

IST198

OpenStack

Administration

Version 5: 2017-08-15

These exercises will guide the student through the concepts and topics learned in chapter 3, configure the Networks and Routers on OpenStack Mitaka installed on CentOS 7.

Configure OpenStack Networks and Routers.



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Attributions:



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



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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:

- Configure OpenStack Networks and Routers

Lab 6-8

These labs will guide the student through configuring OpenStack Networks and Routers for use by the customer's cloud instances.

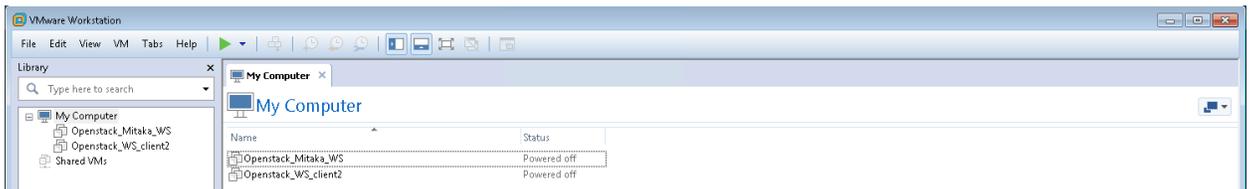
(Note: This lab is designed to be completed on an NDG NETLAB System with the IST198_OpenStack_HXXX POD installed. The labs can also be completed on a physical machine with the appropriate software packages installed, or a PC that has VMware Workstation installed with the appropriate virtual machines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



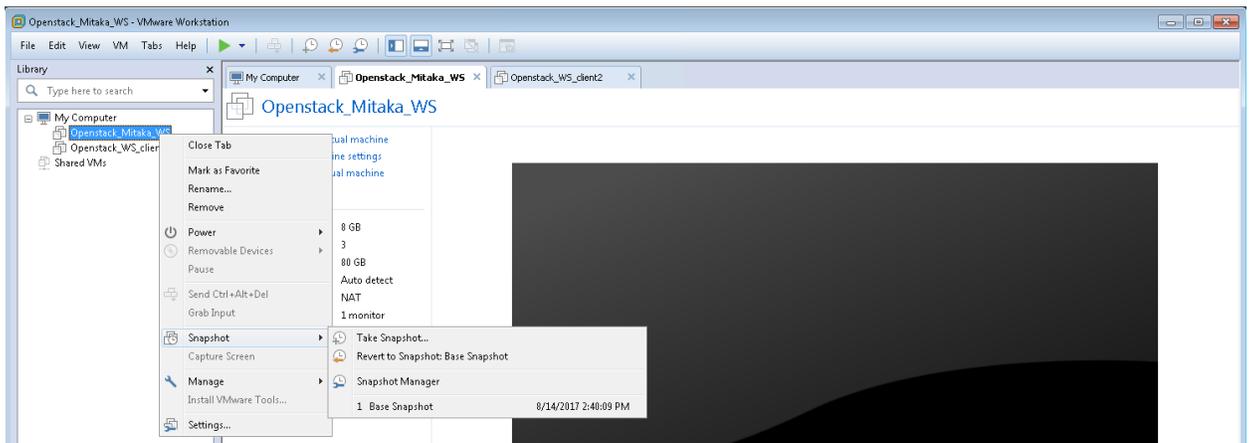
Prepare the OpenStack Virtual Machines



1. Launch the **VMware Workstation Pro** application

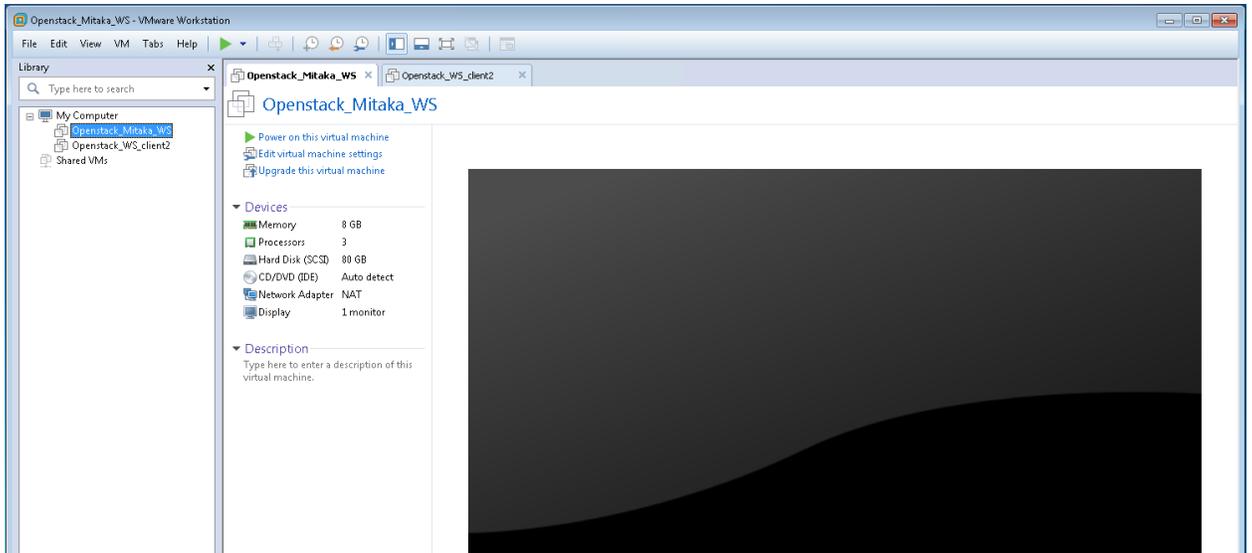


2. Workstation should have two virtual machines (VM) installed; `Openstack_Mitaka_WS` and `Openstack_WS_client2`.



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 3: Configure OpenStack Networks and Routers



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 CLOUDTech's customer support team, this is your first field visit to XYZ Company. During this visit, you will assist the customer in configuring their Private Network and Router.

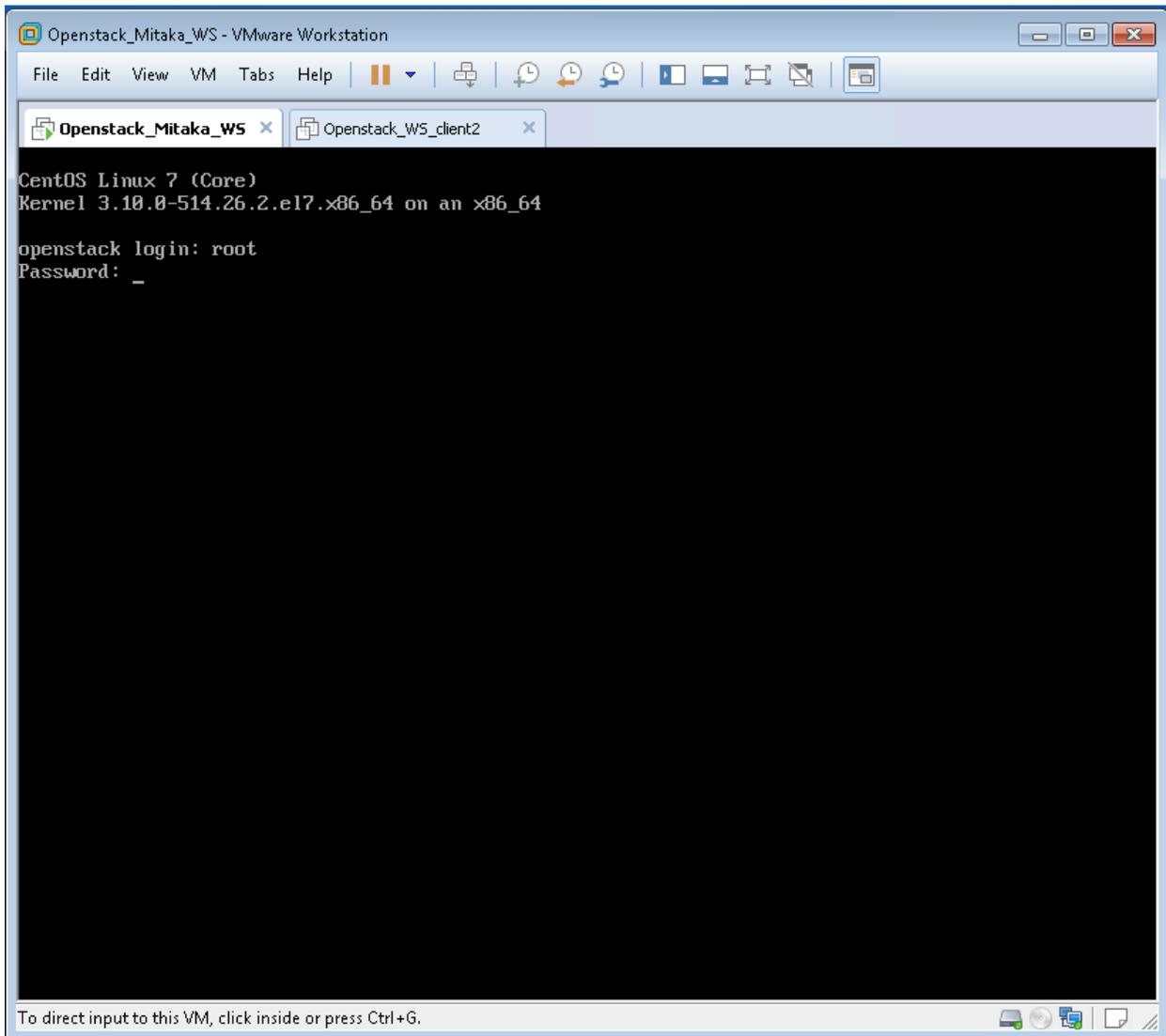
Lab Settings

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	CentOS 7 Client
Server1	10.220.0.30	root	P@ssword	OpenStack 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.

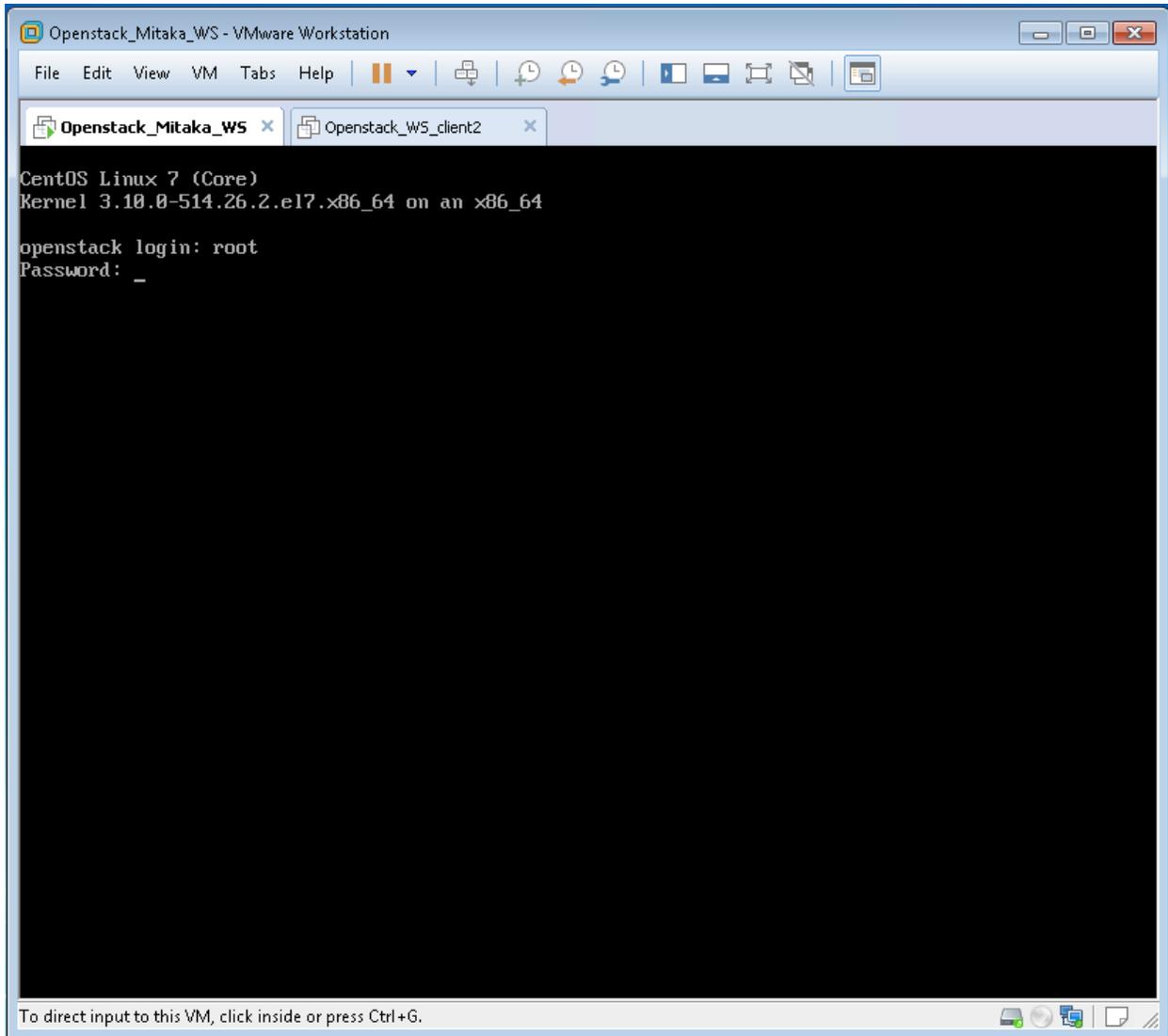
Run the lab setup script



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

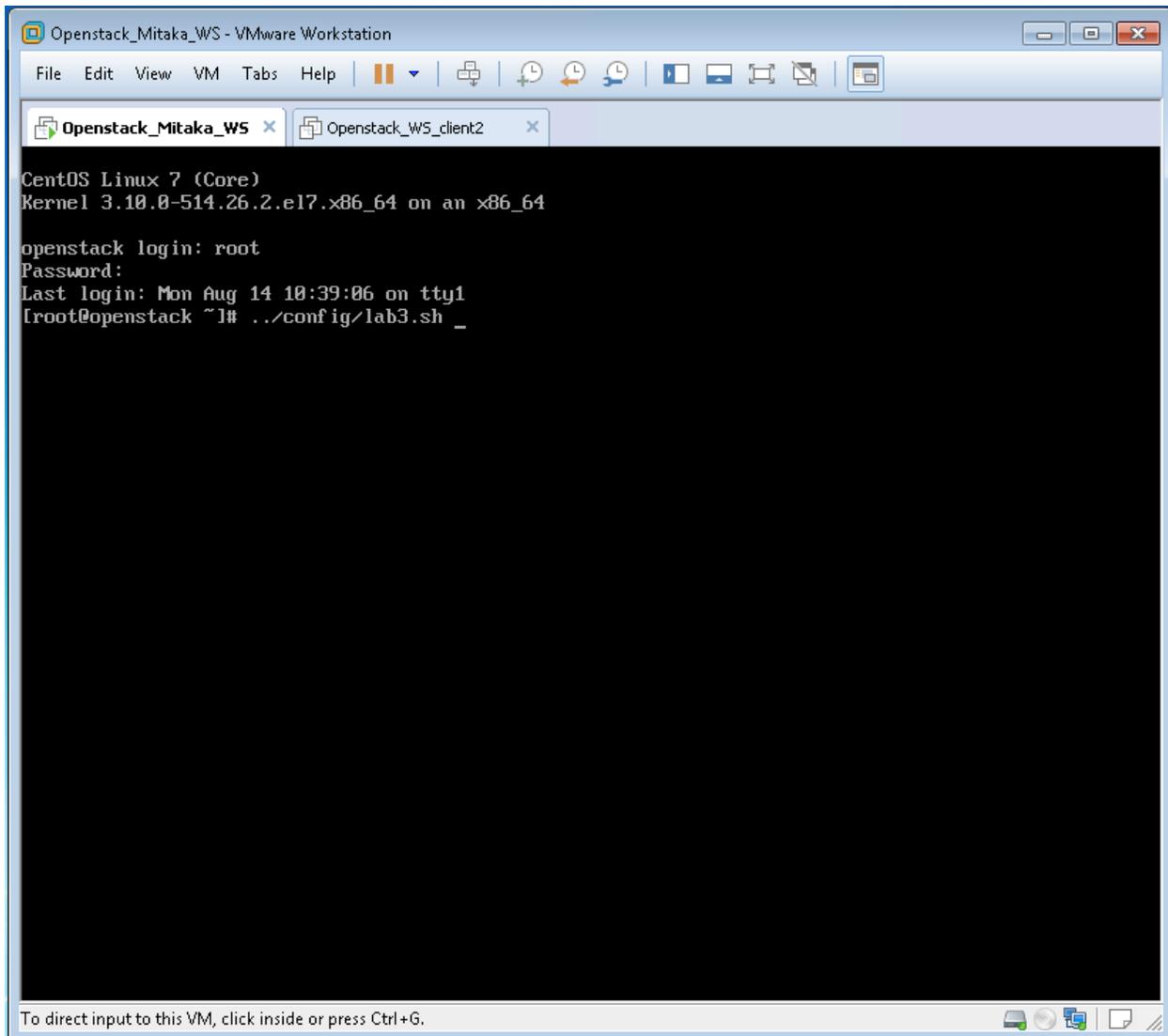
Note: The password is NOT visible as you type it

Module 3: Configure OpenStack Networks and Routers



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

Module 3: Configure OpenStack Networks and Routers



The screenshot shows a VMware Workstation window titled "Openstack_Mitaka_WS - VMware Workstation". The terminal window displays the following text:

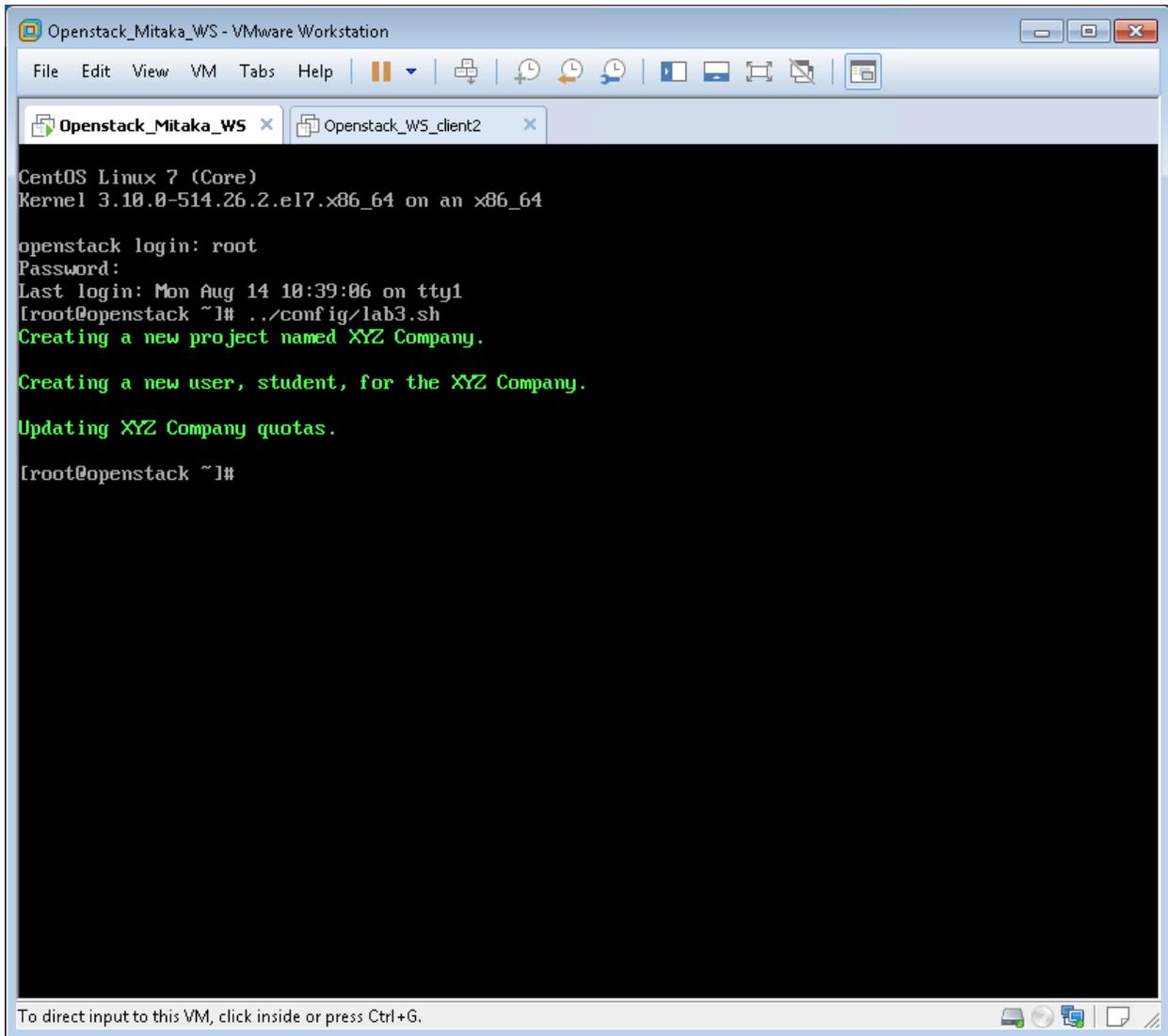
```
CentOS Linux 7 (Core)
Kernel 3.10.0-514.26.2.el7.x86_64 on an x86_64

openstack login: root
Password:
Last login: Mon Aug 14 10:39:06 on tty1
[root@openstack ~]# ../config/lab3.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/lab3.sh` and **press Enter** as shown in the screen capture above to run the Module 3 setup script

Module 3: Configure OpenStack Networks and Routers



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: Mon Aug 14 10:39:06 on tty1
[root@openstack ~]# ../config/lab3.sh
Creating a new project named XYZ Company.

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

Updating XYZ Company quotas.

[root@openstack ~]#
```

