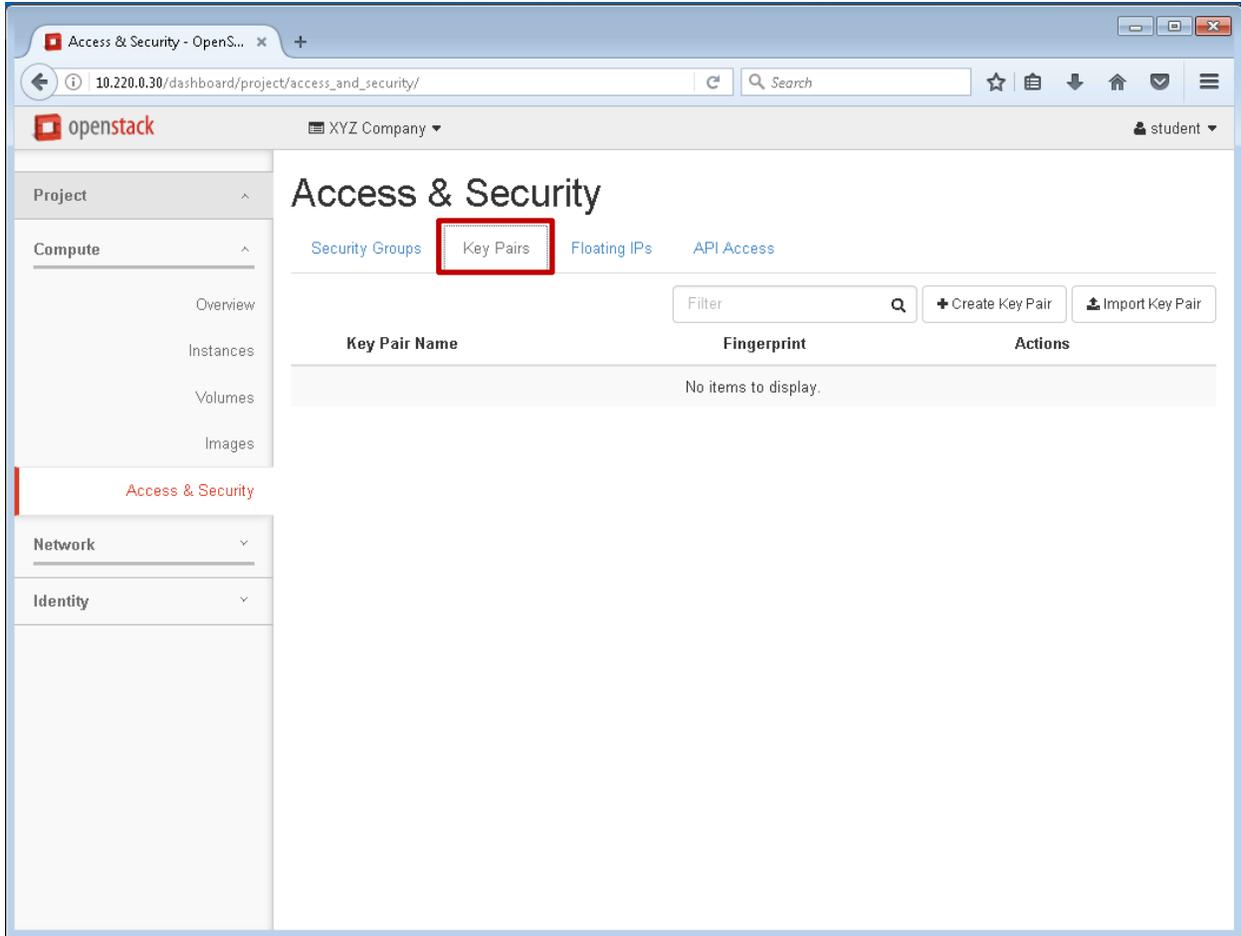
The screenshot shows the OpenStack dashboard interface. The browser address bar indicates the URL: `10.220.0.30/dashboard/project/access_and_security/security_groups/b202824f-32f2-4faa-833f-0c9354b04f00`. The dashboard header includes the OpenStack logo, the company name 'XYZ Company', and the user 'student'. The left sidebar contains a navigation menu with categories: Project, Compute, Network, and Identity. Under 'Compute', there are sub-items: Overview, Instances, Volumes, and Images. The 'Access & Security' item is highlighted with a red box. The main content area is titled 'Access & Security' and shows the path: '/ Manage Security Group Rules: default (b202824f-32f2-4faa-833f-0c9354b04f00)'. There are buttons for '+ Add Rule' and 'Delete Rules'. Below is a table of security group rules:

<input type="checkbox"/>	Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
<input type="checkbox"/>	Egress	IPv6	Any	Any	:::0	-	Delete Rule
<input type="checkbox"/>	Egress	IPv4	Any	Any	0.0.0.0/0	-	Delete Rule
<input type="checkbox"/>	Ingress	IPv4	Any	Any	-	default	Delete Rule
<input type="checkbox"/>	Ingress	IPv6	Any	Any	-	default	Delete Rule

Displaying 4 items

17. By default, all egress network traffic is allowed from cloud instances and all ingress network traffic to the cloud instances is denied. You can think of this OpenStack function as a firewall that the user can configure to meet their needs. Additionally, the system supports both IPv4 and IPv6. You will be configuring new rules during the field visit to XYZ Company. **Click on Access & Security** to exit the Manage Rules pane

Module 1: OpenStack Dashboard

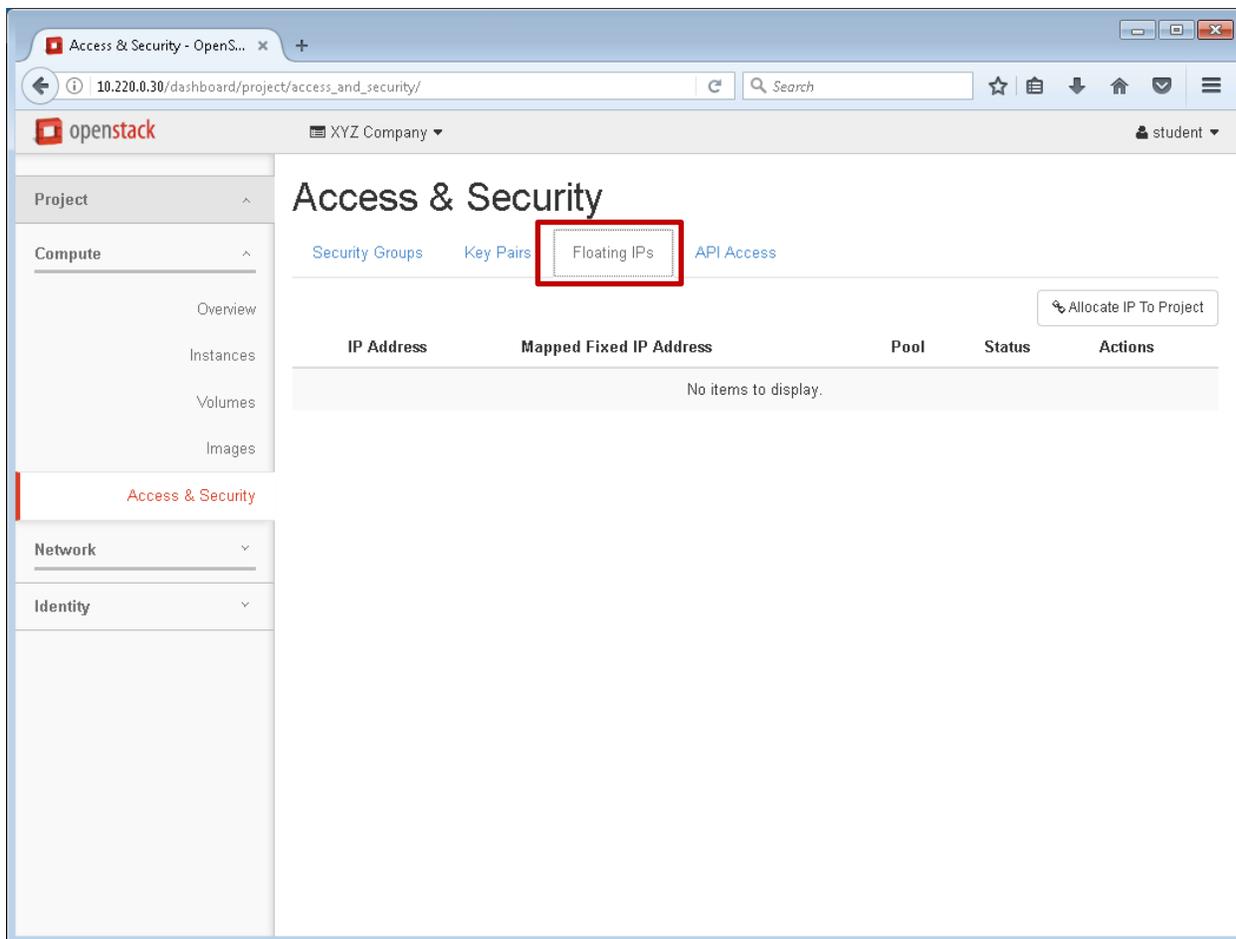


18. **Click** on the **Key Pairs** tab. In this pane you can view, create, edit, import, and deleted key pairs.

Key pairs

Key pairs are SSH credentials that are injected into an instance when it is launched. To use key pair injection, the image that the instance is based on must contain the cloud-init package. Each project should have at least one key pair. To improve the security posture in the cloud, logging into the cloud instances with SSH is done by use of a public and private key pair instead of using a username and password. Key pairs can be created or imported via the Horizon dashboard under Access & Security.