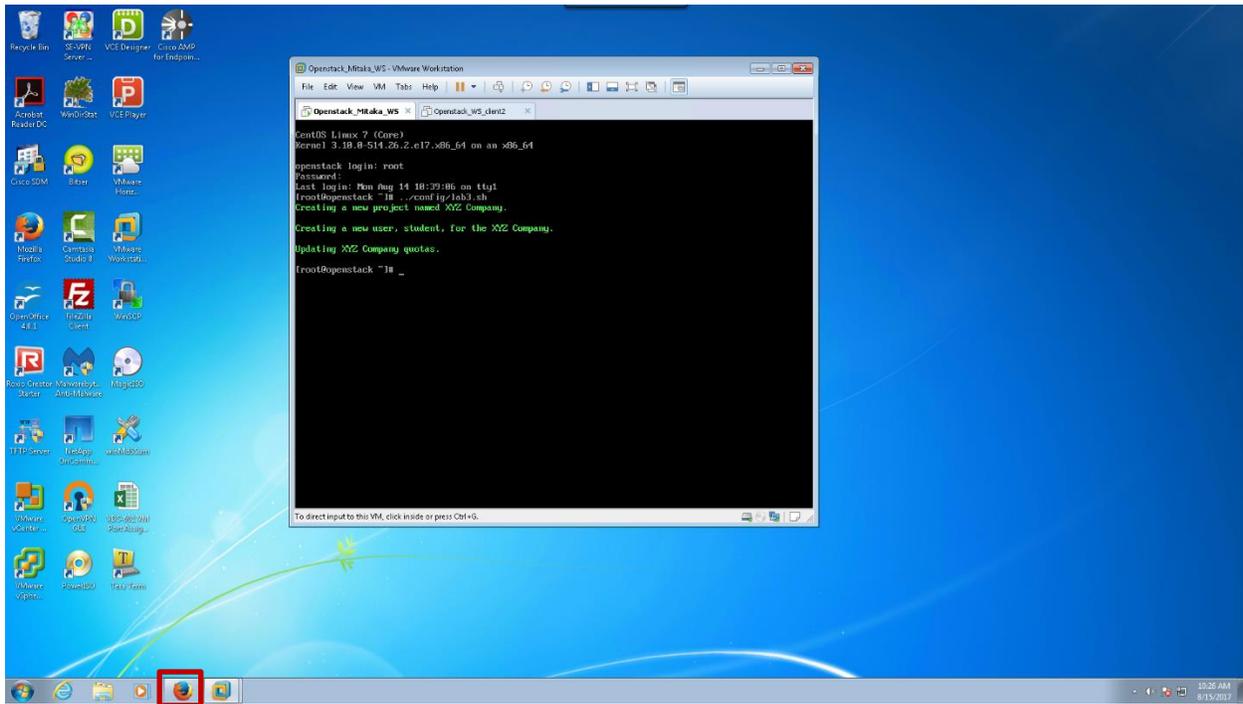
At the bottom of the terminal window, there is a status bar that reads: "To direct input to this VM, click inside or press Ctrl+G."

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

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



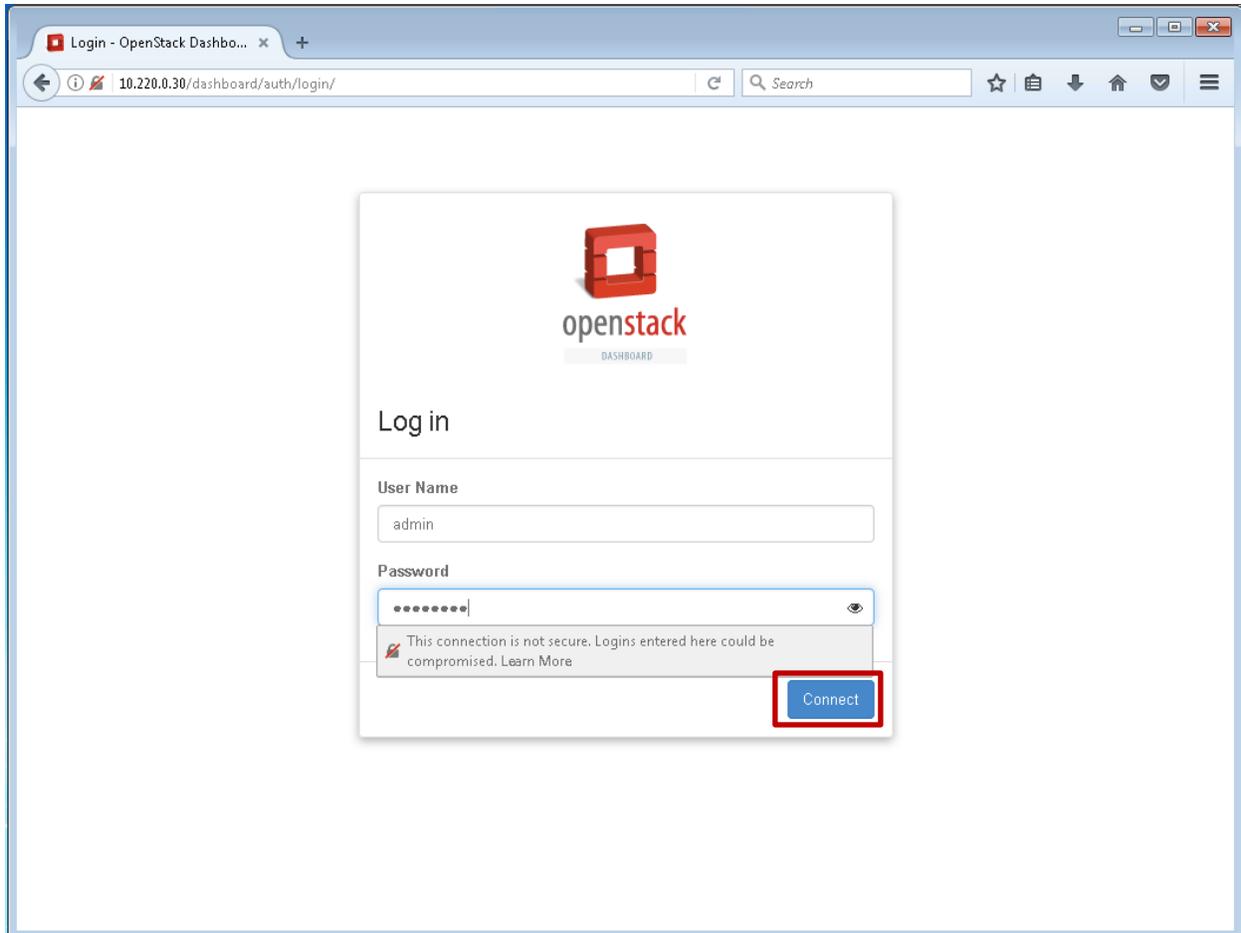
Access the OpenStack Dashboard



1. On your Windows 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 to accomplish all of the labs, unless specifically noted in the instructions.

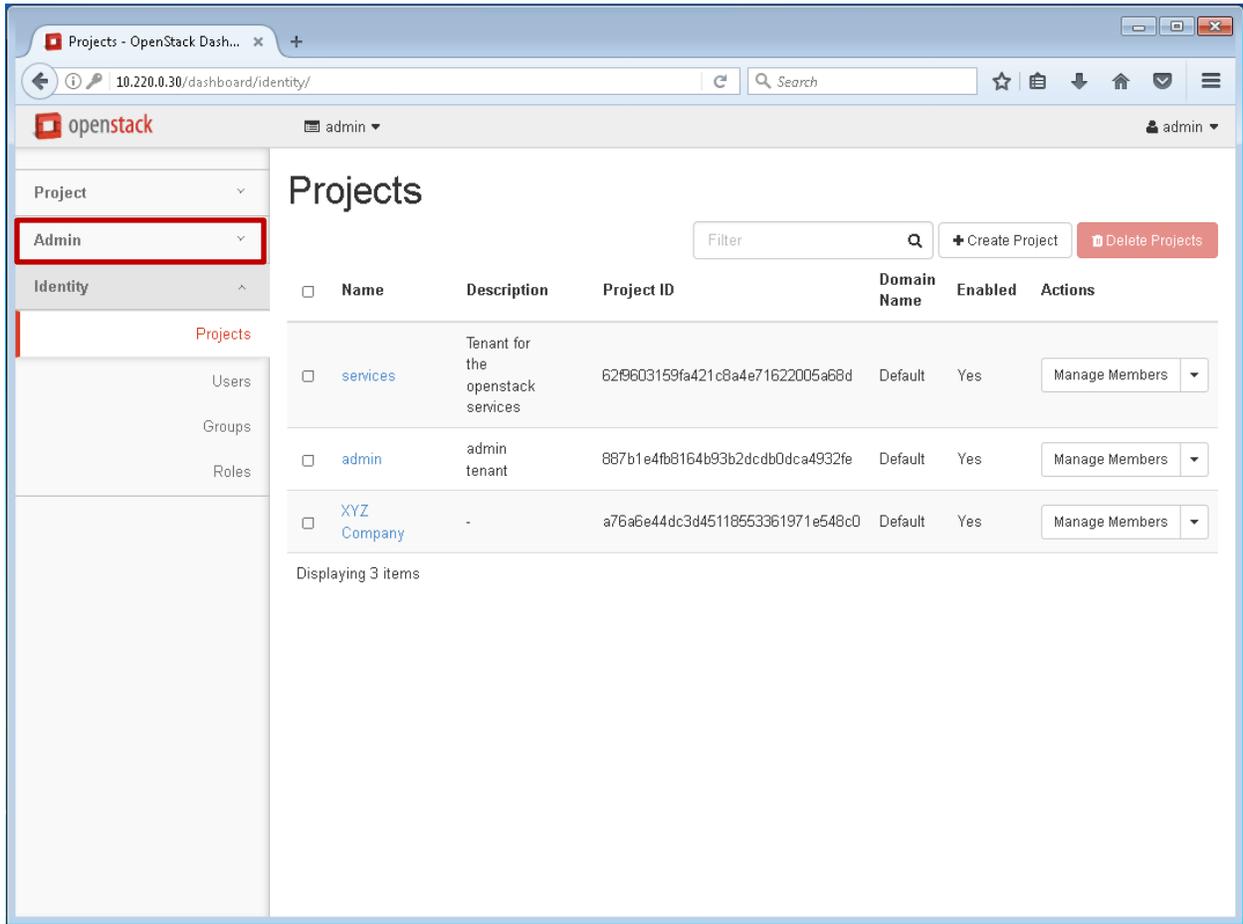
Module 3: Configure OpenStack Networks and Routers



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

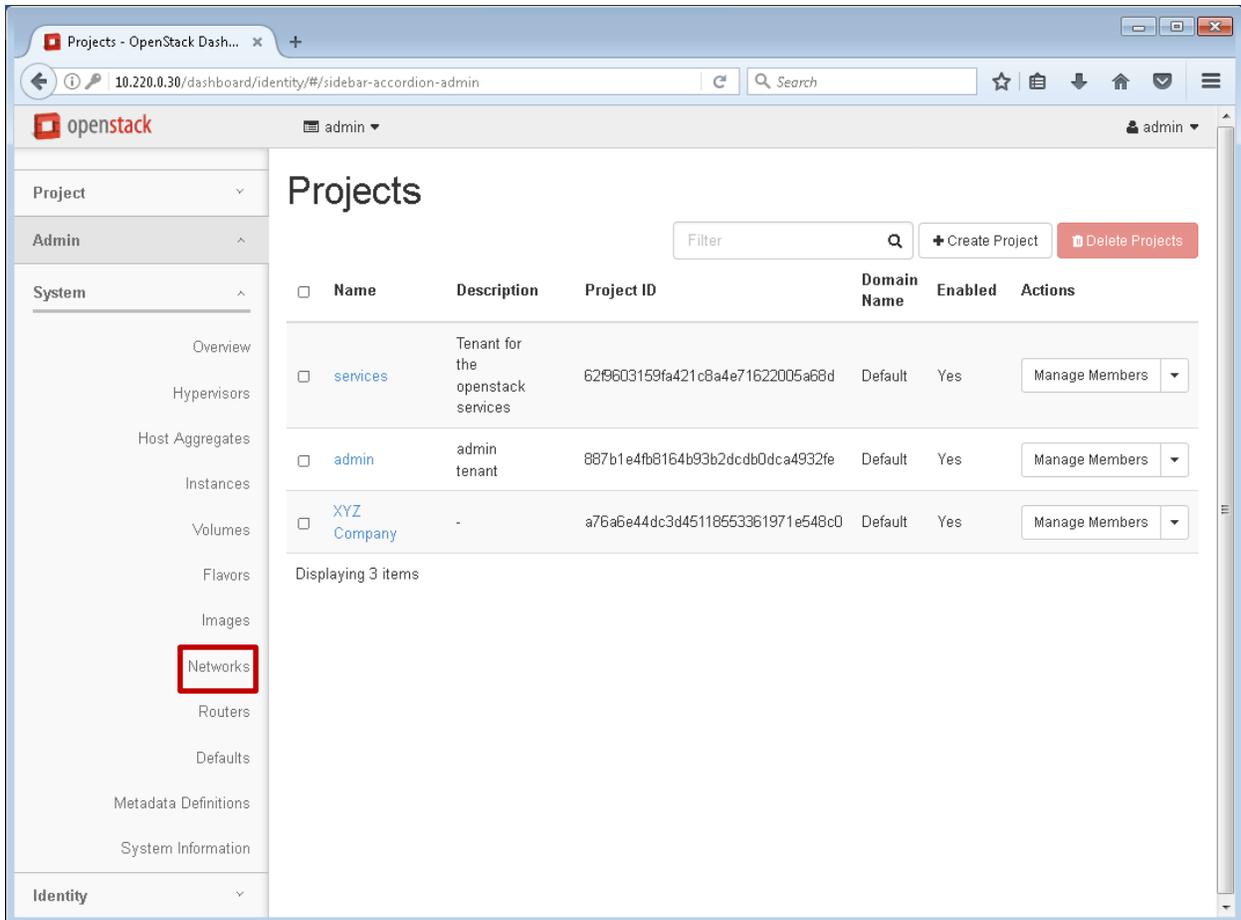
Note: User Name entries are not case sensitive, passwords are.

Lab 6: Add and configure a Public Network



1. Select the **Admin** tab in the left pane.

Module 3: Configure OpenStack Networks and Routers



The screenshot shows the OpenStack dashboard interface. The left sidebar contains a navigation menu with categories: Project, Admin, and System. Under the System category, the 'Networks' item is highlighted with a red rectangular box. The main content area is titled 'Projects' and features a search filter, '+ Create Project' button, and '- Delete Projects' button. Below these is a table listing three projects:

<input type="checkbox"/>	Name	Description	Project ID	Domain Name	Enabled	Actions
<input type="checkbox"/>	services	Tenant for the openstack services	62f9603159fa421c8a4e71622005a68d	Default	Yes	Manage Members
<input type="checkbox"/>	admin	admin tenant	887b1e4fb8164b93b2dcd0dca4932fe	Default	Yes	Manage Members
<input type="checkbox"/>	XYZ Company	-	a76a6e44dc3d45118553361971e548c0	Default	Yes	Manage Members

Below the table, it says 'Displaying 3 items'.

2. Select Networks

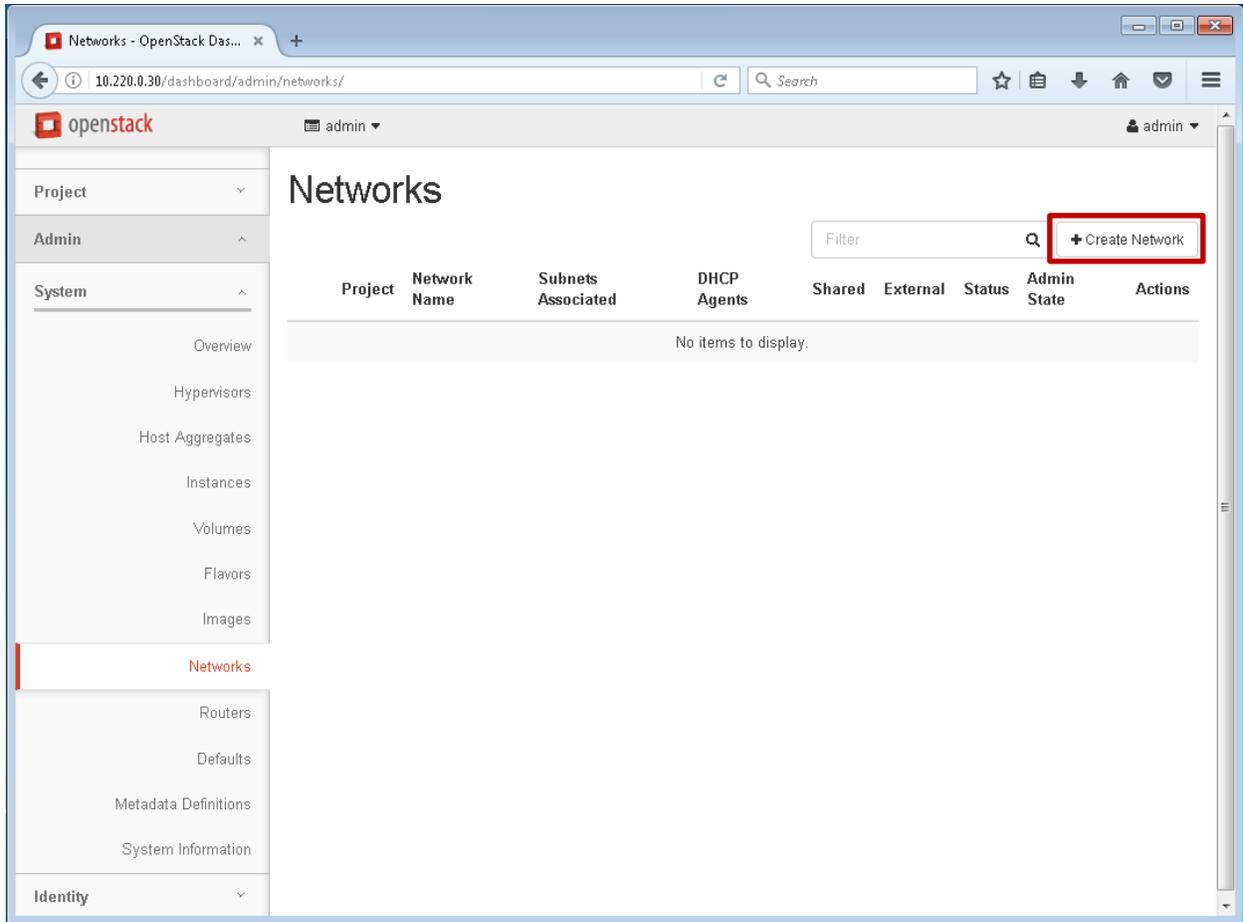
Networks

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.

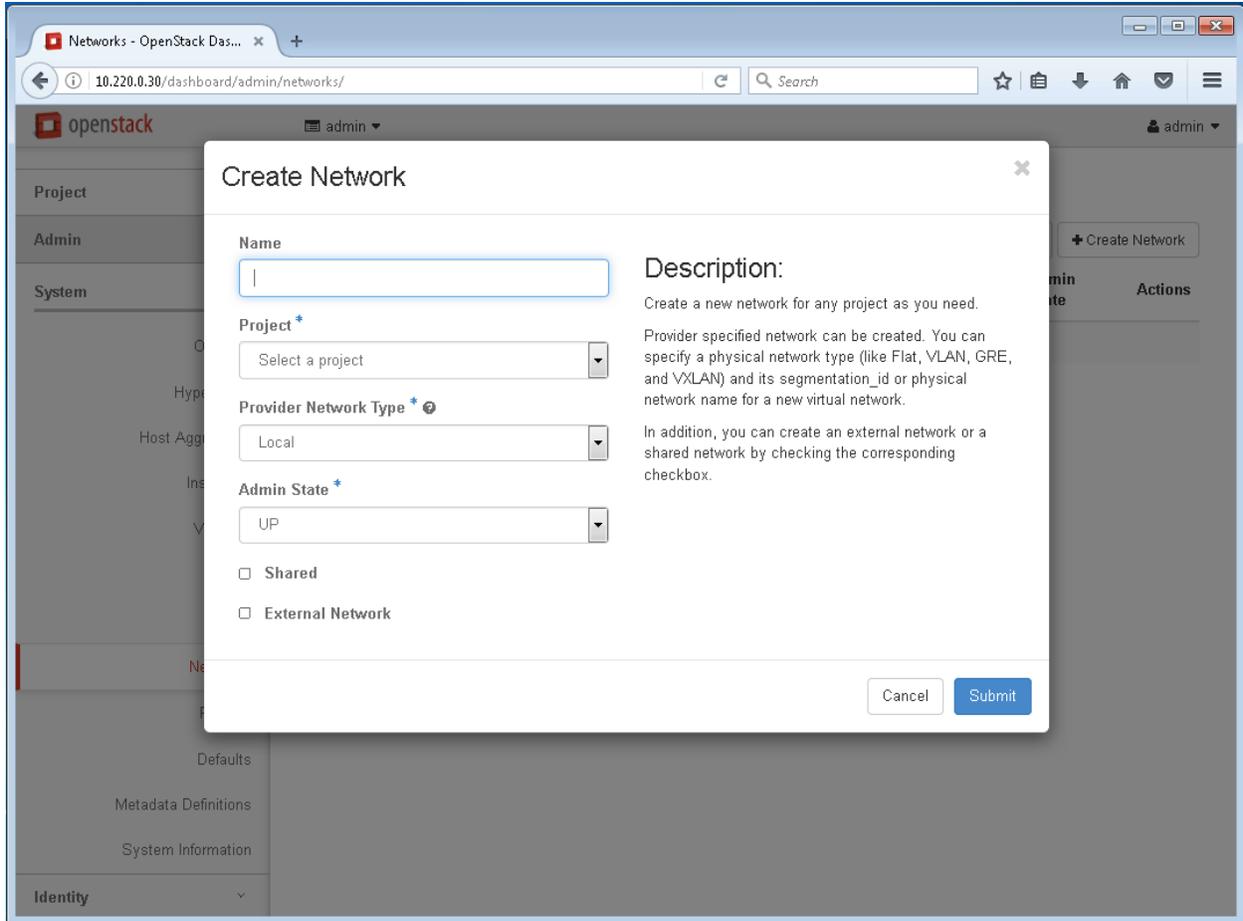
Private IP addresses (fixed IP addresses) are used for communication between instances, and public addresses (floating IP addresses) are used for communication with networks outside the cloud, including the Internet.

Module 3: Configure OpenStack Networks and Routers



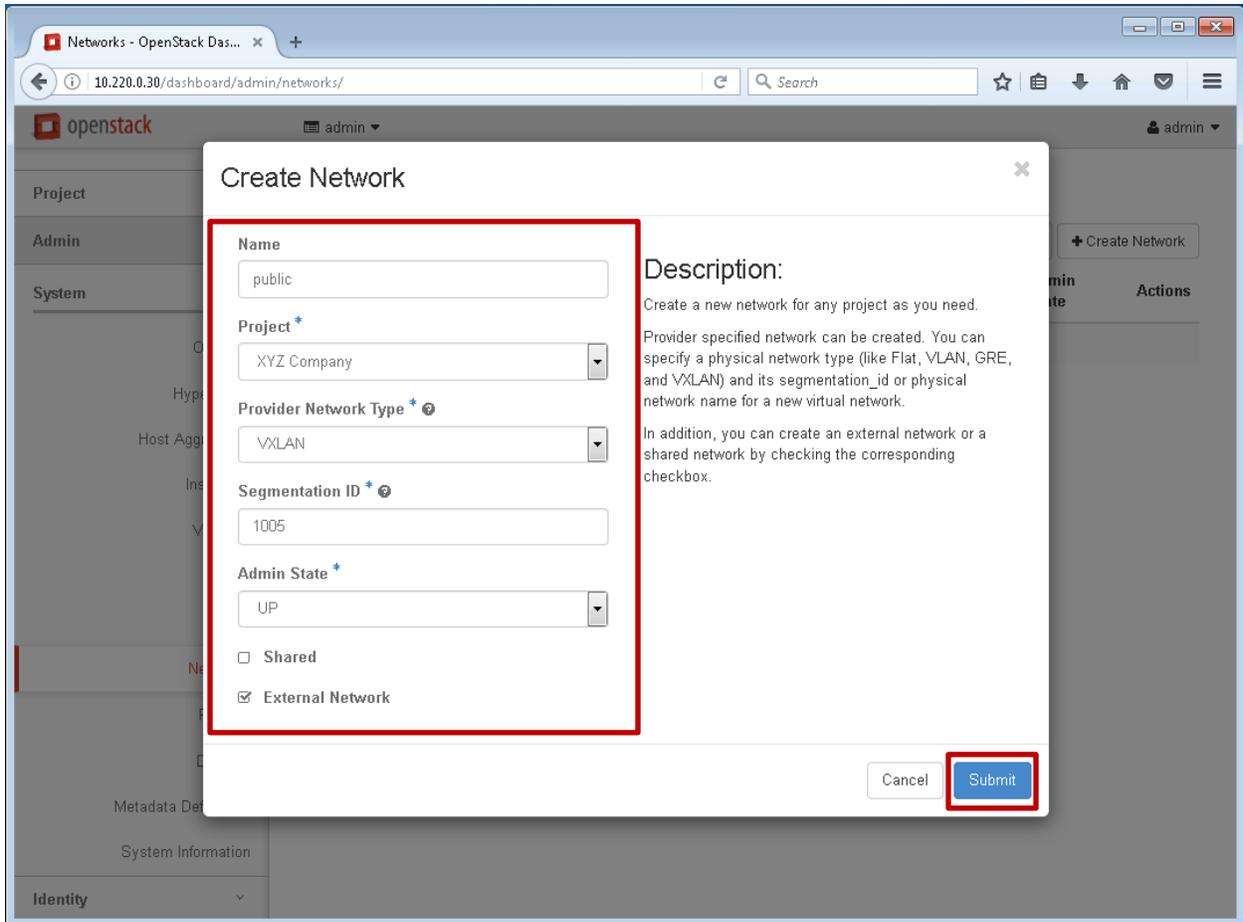
3. Select Create Network

Module 3: Configure OpenStack Networks and Routers



4. The Create Network wizard should open.

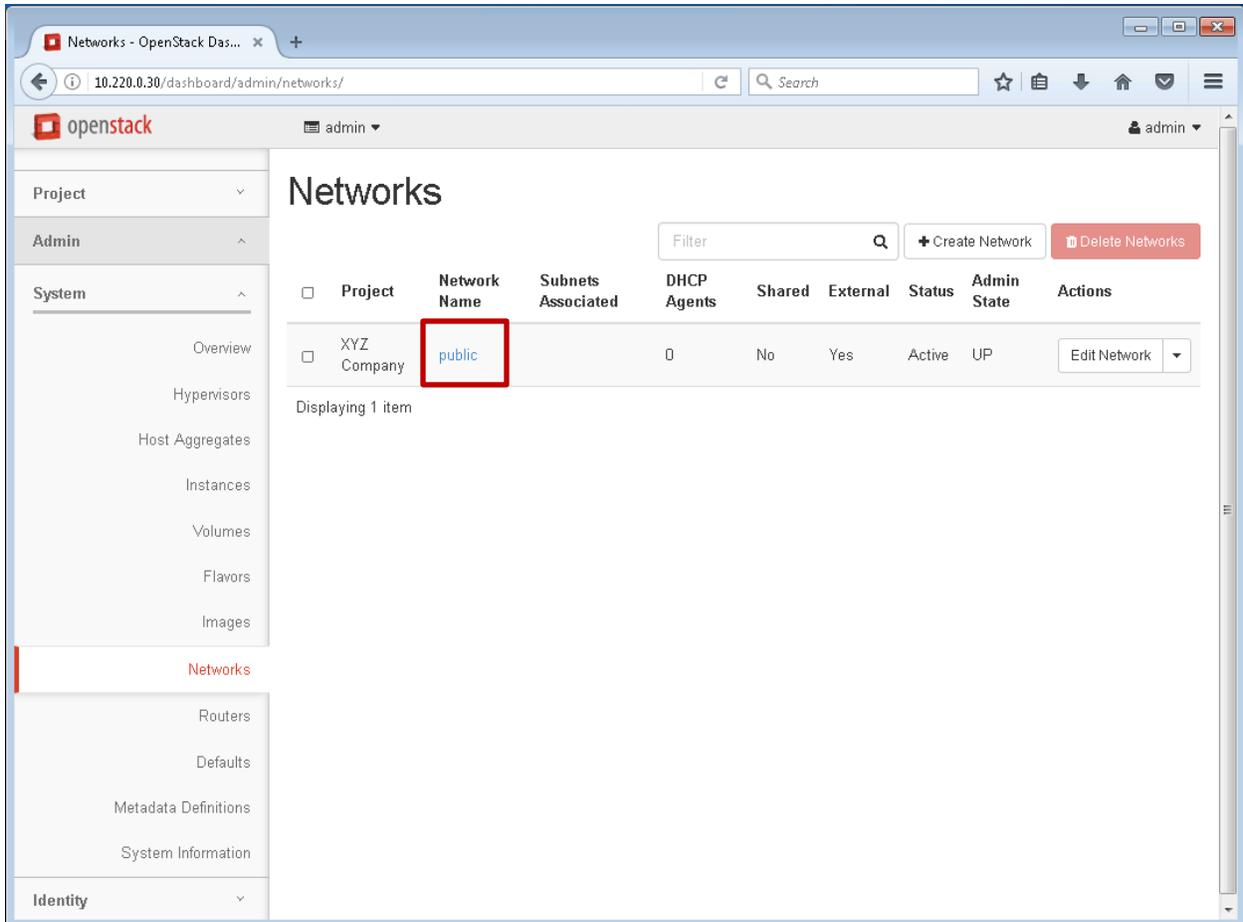
Module 3: Configure OpenStack Networks and Routers



5. **Enter** the Network Name of **public**, and using the dropdown menu for Project, Provider Network Type and Segmentation ID enter the information as shown in the screen capture and the table below. **Select External Network** and **Click Submit**

Name	public
Project	XYZ Company
Provider Network Type	VXLAN
Segmentation ID	1005
External Network	checked

Module 3: Configure OpenStack Networks and Routers



- The network name **public** and external status of **Yes** should be present on the same line as XYZ Company. To add the required subnet information, **Click** on the **public** network name hyperlink

Public Network

The Network Controller provides virtual networks to enable compute servers to interact with each other and with the public network. All machines must have a public and private network interface

Module 3: Configure OpenStack Networks and Routers

The screenshot shows the OpenStack dashboard interface for a network. The browser address bar indicates the URL: `10.220.0.30/dashboard/admin/networks/2ee8b9d3-ecbd-4398-9567-8a9ca21a8f9a/detail`. The page title is "Network Details - OpenSta...". The user is logged in as "admin".

The main content area is titled "Networks / public" and includes an "Edit Network" button. Below this is the "Network Overview" section, which displays the following details:

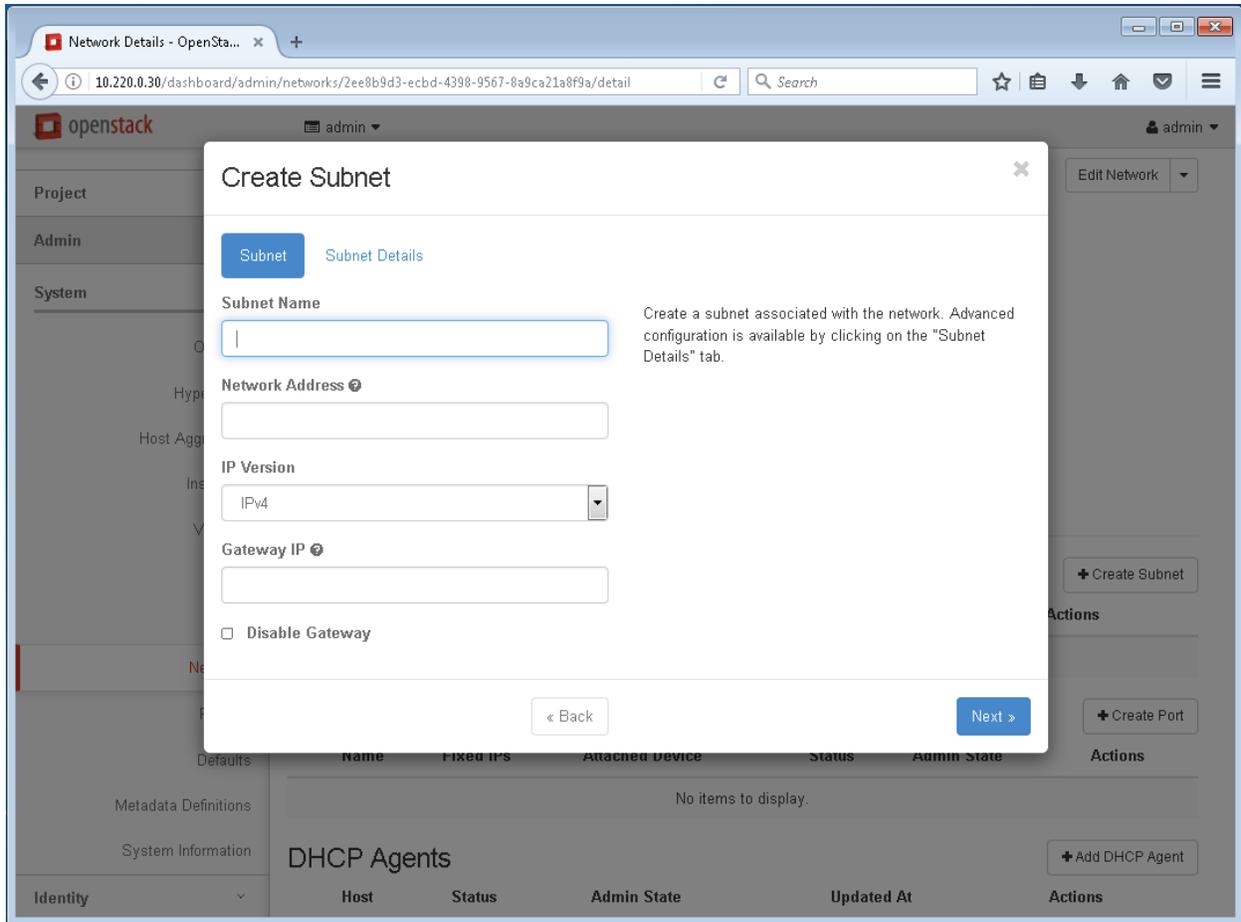
- Name:** public
- ID:** 2ee8b9d3-ecbd-4398-9567-8a9ca21a8f9a
- Project ID:** a76a6e44dc3d45118553361971e548c0
- Status:** Active
- Admin State:** UP
- Shared:** No
- External Network:** Yes
- MTU:** 1450
- Provider Network:** Network Type: vxlan, Physical Network: -, Segmentation ID: 1005

Below the overview is the "Subnets" section, which contains a table with columns: Name, CIDR, IP Version, Gateway IP, and Actions. The table is currently empty, displaying "No items to display." A red box highlights the "+ Create Subnet" button in the top right corner of this section.

Other sections visible include "Ports" (with a "+ Create Port" button) and "DHCP Agents" (with an "+ Add DHCP Agent" button). A left-hand navigation menu shows various system components like Overview, Hypervisors, Host Aggregates, Instances, Volumes, Flavors, Images, Networks (highlighted), Routers, Defaults, Metadata Definitions, System Information, and Identity.

7. Click on Create Subnet

Module 3: Configure OpenStack Networks and Routers

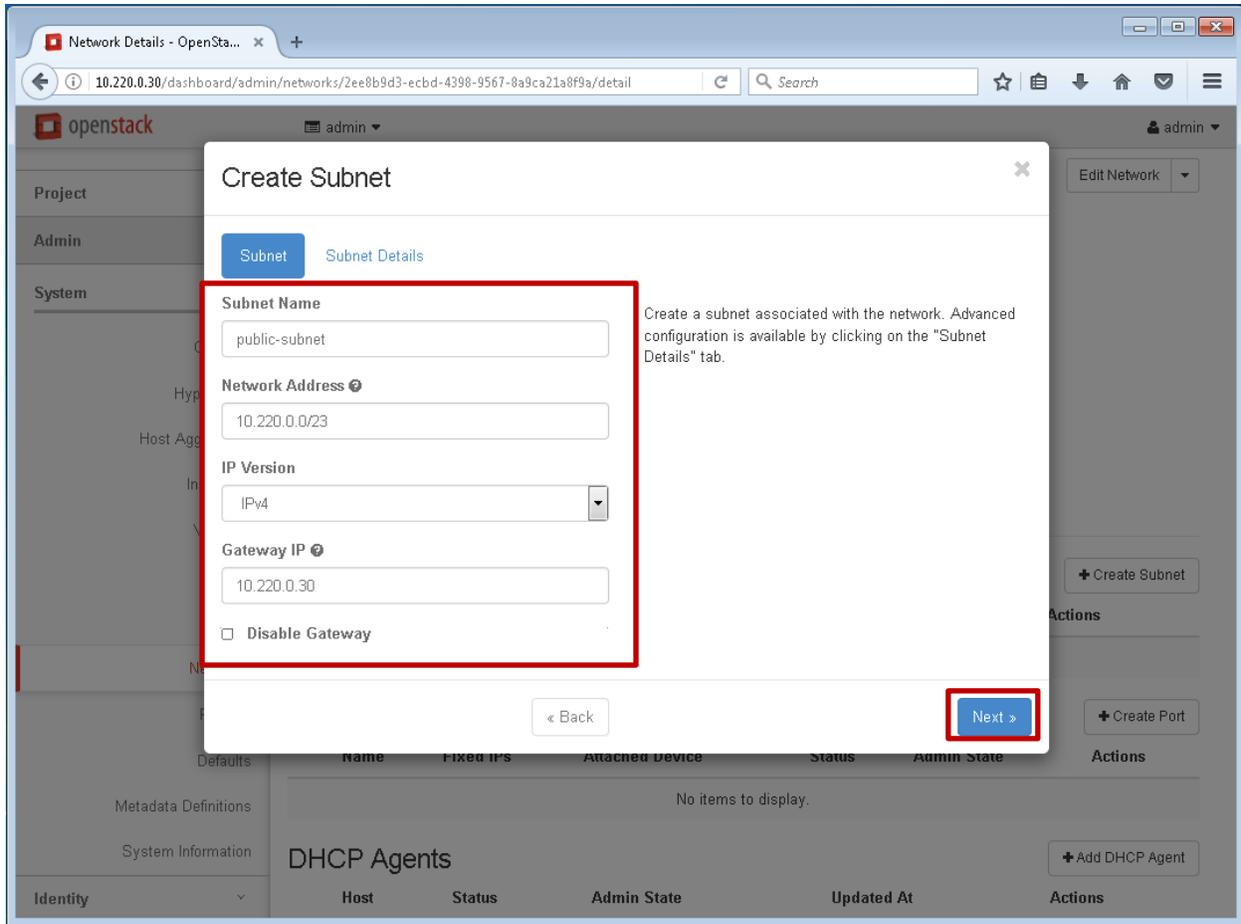


8. The Create Subnet wizard should open

Subnet

Logical subdivision of an IP network.