Module 1: OpenStack Dashboard



19. Click on the **Floating IPs** tab. Floating IPs can be allocated or released from an instance.

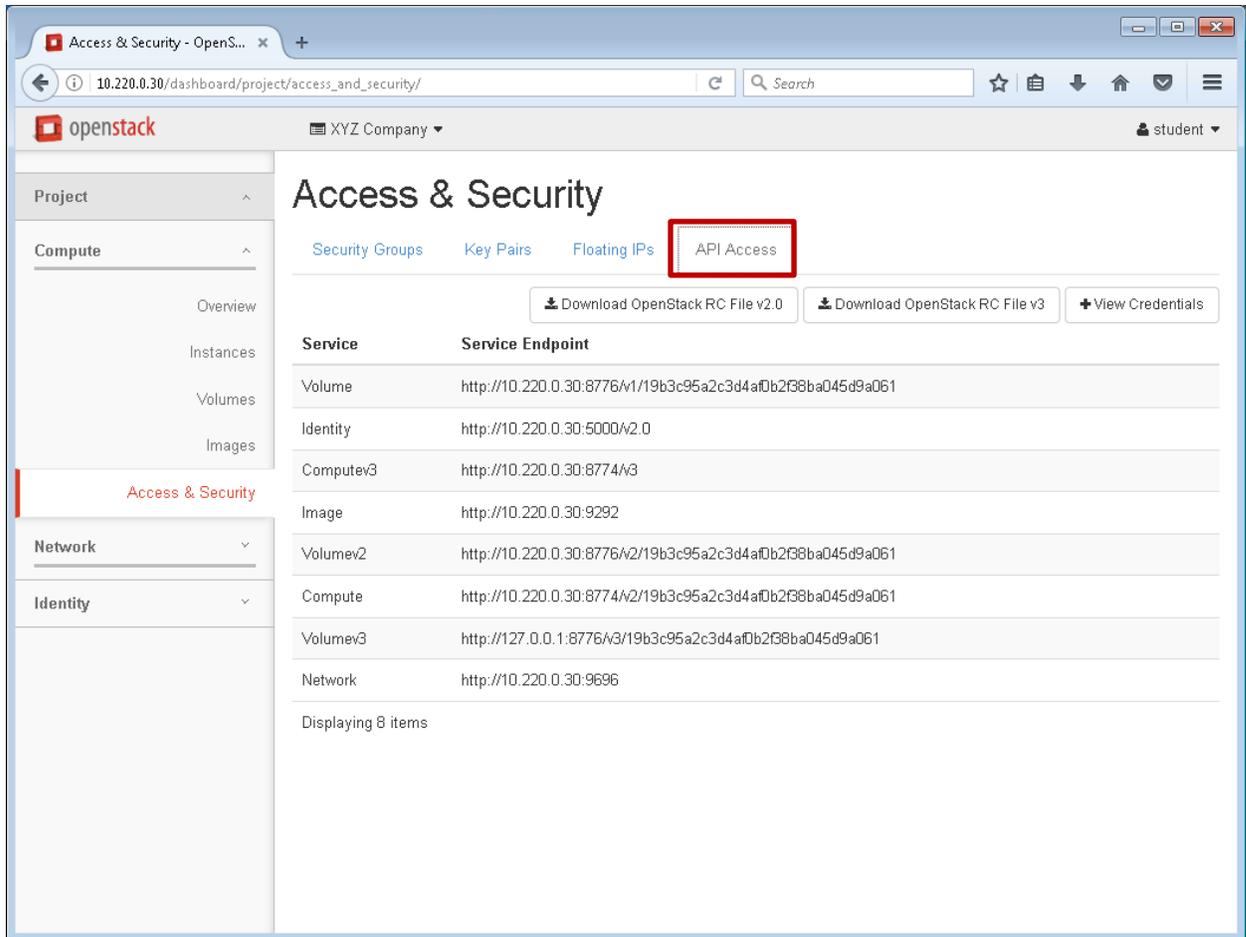
Networks

When an instance is created in OpenStack, it is automatically assigned a fixed IP address in the network to which the instance is assigned. This IP address is permanently associated with the instance until the instance is terminated.

However, in addition to the fixed IP address, a floating IP address can also be attached to an instance. Unlike fixed IP addresses, floating IP addresses can have their associations modified at any time, regardless of the state of the instances involved.

Private IP addresses (fixed IP addresses) are used for communication between instances, and public addresses (floating IP addresses) are used for communication with networks outside the cloud, including the Internet.