Module 3: Configure OpenStack Networks and Routers

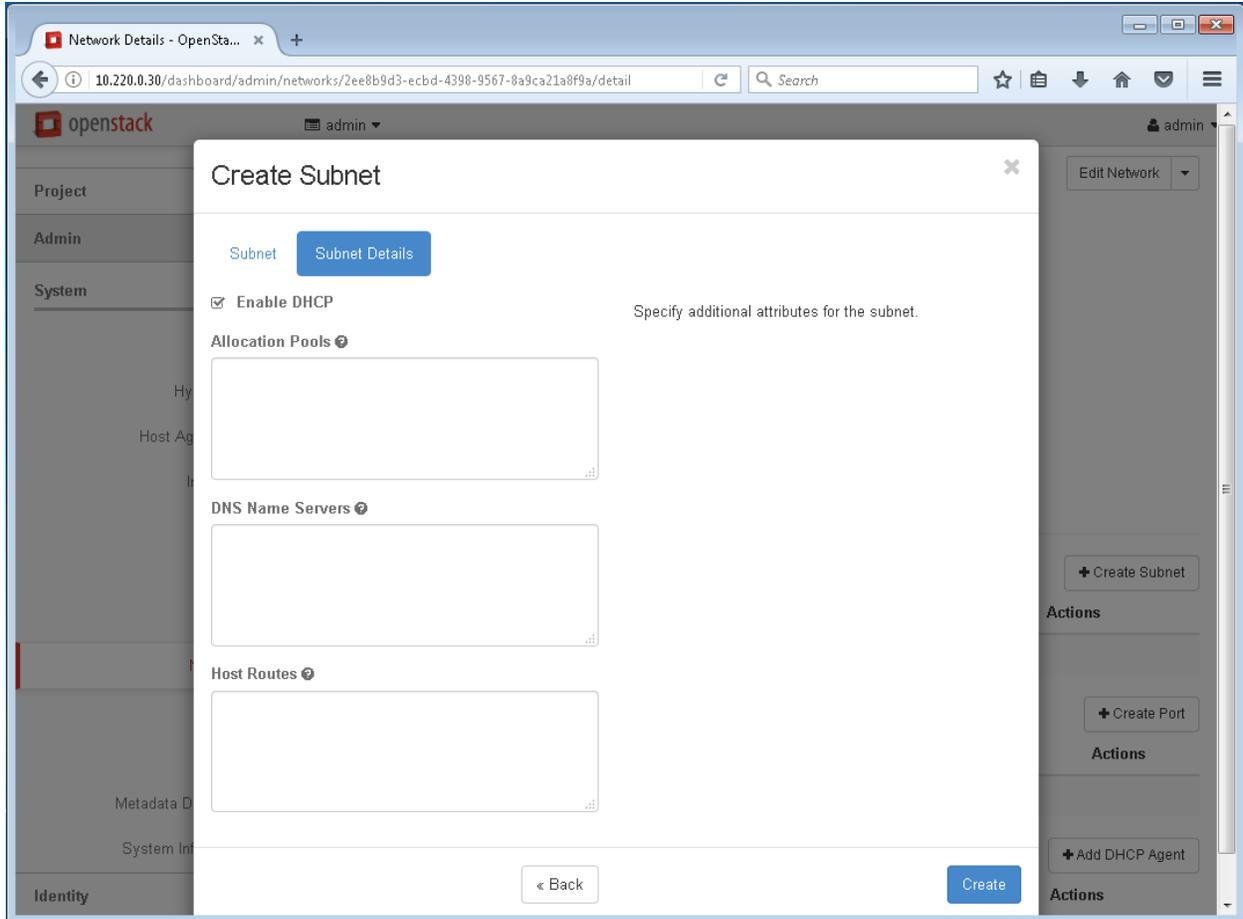


9. Enter the Subnet Name of **public-subnet** and enter the information as shown in the screen capture and the table below. **Click Next**

Subnet Name	public-subnet
Network Address	10.220.0.0/23
IP Version	IPv4 (default setting)
Gateway IP	10.220.0.30

Note: The Gateway IP address is the IP address of the OpenStack server, this is was required to simplify the VMware Workstation networking environment, so you would not normally see this IP addressing scheme in a production environment

Module 3: Configure OpenStack Networks and Routers

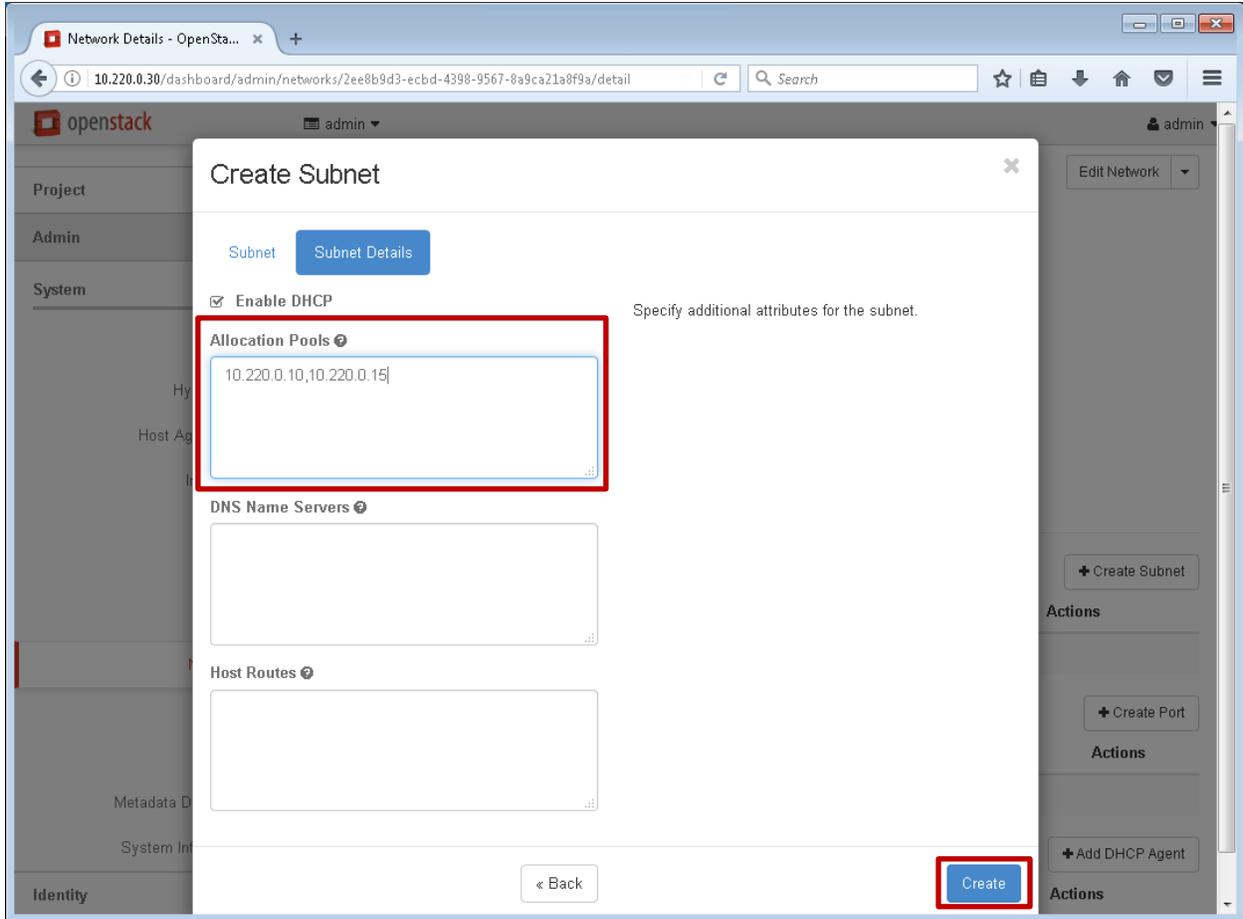


10. The Edit Subnet wizard should open

Dynamic Host Configuration Protocol (DHCP)

A network protocol that configures devices that are connected to a network so that they can communicate on that network by using the Internet Protocol (IP). The protocol is implemented in a client-server model where DHCP clients request configuration data, such as an IP address, a default route, and one or more DNS server addresses from a DHCP server. A method to automatically configure networking for a host at boot time. Provided by both Networking and Compute.

Module 3: Configure OpenStack Networks and Routers



11. Leave the **Enable DHCP** checked, this is the default setting. Enter the IP Addresses, separated by a comma, as shown in the screen capture and the table below. Click **Create**

Allocation Pools	10.220.0.10,10.220.0.15
------------------	-------------------------

Note: The Enable DHCP option allows the OpenStack server to allocate IP addresses, in a typical production environment there would be a server or router dedicated to allocate IP addresses. If the network environment has a dedicated DHCP server or router, the Enable DHCP option would be deselected

Module 3: Configure OpenStack Networks and Routers

The screenshot shows the OpenStack dashboard interface. The browser address bar displays the URL: `10.220.0.30/dashboard/admin/networks/2ee8b9d3-ecbd-4398-9567-8a9ca21a8f9a/detail`. The page title is "Network Details - OpenSta...". The user is logged in as "admin".

The main content area is titled "Networks / public" and includes an "Edit Network" button. Below this is the "Network Overview" section, which lists the following details:

- Name: public
- ID: 2ee8b9d3-ecbd-4398-9567-8a9ca21a8f9a
- Project ID: a76a6e44dc3d45118553361971e548c0
- Status: Active
- Admin State: UP
- Shared: No
- External Network: Yes
- MTU: 1450
- Provider Network: Network Type: vxlan, Physical Network: -, Segmentation ID: 1005

Below the overview is the "Subnets" section, which includes a table with one row highlighted by a red box:

<input type="checkbox"/>	Name	CIDR	IP Version	Gateway IP	Actions
<input type="checkbox"/>	public-subnet	10.220.0.0/23	IPv4	10.220.0.30	Edit Subnet

Below the subnets table is the "Ports" section, which is currently empty with the message "No items to display." and a "+ Create Port" button.

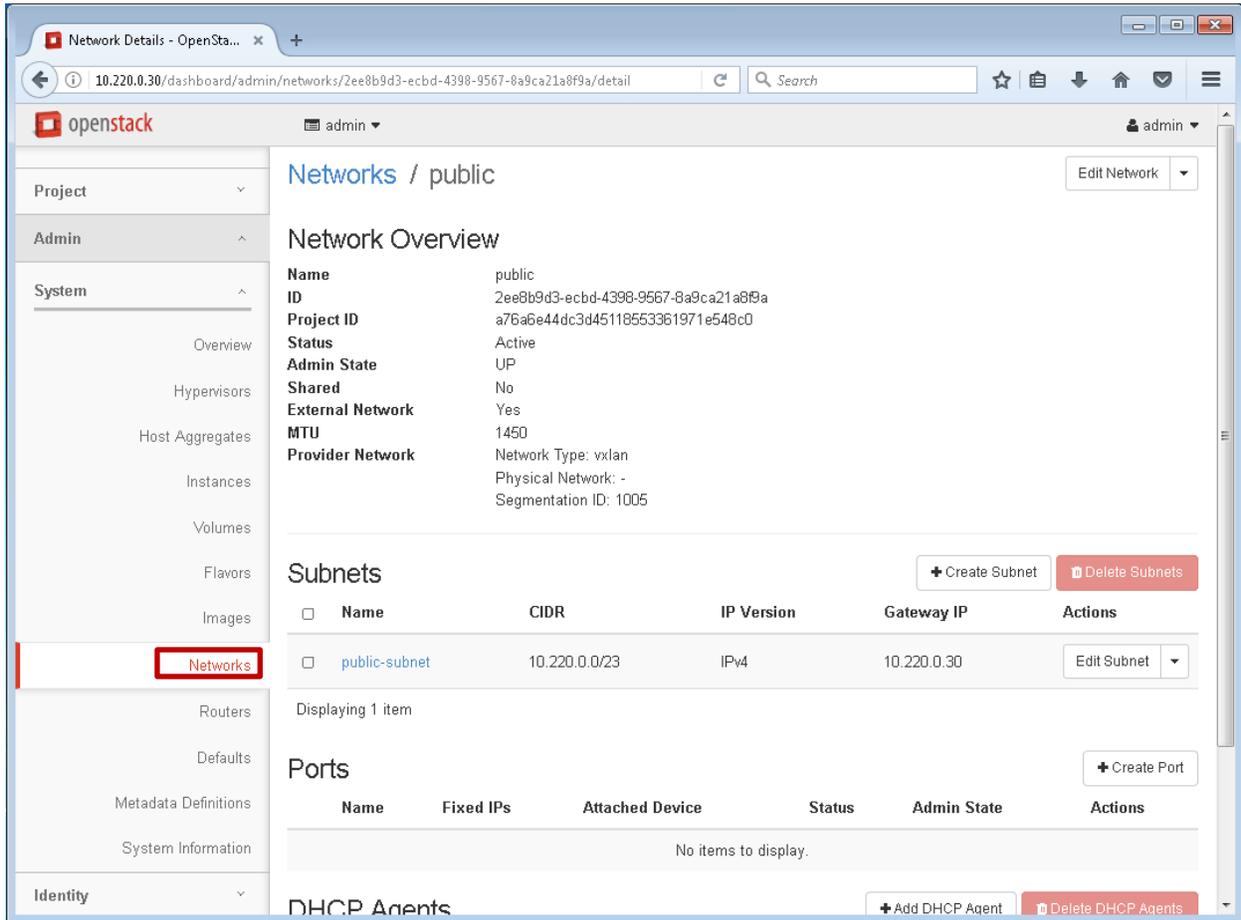
At the bottom of the page is the "DHCP Agents" section, which includes "+ Add DHCP Agent" and "- Delete DHCP Agents" buttons.

12. Verify that the public-subnet was created with the desired CIDR, IP Version and Gateway IP. **Click Networks** in the left pane to return to the Networks overview pane

The public network and public-subnet are ready for use by the XYZ Company.

Continue to lab 7.

Lab 7: Add and configure a Private Network

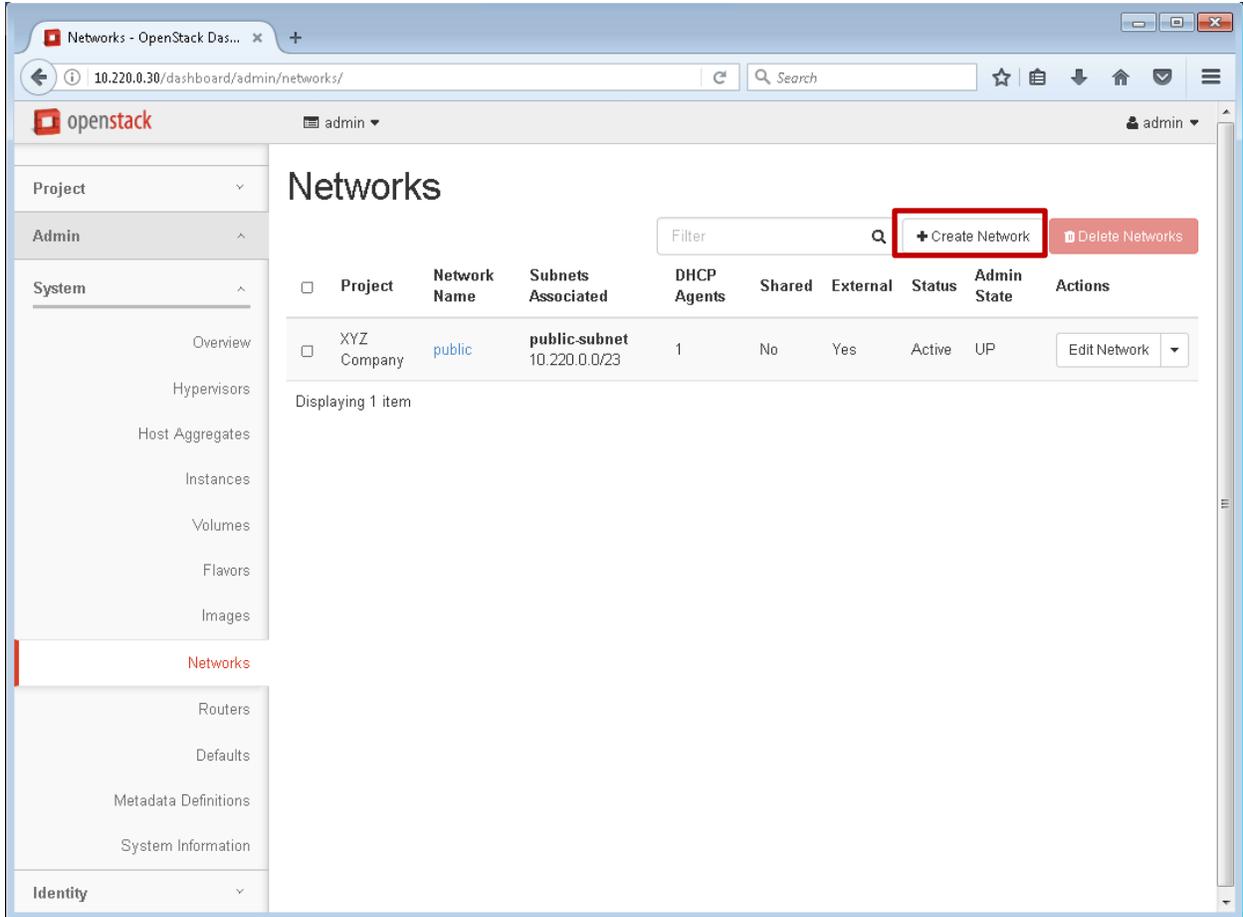


1. Click on Networks

Private Networks

Private Networks, also known as Self-service and internal networks primarily enable general (non-privileged) projects to manage networks without involving administrators. These networks are entirely virtual and require virtual routers to interact with provider and external networks such as the Internet. Self-service networks also usually provide DHCP and metadata services to instances.

Module 3: Configure OpenStack Networks and Routers

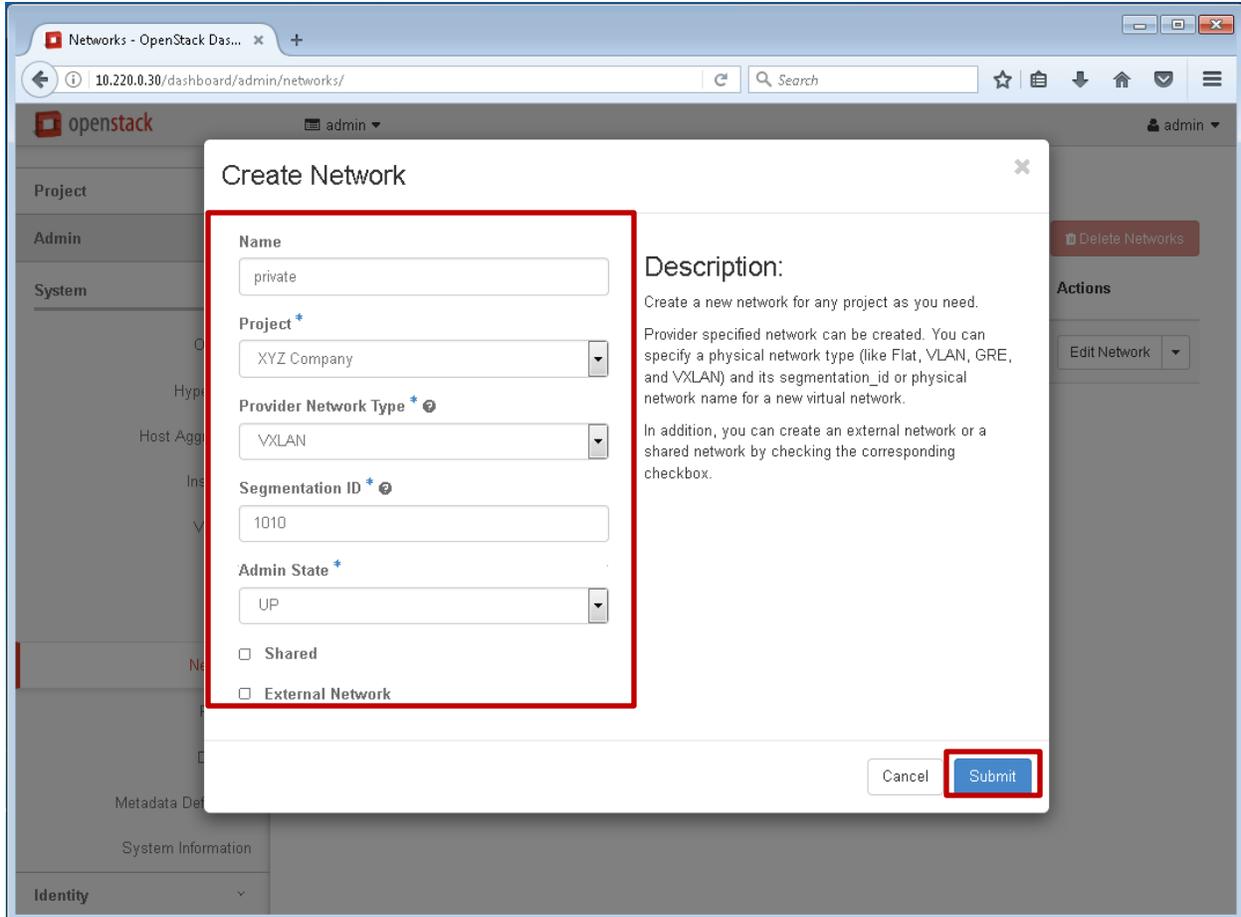


2. Click on Create Network

Networks

OpenStack networking service, project name Neutron, allows users to create and attach virtual interfaces and/or devices that perform the same functions that their physical counterparts do. Typically, the OpenStack environment will include one or more internal networks (private) and an external network (public).

Module 3: Configure OpenStack Networks and Routers



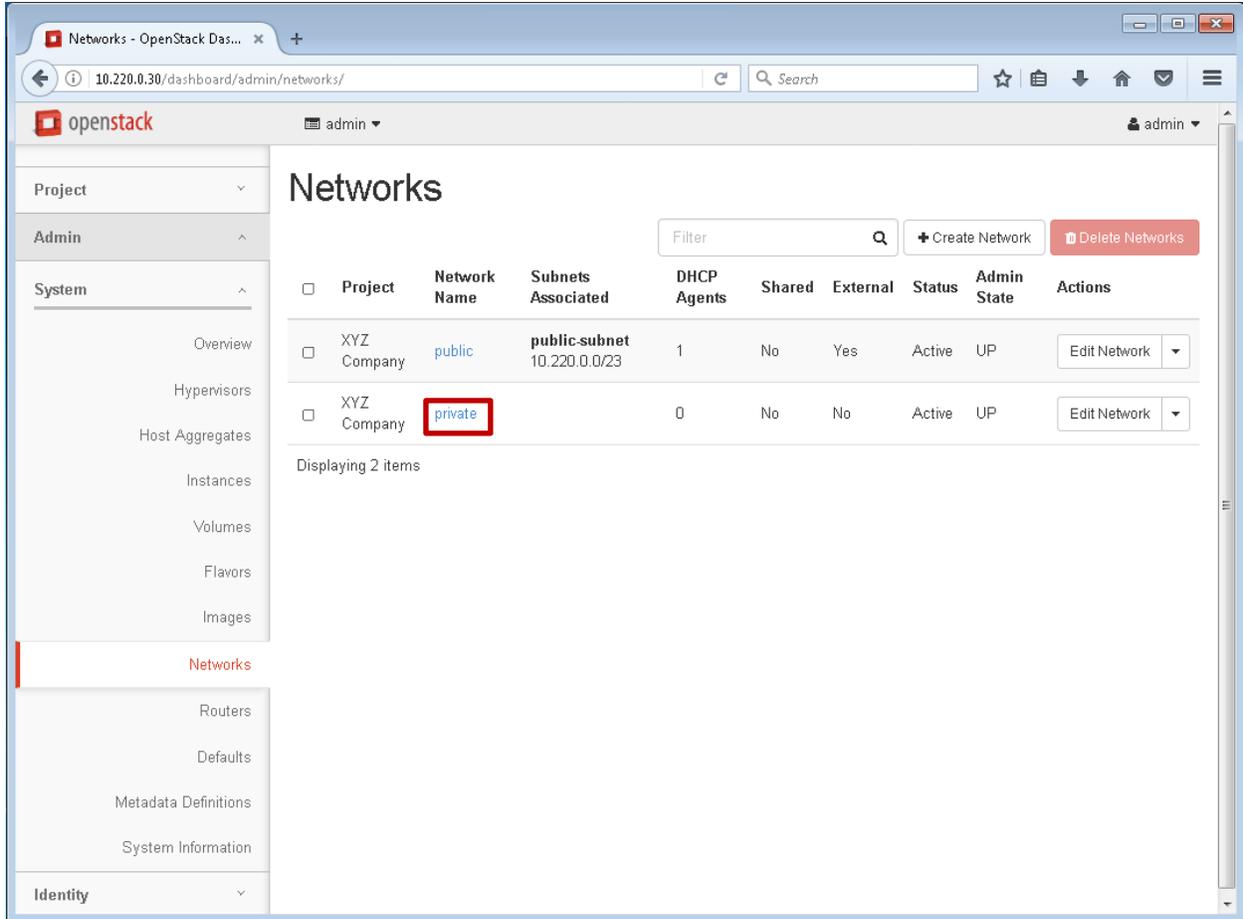
3. Enter the Network Name of **private**, and using the dropdown menu for Project, Provider Network Type and Segmentation ID enter the information as shown in the screen capture and the table below. **Click Submit**

Name	private
Project	XYZ Company
Provider Network Type	VXLAN
Segmentation ID	1010

External Network

The public network allows instances to communicate with networks that are outside of the cloud, for example: The Internet.

Module 3: Configure OpenStack Networks and Routers



The screenshot shows the OpenStack Networks dashboard. The left sidebar contains navigation options: Project, Admin, System (Overview, Hypervisors, Host Aggregates, Instances, Volumes, Flavors, Images), Networks (highlighted), Routers, Defaults, Metadata Definitions, System Information, and Identity. The main content area is titled 'Networks' and features a table with columns: Project, Network Name, Subnets Associated, DHCP Agents, Shared, External, Status, Admin State, and Actions. Two networks are listed: 'public' and 'private'. The 'private' network is highlighted with a red box. The table also includes buttons for '+ Create Network' and 'Delete Networks' at the top right, and 'Edit Network' buttons for each row.

<input type="checkbox"/>	Project	Network Name	Subnets Associated	DHCP Agents	Shared	External	Status	Admin State	Actions
<input type="checkbox"/>	XYZ Company	public	public-subnet 10.220.0.0/23	1	No	Yes	Active	UP	Edit Network
<input type="checkbox"/>	XYZ Company	private		0	No	No	Active	UP	Edit Network

Displaying 2 items

4. Click on private

Module 3: Configure OpenStack Networks and Routers

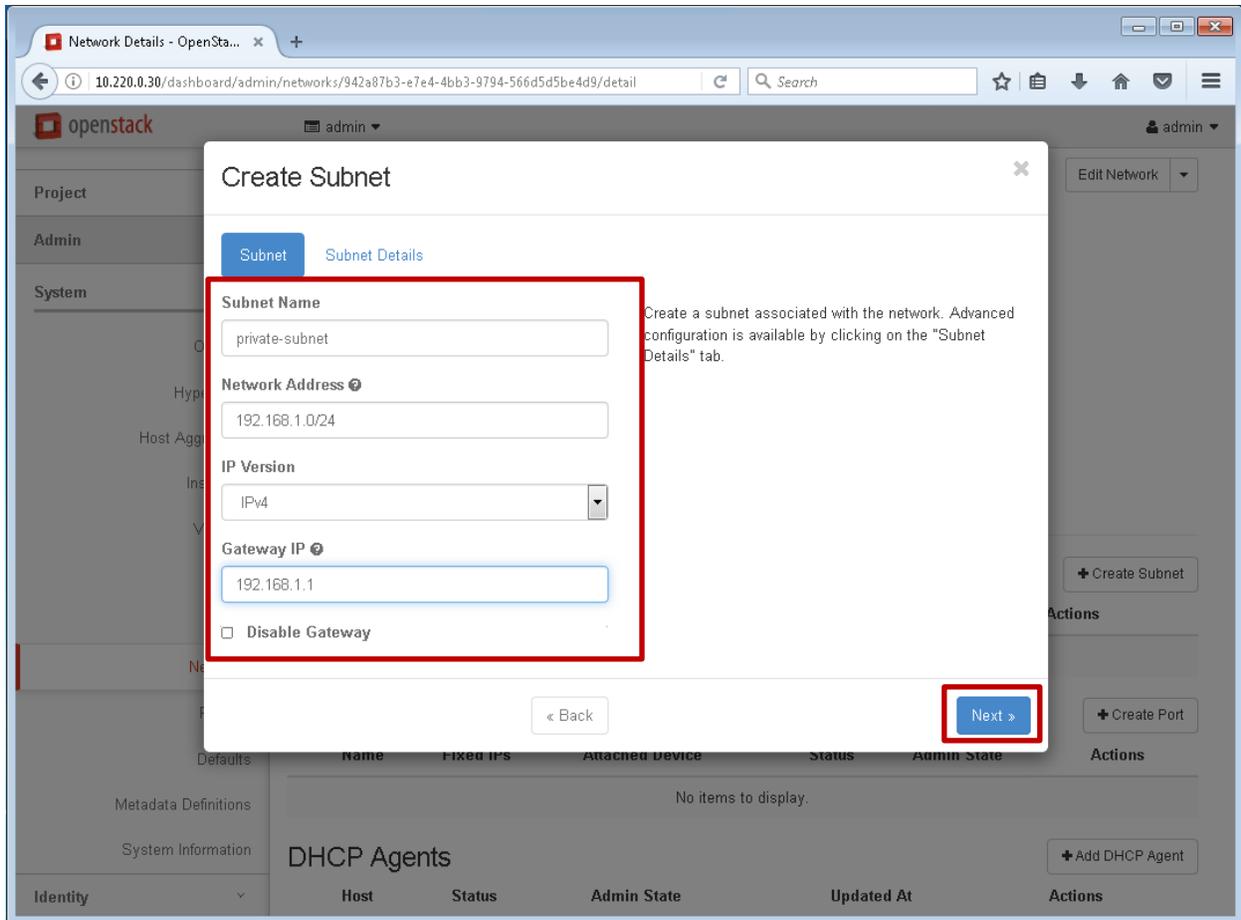
The screenshot shows the OpenStack dashboard interface for a private network. The left sidebar contains navigation options: Project, Admin, System, Overview, Hypervisors, Host Aggregates, Instances, Volumes, Flavors, Images, Networks (highlighted), Routers, Defaults, Metadata Definitions, System Information, and Identity. The main content area displays the 'Network Overview' for a network named 'private'. Below this, there are sections for 'Subnets', 'Ports', and 'DHCP Agents'. The 'Subnets' section has a table with columns: Name, CIDR, IP Version, Gateway IP, and Actions. A '+ Create Subnet' button is highlighted with a red box. The 'Ports' section has a table with columns: Name, Fixed IPs, Attached Device, Status, Admin State, and Actions, and a '+ Create Port' button. The 'DHCP Agents' section has a table with columns: Host, Status, Admin State, Updated At, and Actions, and an '+ Add DHCP Agent' button.

5. Click Create Subnet

Internal Network

These private networks connect directly to instances and can only be accessed by other instances that are in the same subnet, or are connected by a router, if in a different private subnet.

Module 3: Configure OpenStack Networks and Routers



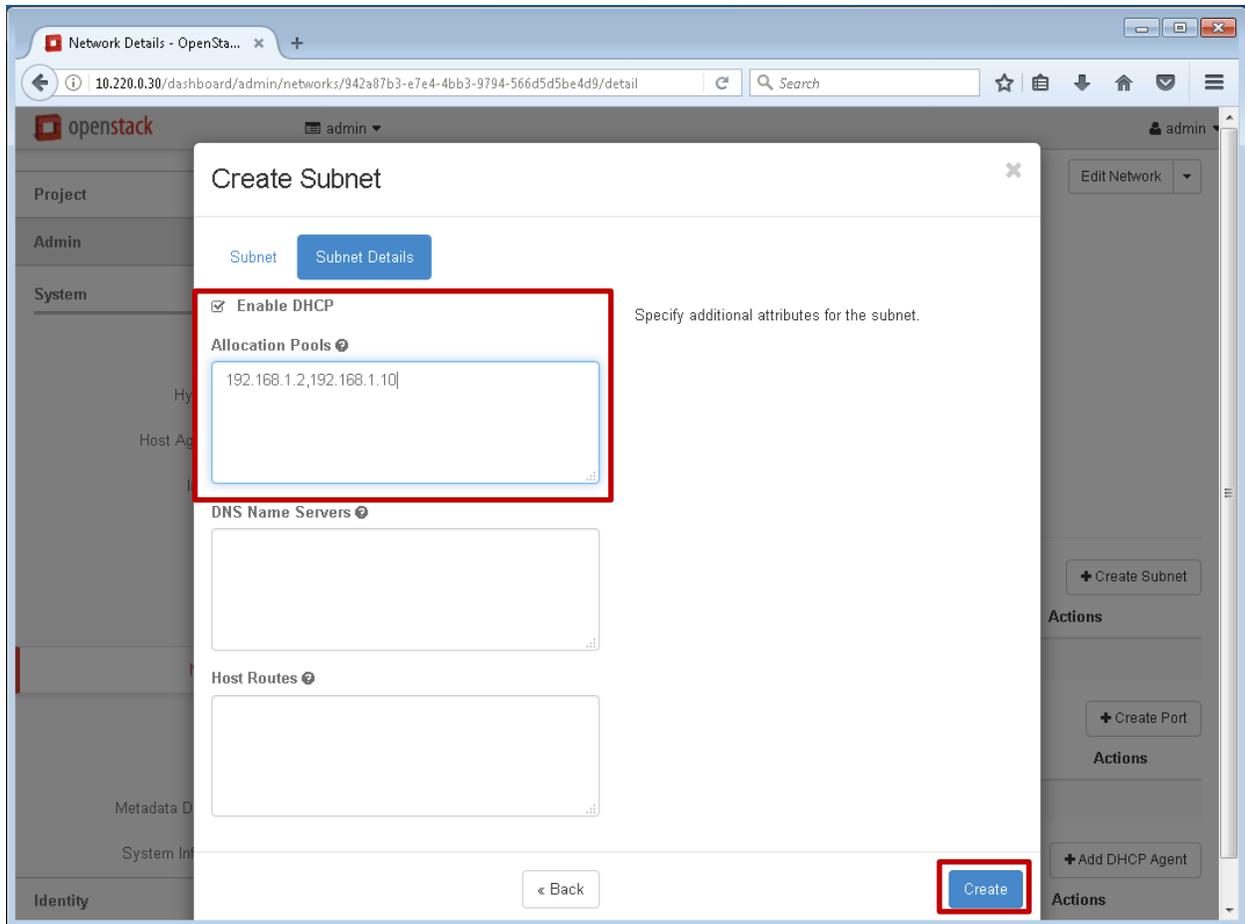
6. Enter the information as shown in the screen capture and the table below. Click Next

Subnet Name	private-subnet
Network Address	192.168.1.0/24
IP Version	IPv4
Gateway IP	192.168.1.1

Note: The best practice is to use the first available IP address from the network, in this case 192.168.1.1, as the gateway address. If you leave this entry blank, OpenStack will automatically assign the 192.168.1.1 address, or the first available address from the network you have chosen.



Module 3: Configure OpenStack Networks and Routers



7. Leave the **Enable DHCP** checked, this is the default setting. Enter the IP Addresses, separated by a comma, as shown in the screen capture and the table below. Click **Create**

Allocation Pools	192.168.1.2,192.168.1.10
------------------	--------------------------

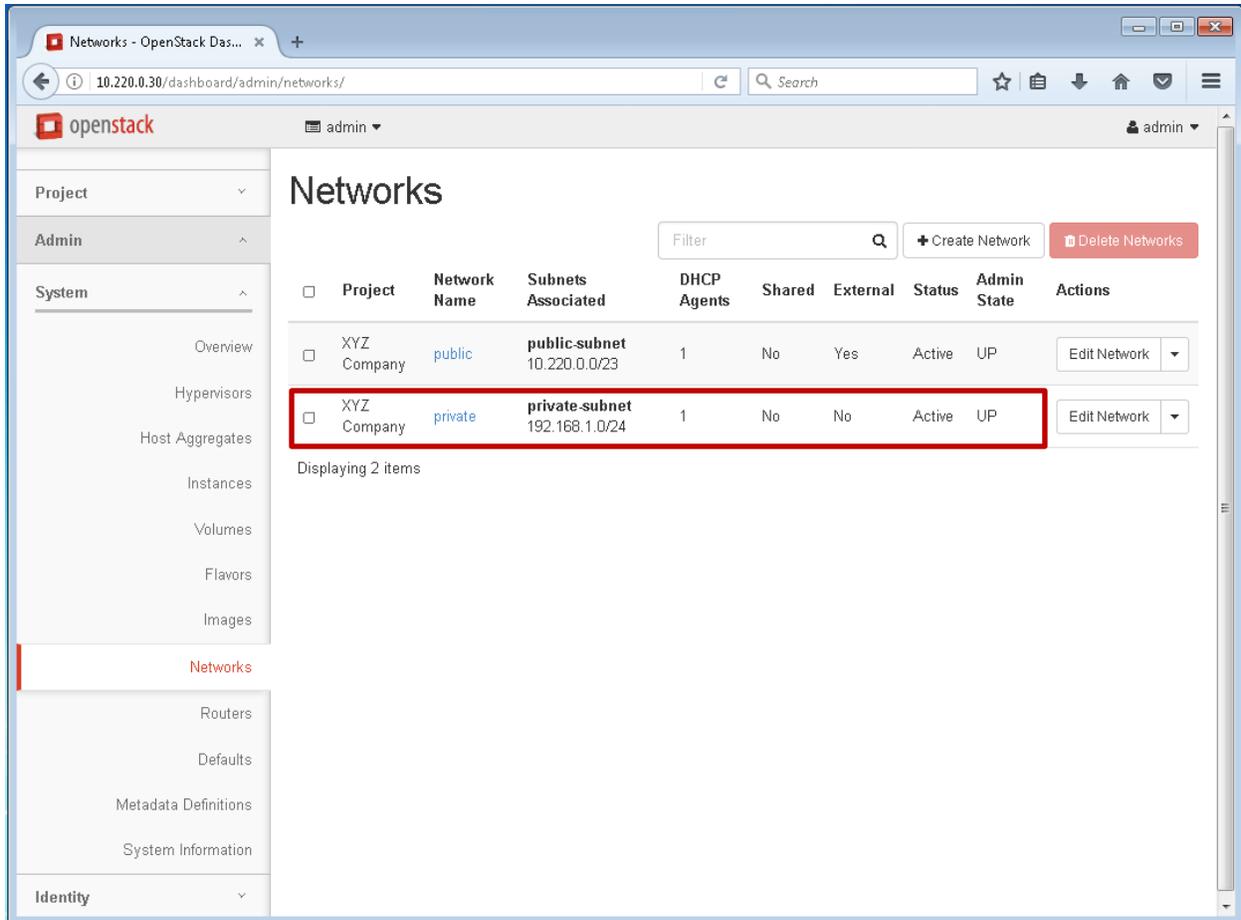
Note: The allocation pool starts at the second available IP address from the private-subnet network address range. This is because the first IP address, 192.168.1.1, was used as the gateway IP address on the previous create network page.