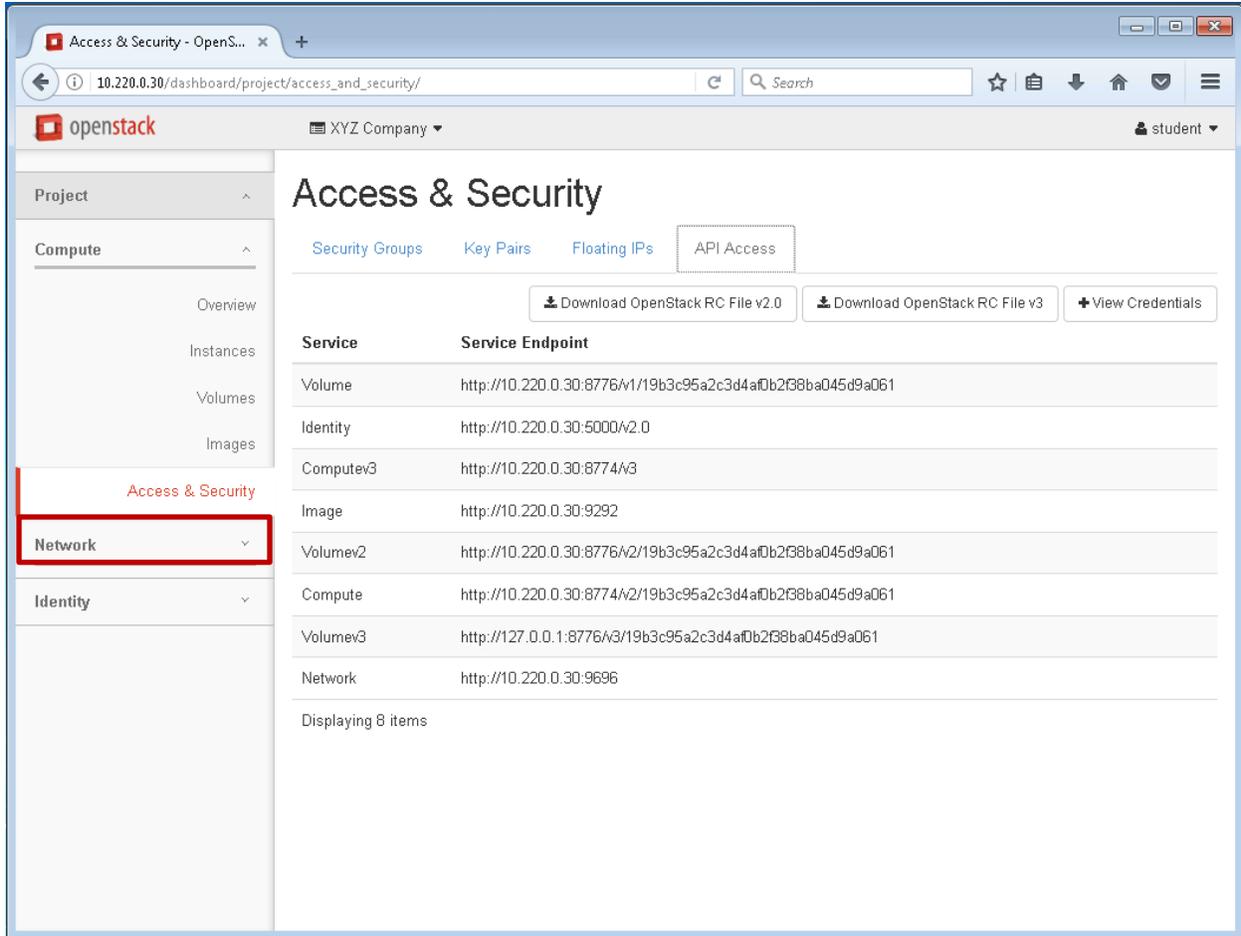
Module 1: OpenStack Dashboard



20. Click on the **API Access** tab. The user can view API endpoints

Note: API Access is a function that XYZ Company's staff can use to develop specific applications for their customers use.

Module 1: OpenStack Dashboard



The screenshot shows the OpenStack dashboard interface. The browser address bar displays the URL `10.220.0.30/dashboard/project/access_and_security/`. The page title is "Access & Security". The left sidebar contains a navigation menu with "Project", "Compute", "Network", and "Identity" sections. The "Network" section is highlighted with a red box. The main content area has tabs for "Security Groups", "Key Pairs", "Floating IPs", and "API Access". Below the tabs are buttons for "Download OpenStack RC File v2.0", "Download OpenStack RC File v3", and "View Credentials". A table lists service endpoints:

Service	Service Endpoint
Volume	<code>http://10.220.0.30:8776/v1/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Identity	<code>http://10.220.0.30:5000/v2.0</code>
Computev3	<code>http://10.220.0.30:8774/v3</code>
Image	<code>http://10.220.0.30:9292</code>
Volumev2	<code>http://10.220.0.30:8776/v2/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Compute	<code>http://10.220.0.30:8774/v2/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Volumev3	<code>http://127.0.0.1:8776/v3/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Network	<code>http://10.220.0.30:9696</code>