Note: The DNS Name Servers block is not used in this lab environment. If this were an actual deployment, then you would enter your network's DNS Name Server IP address, even if it's not in the same subnet as the private network. For example, you could enter Google's DNS server IP Address 8.8.8.8

Note: Host Routes is for any additional network route information specific to your setup, which is not used in this lab environment



Module 3: Configure OpenStack Networks and Routers



The screenshot shows the OpenStack Networks dashboard. The left sidebar contains navigation options: Project, Admin, System (Overview, Hypervisors, Host Aggregates, Instances, Volumes, Flavors, Images), Networks (highlighted), Routers, Defaults, Metadata Definitions, System Information, and Identity. The main content area is titled 'Networks' and features a table with columns: Project, Network Name, Subnets Associated, DHCP Agents, Shared, External, Status, Admin State, and Actions. Two networks are listed:

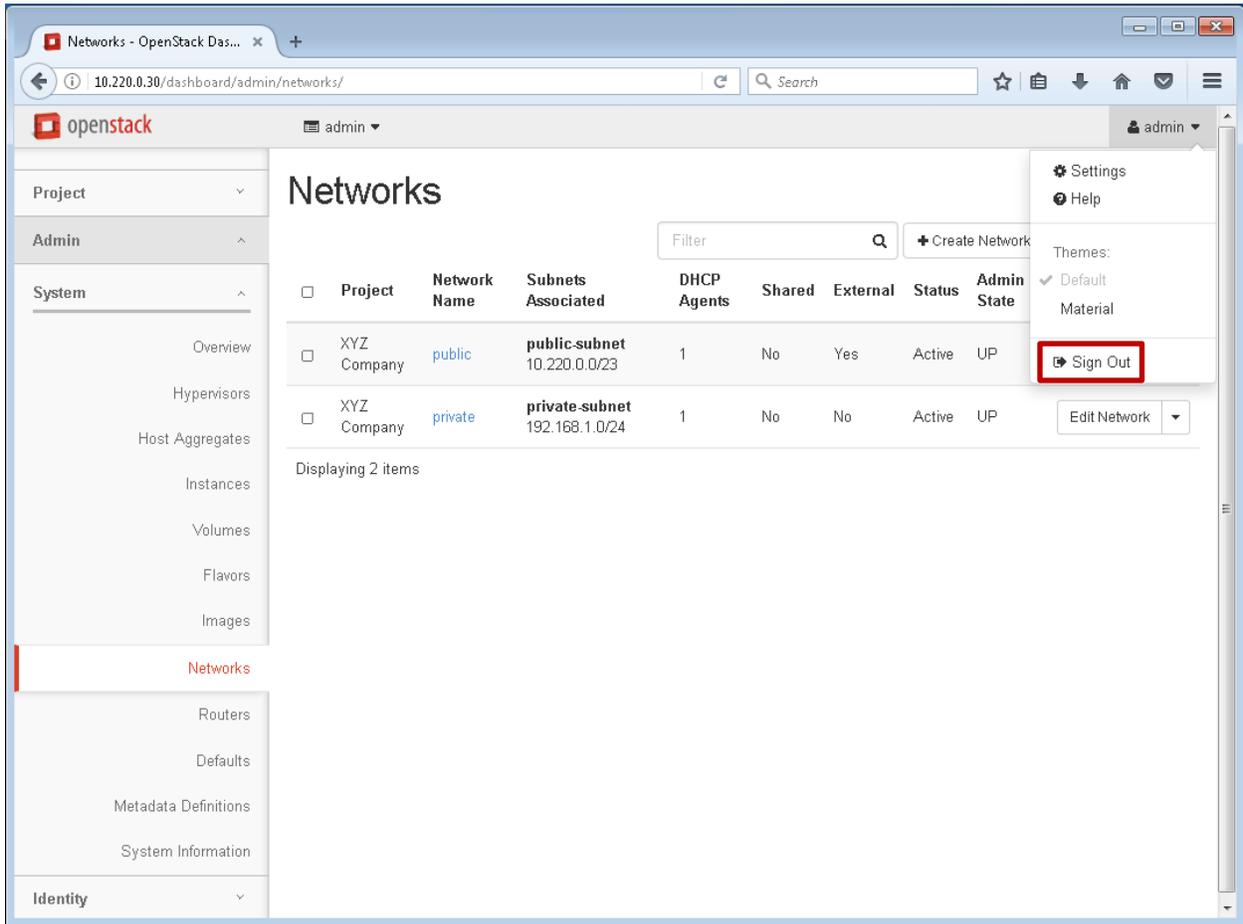
Project	Network Name	Subnets Associated	DHCP Agents	Shared	External	Status	Admin State	Actions
XYZ Company	public	public-subnet 10.220.0.0/23	1	No	Yes	Active	UP	Edit Network
XYZ Company	private	private-subnet 192.168.1.0/24	1	No	No	Active	UP	Edit Network

Below the table, it says 'Displaying 2 items'. The 'private' network row is highlighted with a red border.

8. The **private** network and its **private-subnet** should appear in the Networks pane. You are now ready to add a Router to connect the private and public networks.

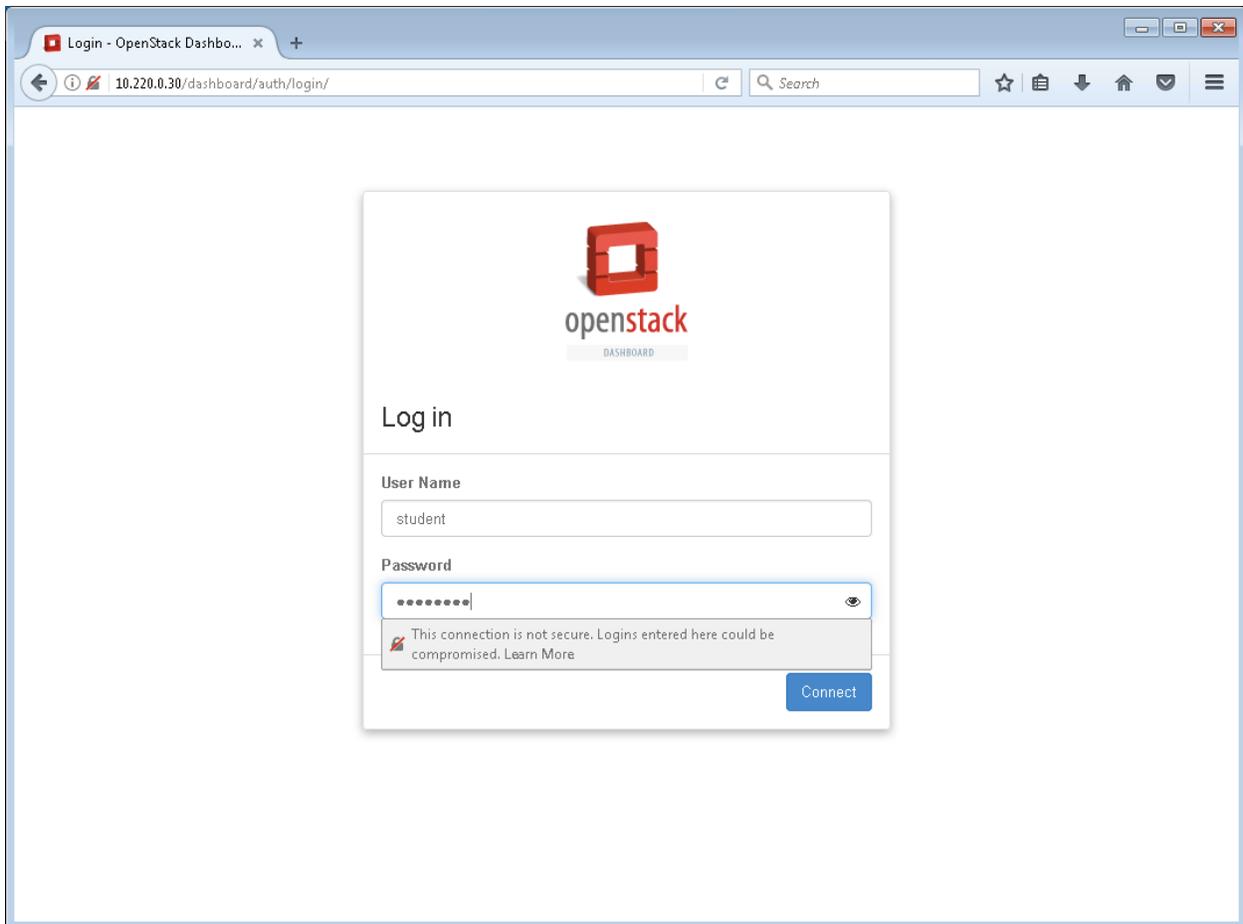
Continue to Lab 8.

Lab 8: Add and Configure a Network Router



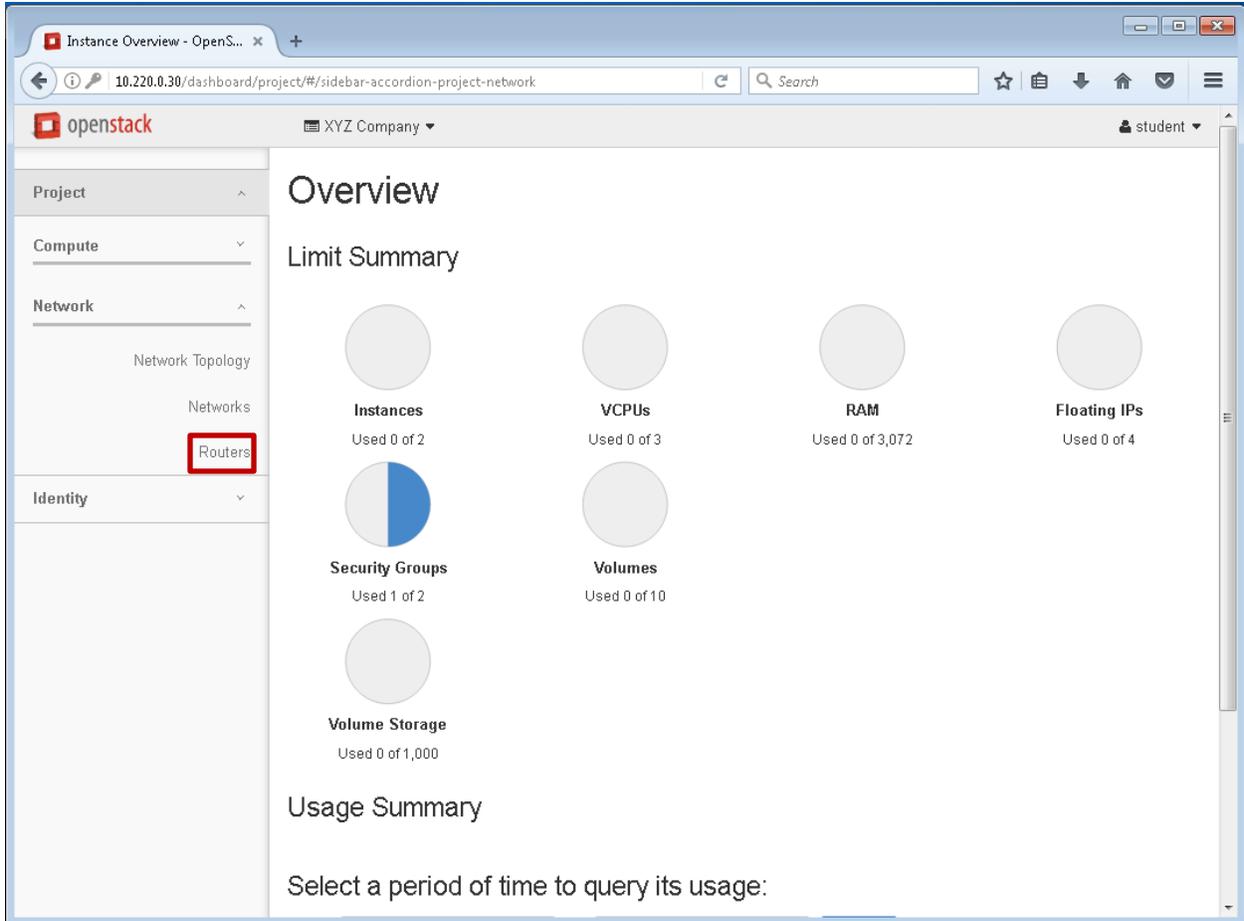
1. **Sign out** from the admin user account.

Module 3: Configure OpenStack Networks and Routers



2. Log in as student

Module 3: Configure OpenStack Networks and Routers

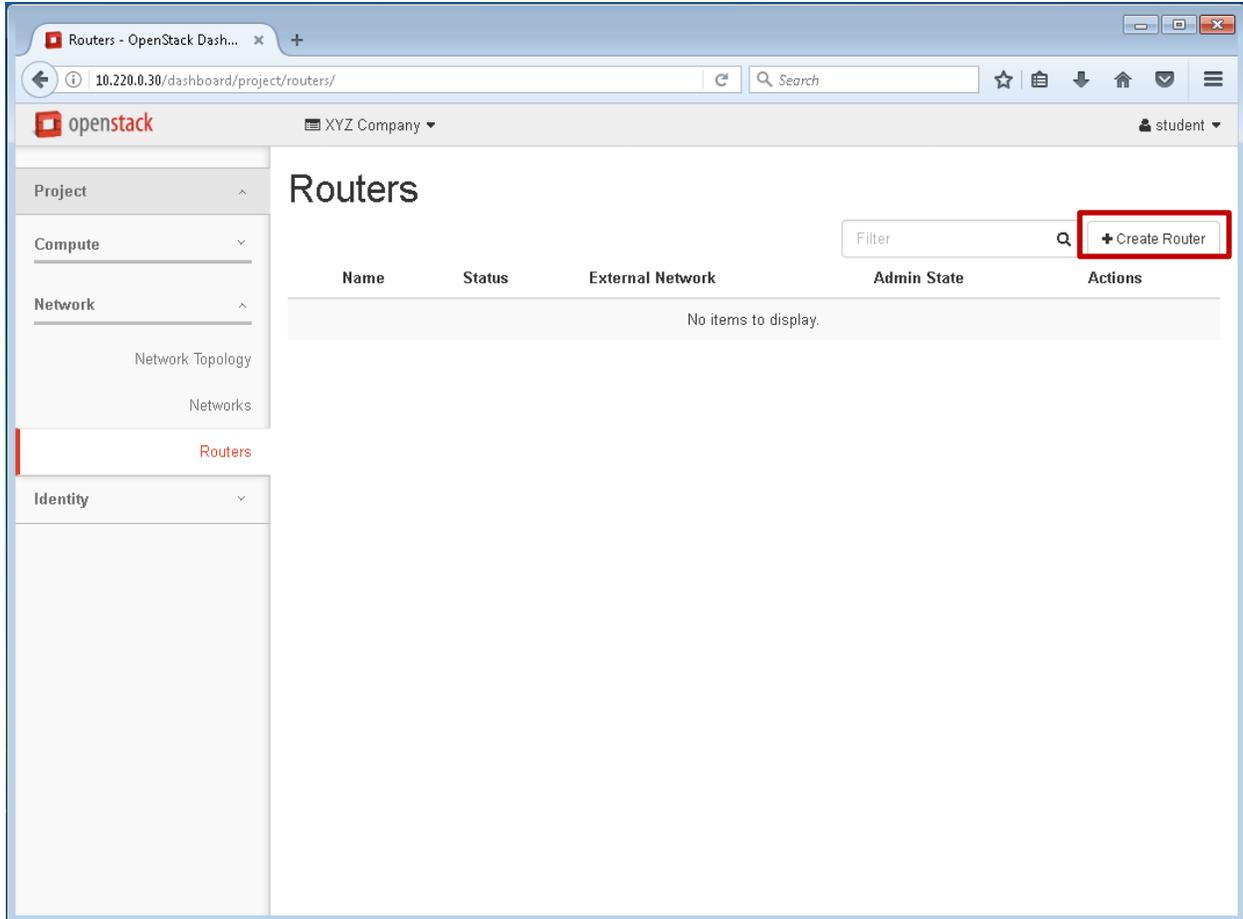


3. Click on **Routers** tab in the left pane

Routers

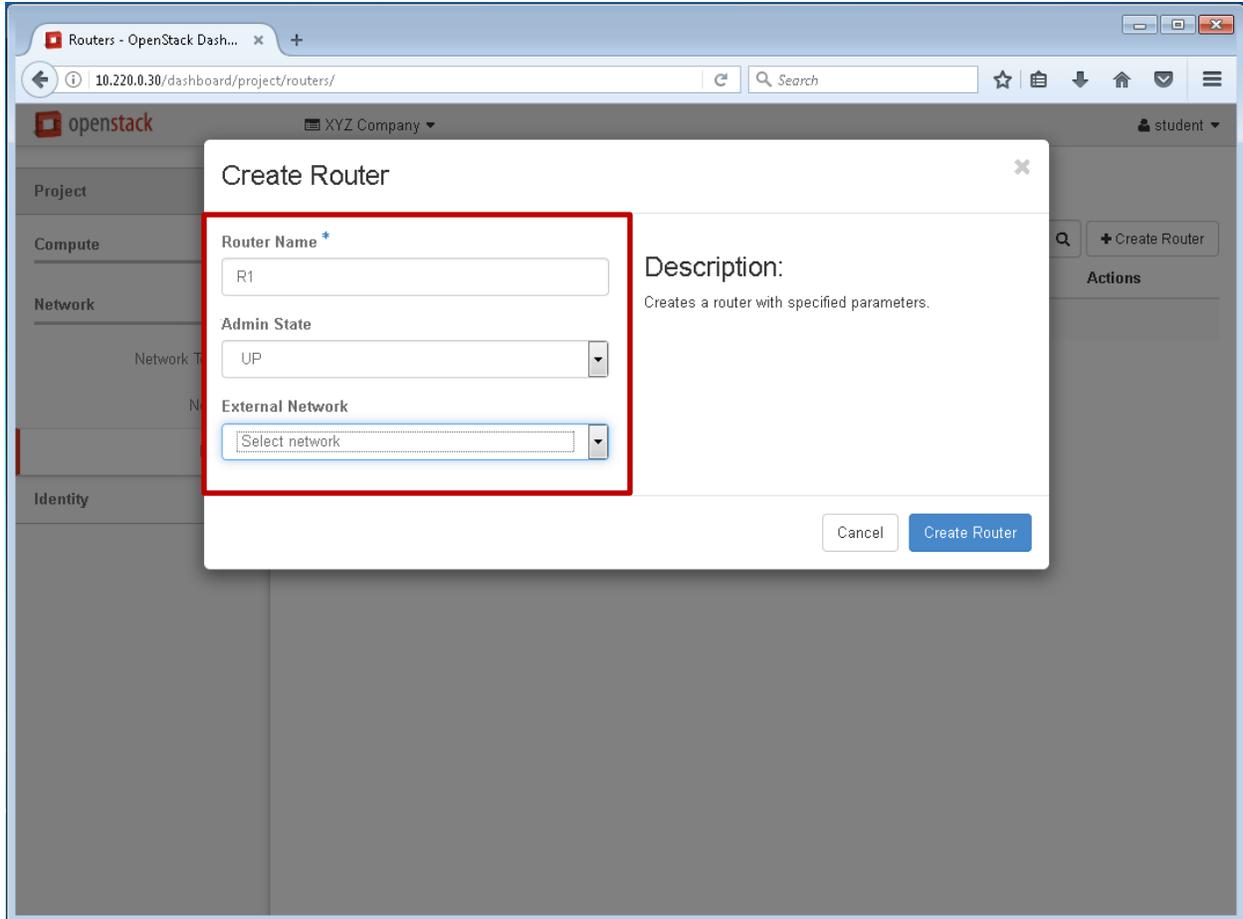
A physical or virtual network device that passes network traffic between different networks. In the OpenStack environment, a router is a virtual device that is required to allow network traffic between the private IP address (fixed IP address) and the public IP address (floating IP address), or between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