Displaying 8 items

21. Click on the **Network** tab drop down arrow

Module 1: OpenStack Dashboard

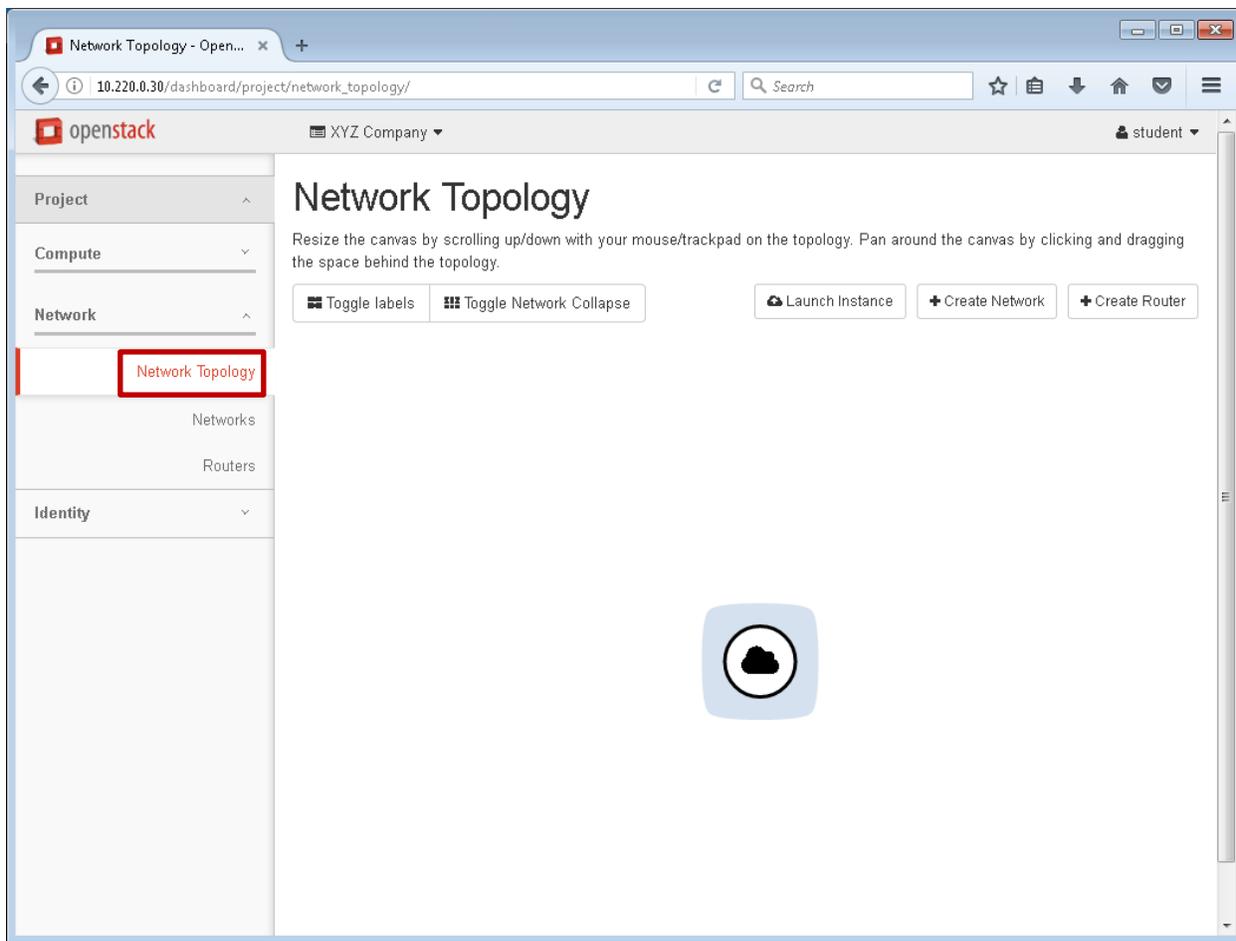
The screenshot shows the OpenStack dashboard interface. The browser address bar indicates the URL: `10.220.0.30/dashboard/project/access_and_security/#/sidebar-accordion-project-network`. The page title is "Access & Security". The left sidebar shows the "Network" menu expanded, with "Network Topology", "Networks", and "Routers" highlighted. The main content area displays a table of service endpoints.

Service	Service Endpoint
Volume	<code>http://10.220.0.30:8776/v1/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Identity	<code>http://10.220.0.30:5000/v2.0</code>
Computev3	<code>http://10.220.0.30:8774/v3</code>
Image	<code>http://10.220.0.30:9292</code>
Volumev2	<code>http://10.220.0.30:8776/v2/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Compute	<code>http://10.220.0.30:8774/v2/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Volumev3	<code>http://127.0.0.1:8776/v3/19b3c95a2c3d4af0b2f38ba045d9a061</code>
Network	<code>http://10.220.0.30:9696</code>

Displaying 8 items

22. You should see the three tabs below Network; **Network Topology**, **Networks**, and **Routers**. Click on the **Network Topology** tab

Module 1: OpenStack Dashboard



23. When properly configured, you should see a graphical representation of your network. This may include the Wide Area Network (WAN), Local Area Network (LAN), and a router to facilitate network traffic between the WAN and the LAN.

Note: The center pane only depicts the WAN, this is because XYZ Company has contracted for Infrastructure as a Service (IaaS) and will have to configure their private network (LAN) and connect it with the public network (WAN) using a virtual router that they will add and configure. You will be assisting XYZ Company with configuring their network settings during a field visit.