Module 3: Configure OpenStack Networks and Routers



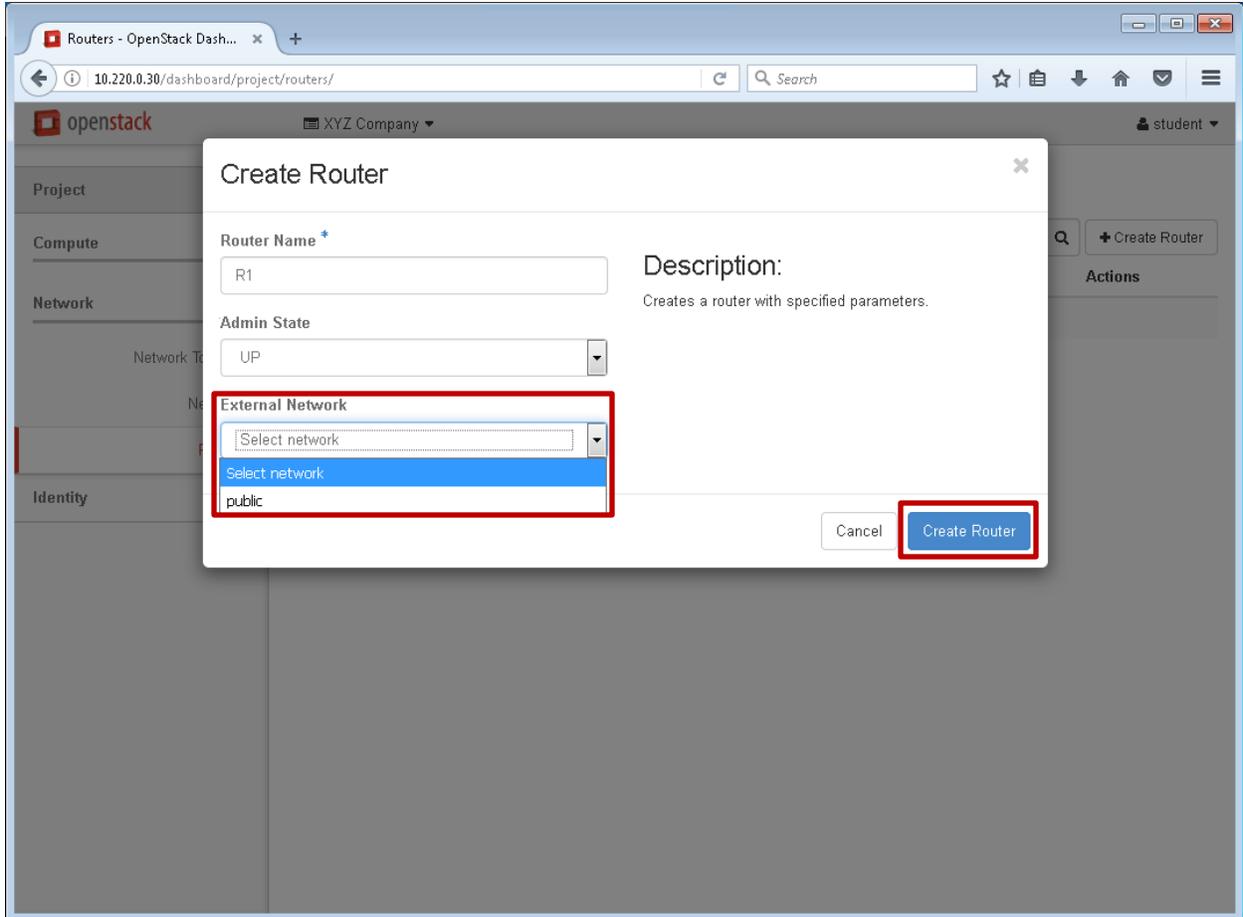
4. Click on the **Create Router**

Module 3: Configure OpenStack Networks and Routers



5. The **Create Router** wizard should open. **Enter R1** in the Router Name block. **Select the drop down menu** to see the available external networks, shown on next page

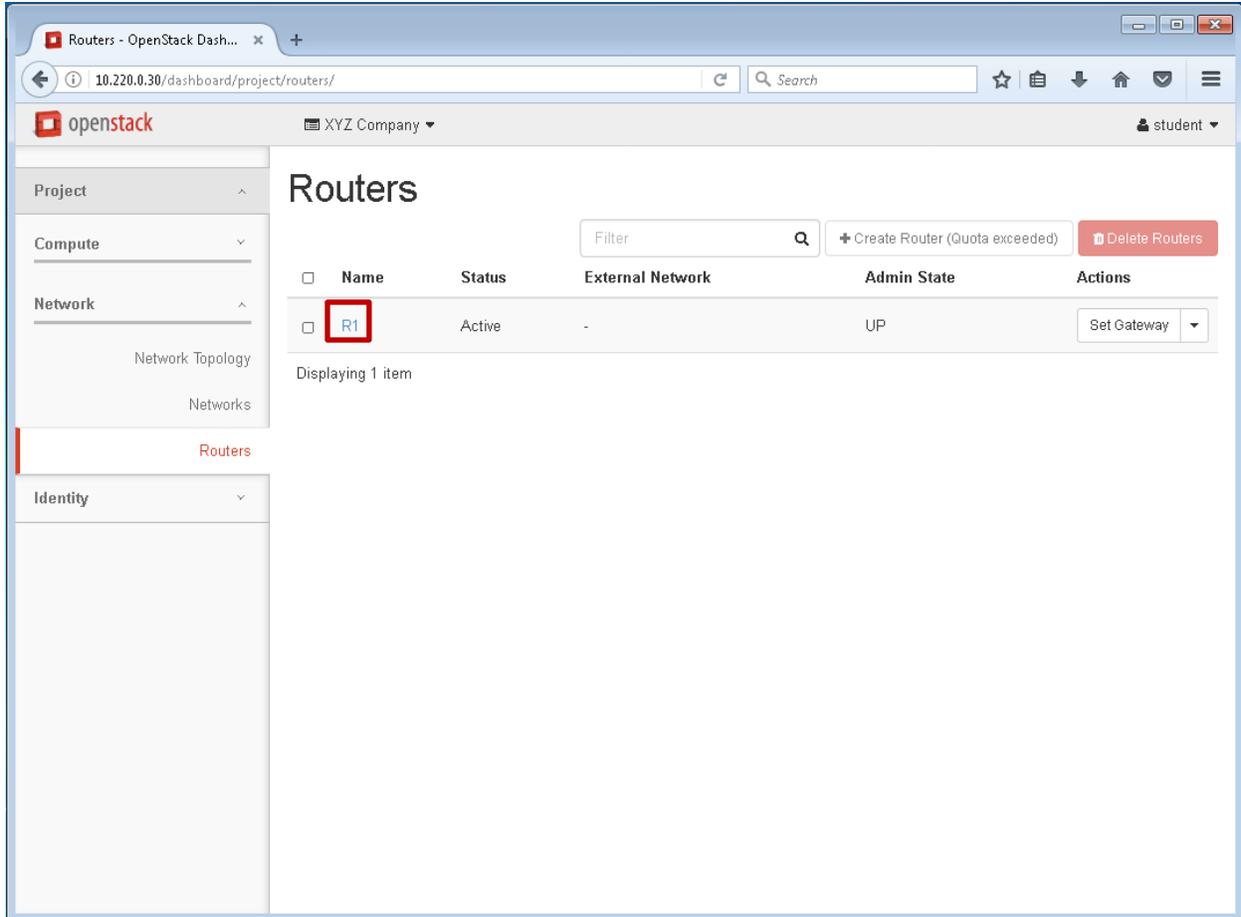
Module 3: Configure OpenStack Networks and Routers



6. Select the **public** network, then Click on **Create Router**

Router Name	R1
External Network	public

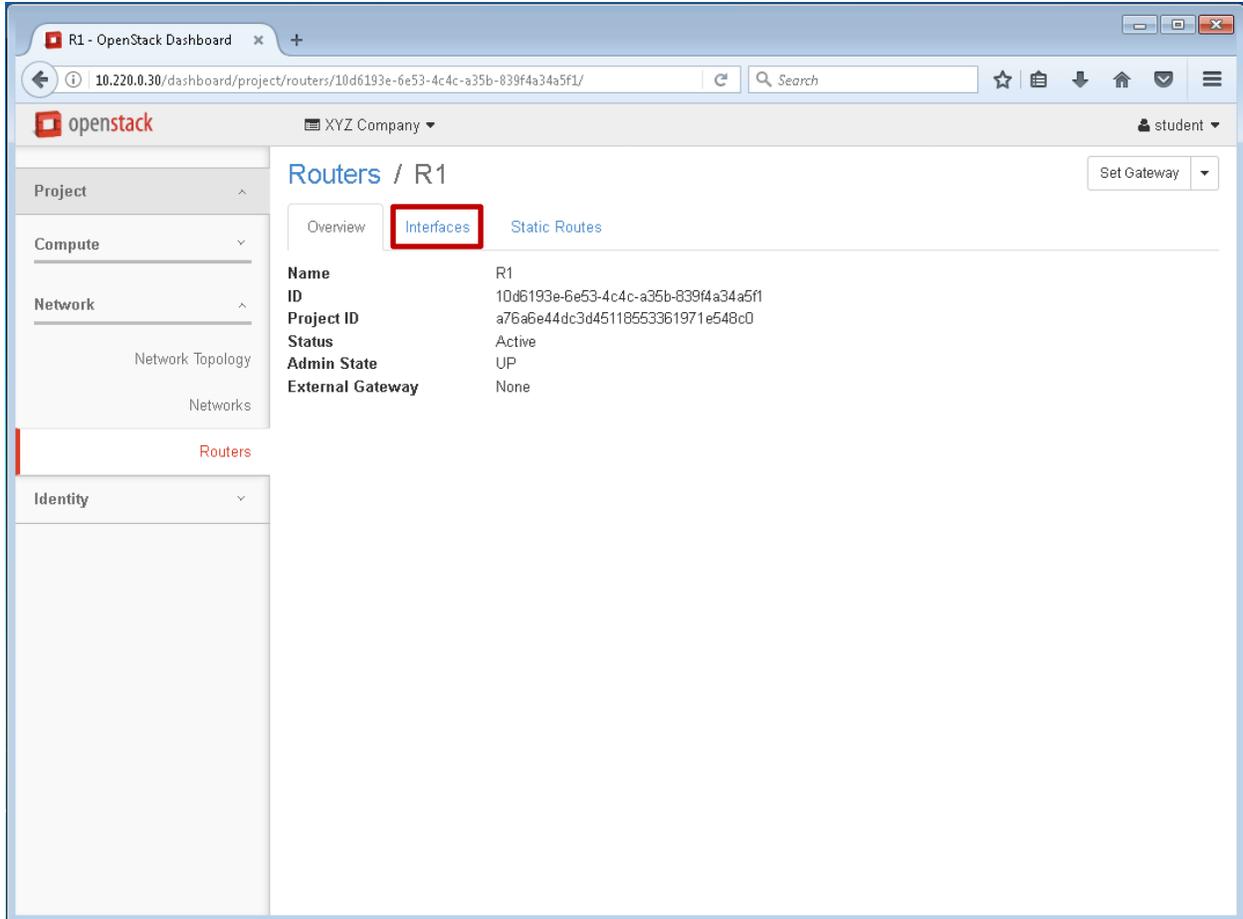
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The screenshot shows the OpenStack dashboard interface for managing Routers. The page title is "Routers" and the URL is "10.220.0.30/dashboard/project/routers/". The dashboard includes a sidebar with navigation options: Project, Compute, Network, and Identity. The main content area displays a table of routers. A single router named "R1" is listed with a status of "Active" and an Admin State of "UP". The "R1" name in the table is highlighted with a red box. Above the table, there are buttons for "Create Router (Quota exceeded)" and "Delete Routers". Below the table, it says "Displaying 1 item".

<input type="checkbox"/>	Name	Status	External Network	Admin State	Actions
<input type="checkbox"/>	R1	Active	-	UP	Set Gateway

7. Your new **R1** router should appear and the **Status** should be **Active** and Admin State should be **UP**. **Click on R1**

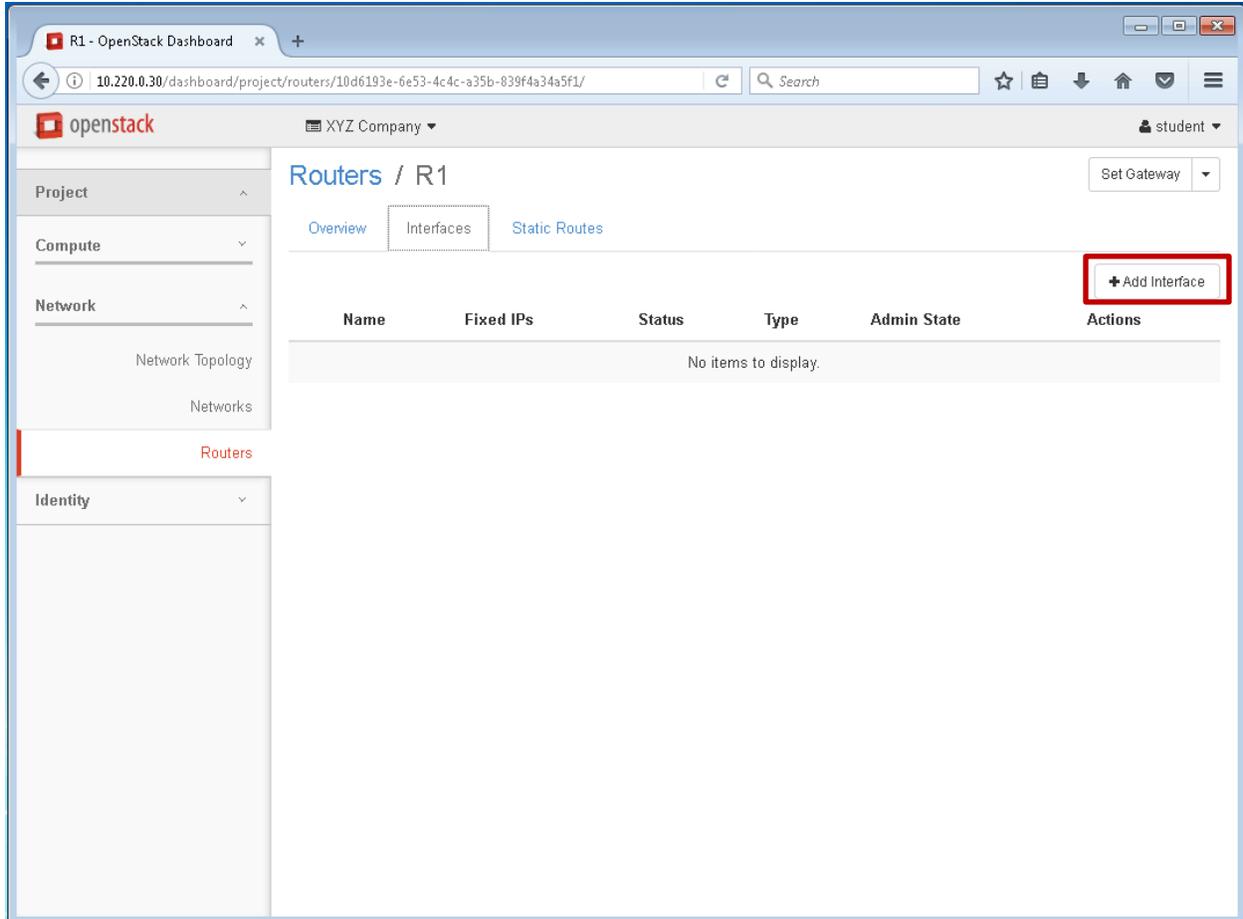


8. The **Routers** pane should appear. There are three additional tabs in the center pane; **Overview**, **Interfaces**, and **Static Routes**. The **Overview** pane, pictured, provides additional information about the Router. The **public network** was added to **Router R1** when it was created with the Create Router wizard. We will add the private network next. **Click on the Interfaces tab**

Interfaces

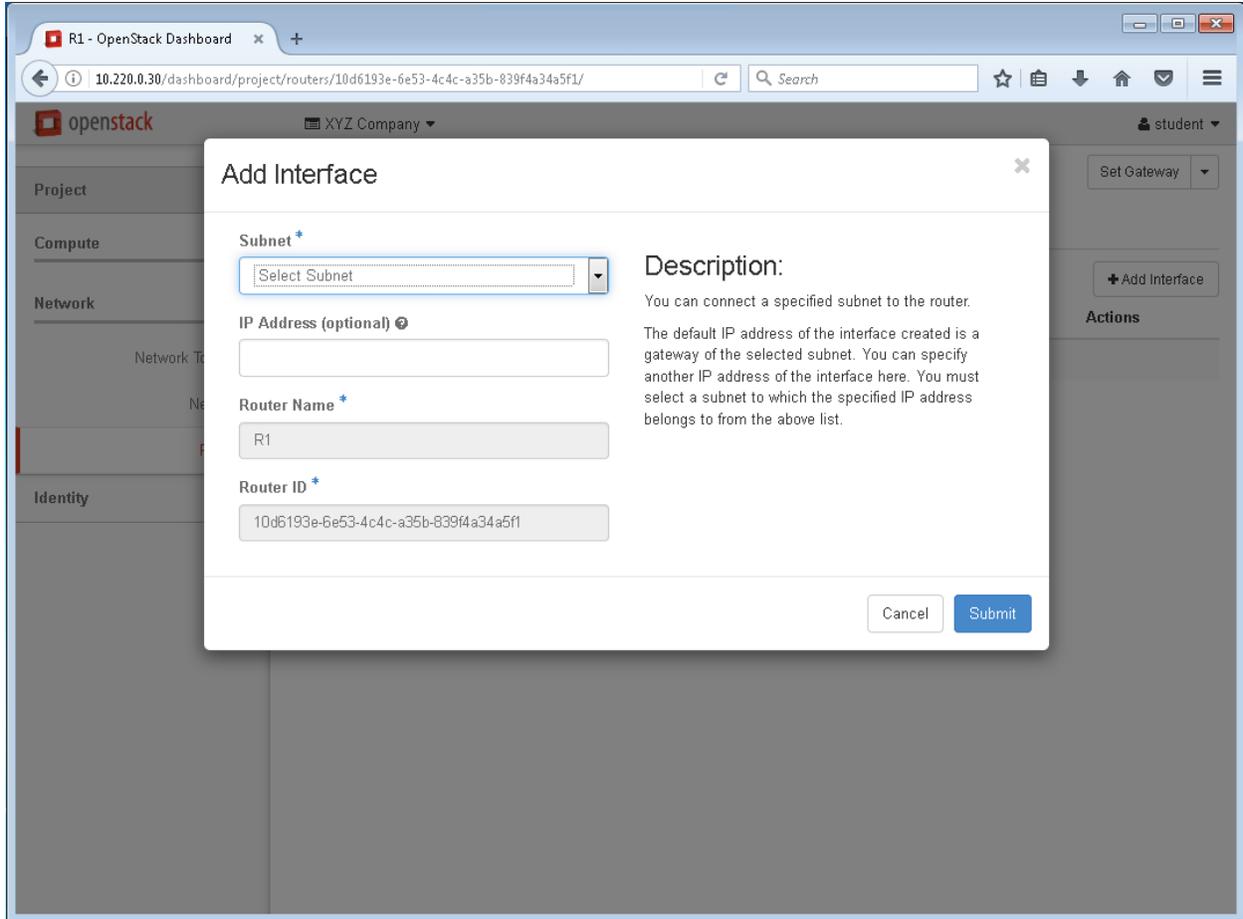
A physical or virtual device that provides connectivity to another device. In this case, you are adding a private interface to the router.