Module 1: OpenStack Dashboard

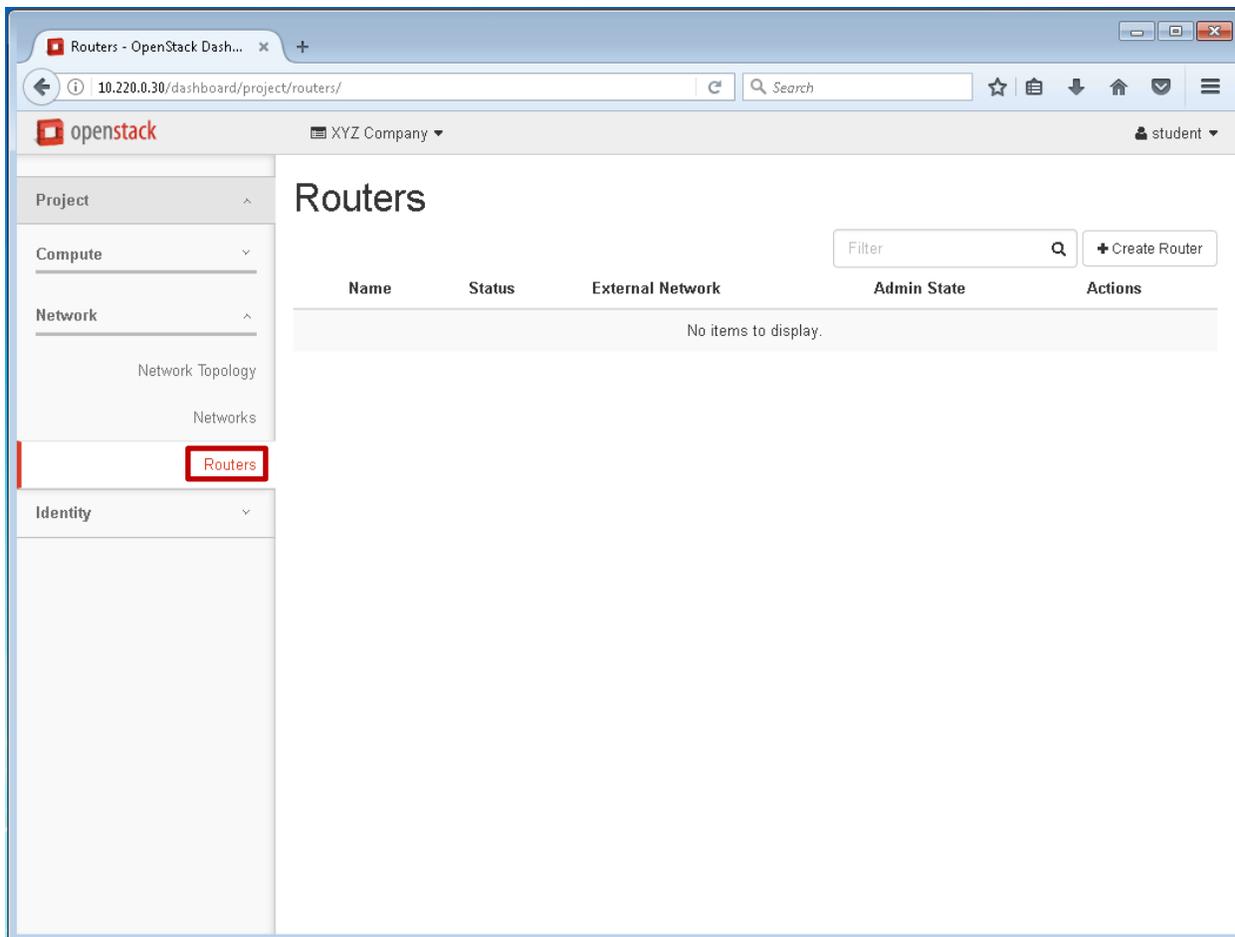
The screenshot shows the OpenStack Dashboard interface. The browser address bar indicates the URL is `10.220.0.30/dashboard/project/networks/`. The dashboard header includes the OpenStack logo, the company name 'XYZ Company', and the user 'student'. The left sidebar contains a navigation menu with items: Project, Compute, Network, Network Topology, **Networks** (highlighted with a red box), Routers, and Identity. The main content area is titled 'Networks' and features a search filter, '+ Create Network' button, and '- Delete Networks' button. Below these is a table with the following data:

<input type="checkbox"/>	Name	Subnets Associated	Shared	External	Status	Admin State	Actions
<input type="checkbox"/>	public	public-subnet 10.220.0.0/23	No	No	Active	UP	Edit Network

Below the table, it states 'Displaying 1 item'.

24. The **Networks** pane show the public network, which CLOUDTech administrators have already configured for XYZ Company.

Module 1: OpenStack Dashboard

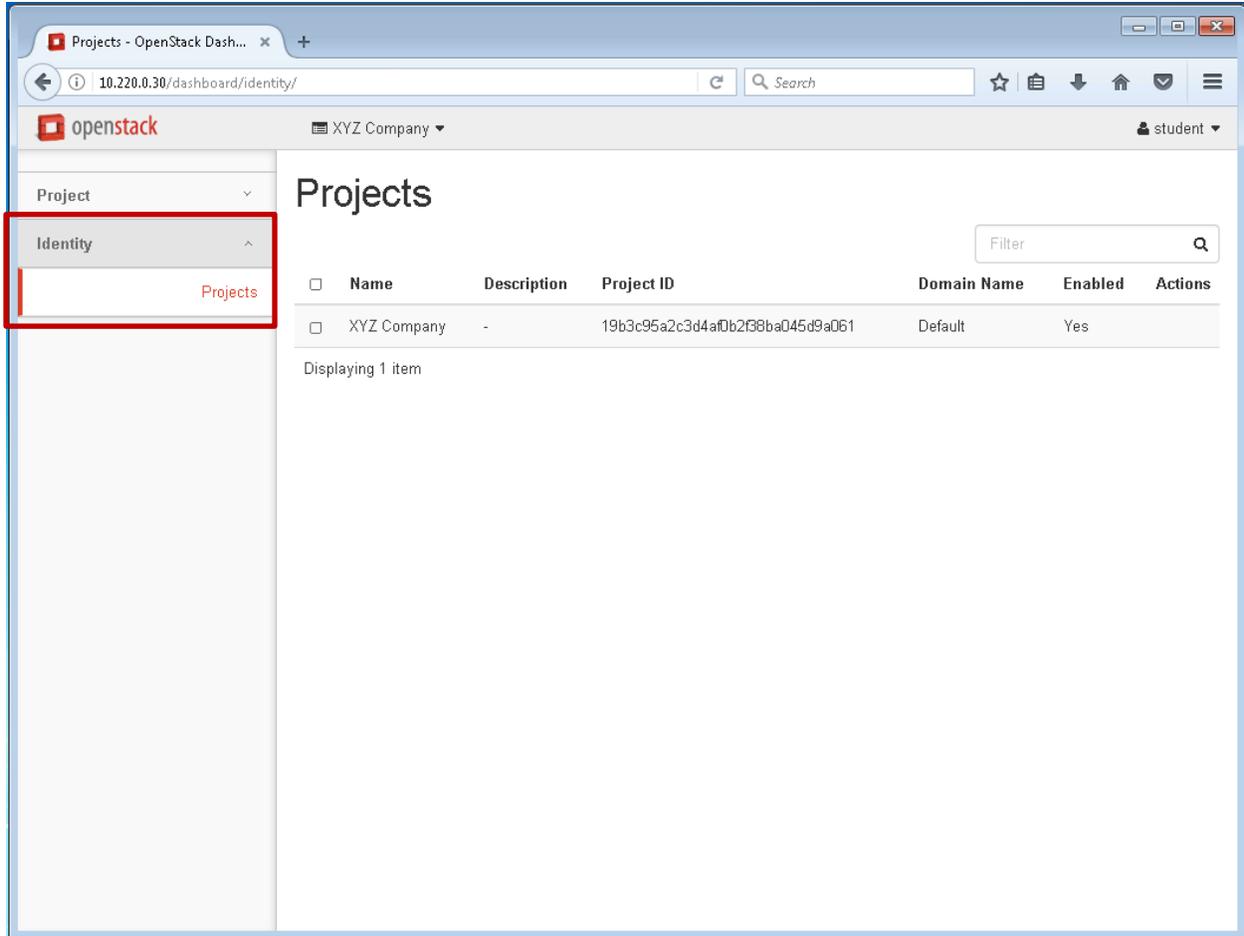


25. The **Routers** pane should be blank. You will assist XYZ Company in creating and configuring their virtual Router.

Routers

A physical or virtual network device that passes network traffic between different networks. In the OpenStack environment, a router is a virtual device that is required to allow network traffic between the private IP address (fixed IP address) and the public IP address (floating IP address).

Module 1: OpenStack Dashboard



26. **Click** on the **Identity** tab, the center pane will list all Projects. In this case, only the XYZ Company exists

This completes Module 1, continue to Conclusion

Conclusion

You should now be able to connect to an OpenStack Dashboard and navigate the various tabs. As part of your CLOUDTech training, you will be accompanying a CLOUDTech customer support team on a field visit to XYZ Company to assist the customer with configuring their Linux and Windows cloud servers.