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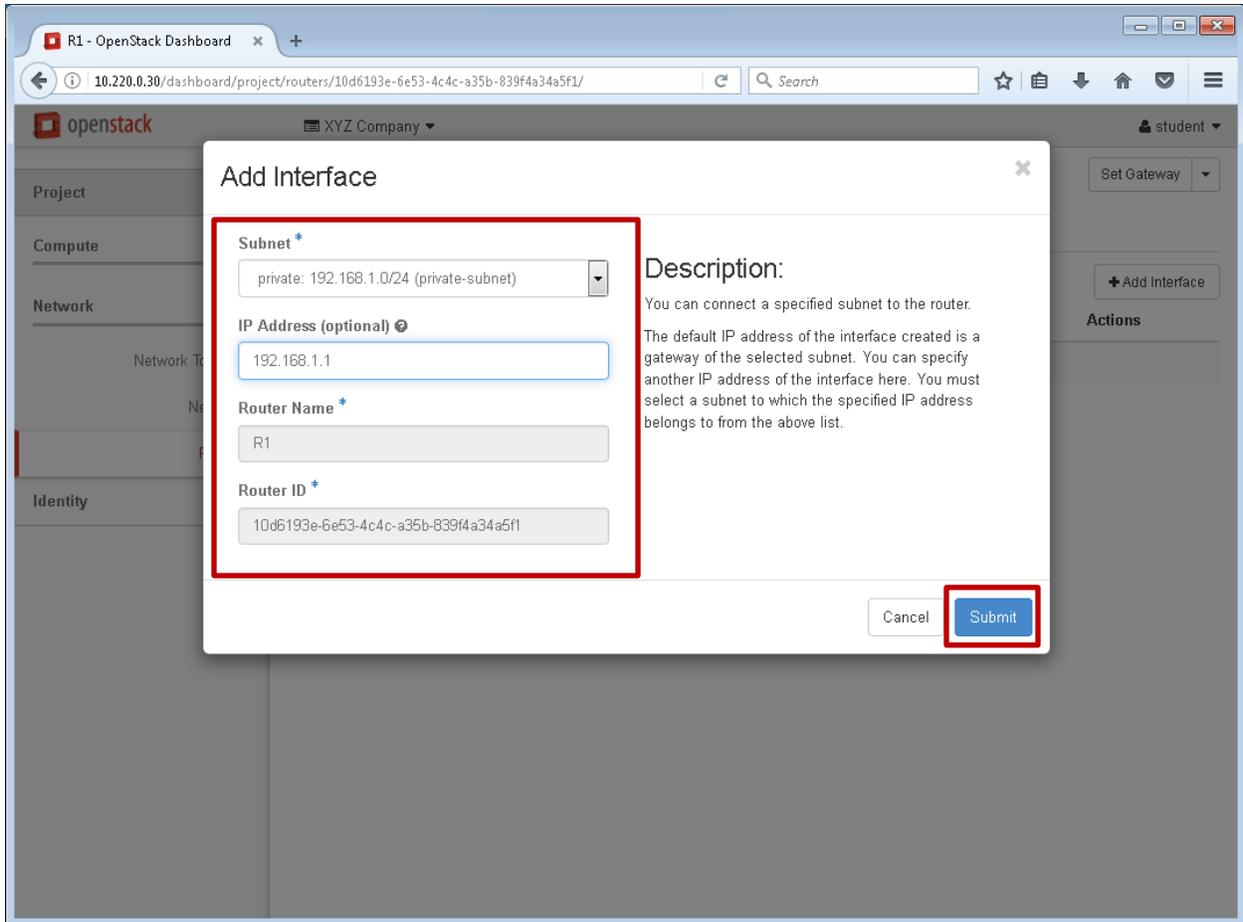
9. Click on **Add interface**

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10. The **Add Interface** wizard should appear

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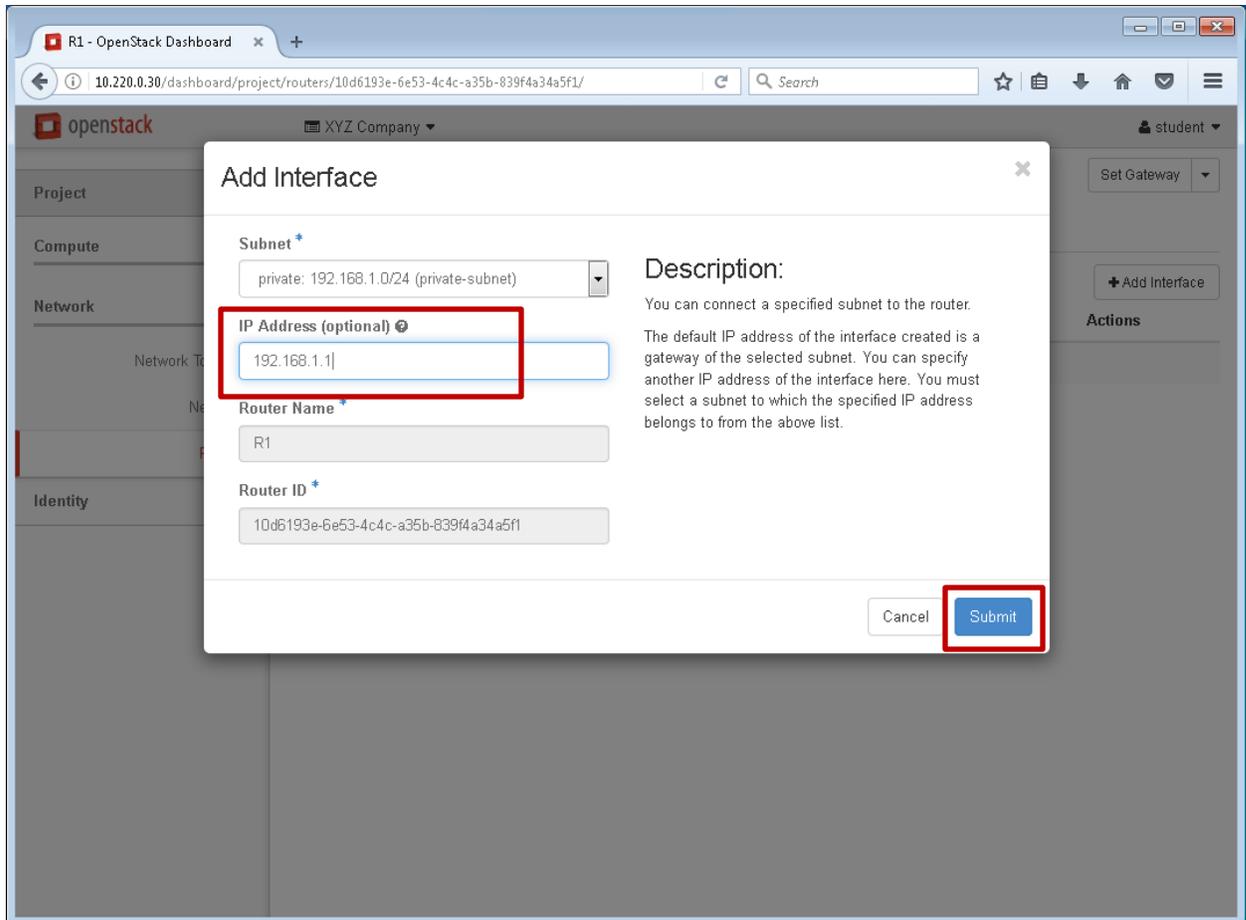


11. Select the **Subnet** drop down menu and **Click** on the **private: 192.168.1.0/24 (private-subnet)** network. **Enter** the **IP address 192.168.1.1**. **Click Submit**

Subnet	Private: 192.168.1.0/24 (private-subnet)
IP address	192.168.1.1



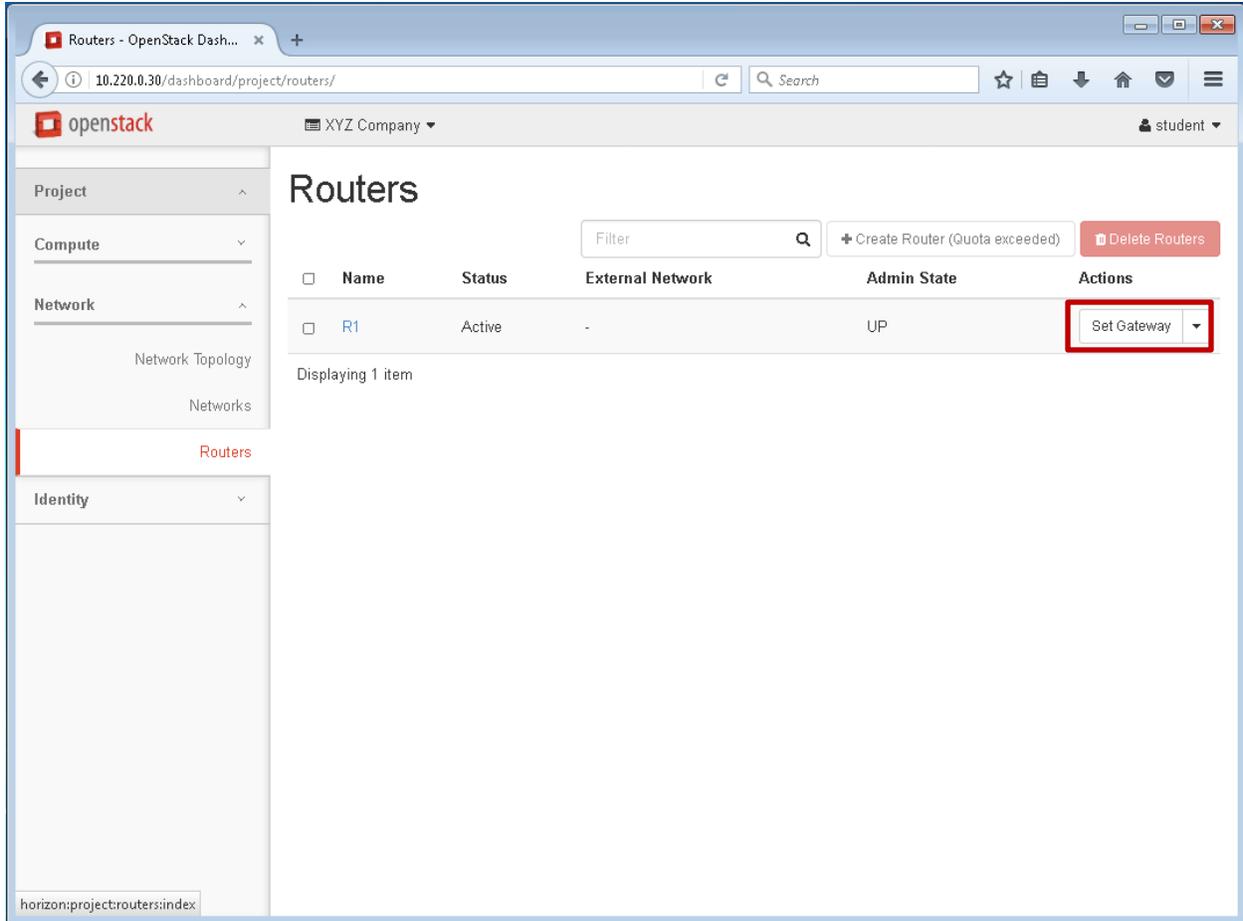
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12. Enter the **192.168.1.1** network address in the **IP Address (optional)** block. Click on **Submit**.

Note: The IP address above is the first available IP address in the private subnet and is the same IP address that you assigned as the gateway IP address in lab 7.

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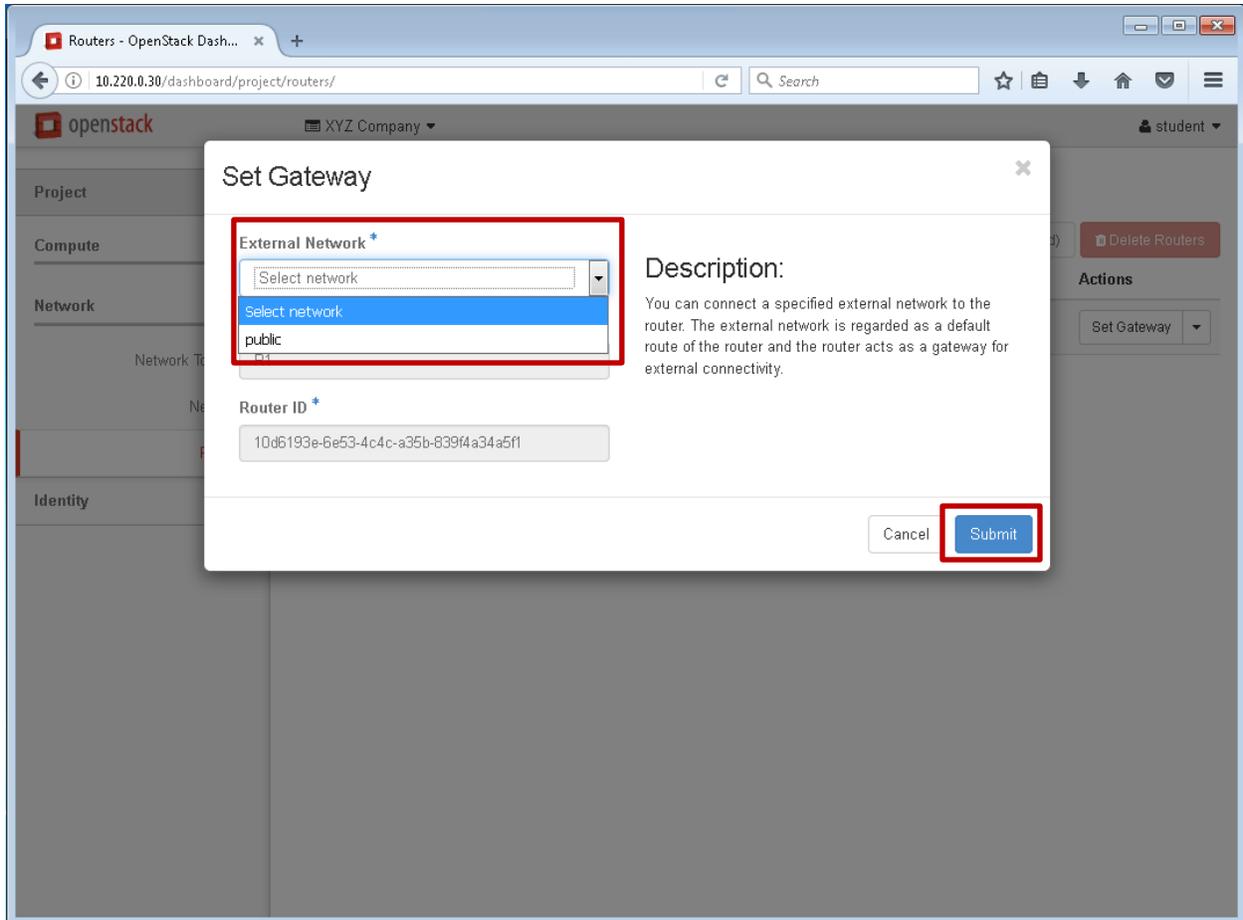
The screenshot displays the OpenStack Horizon interface for managing Routers. The main content area shows a table with the following data:

Name	Status	External Network	Admin State	Actions
R1	Active	-	UP	Set Gateway

The 'Set Gateway' action is highlighted with a red box. The page also includes a sidebar with navigation options (Project, Compute, Network, Identity) and a top navigation bar with the OpenStack logo and user information (XYZ Company, student).

13. Return the **Router tab** and **Click Set Gateway**.

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14. From the dropdown menu, **select the public network. Click Submit.**

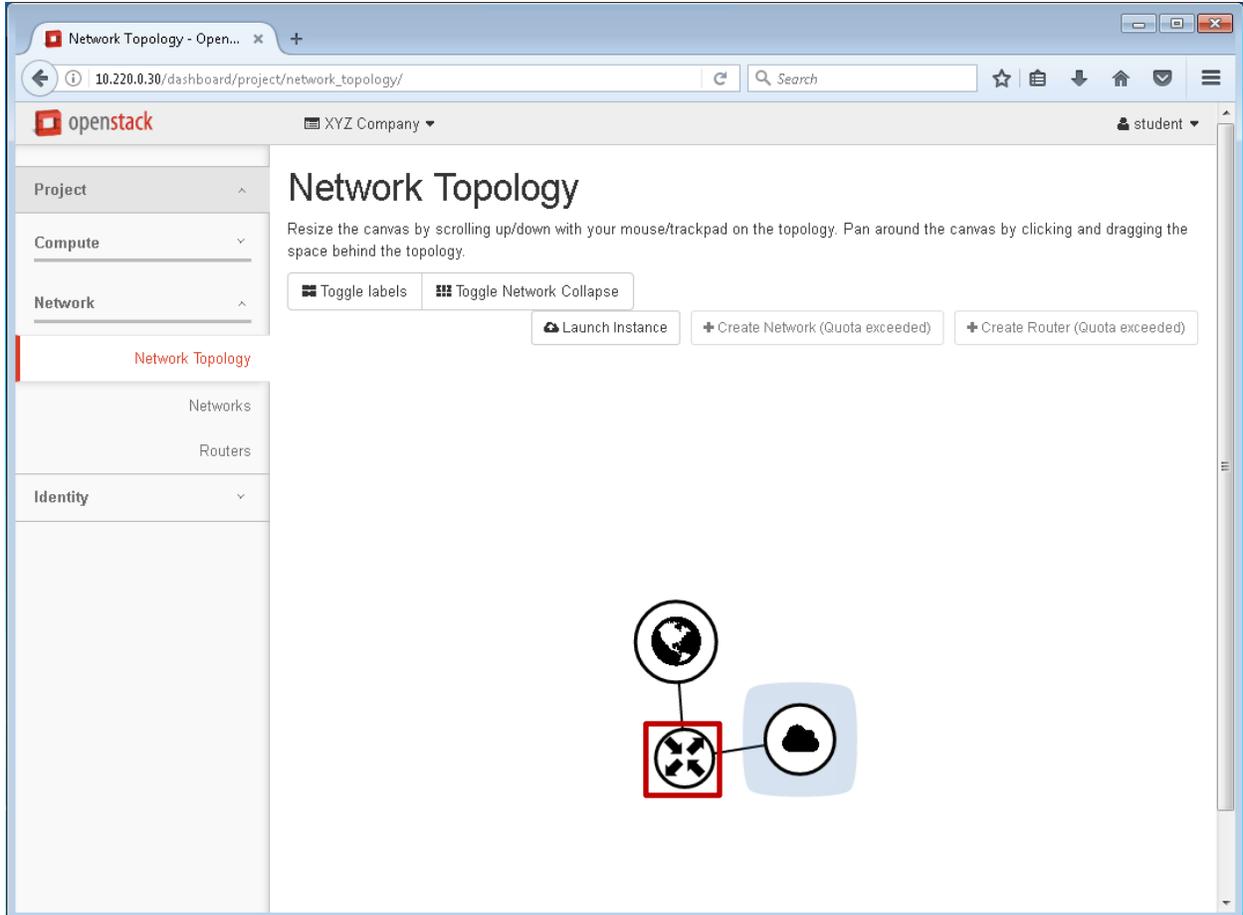
Module 3: Configure OpenStack Networks and Routers

The screenshot shows the OpenStack Dashboard interface. The browser address bar indicates the URL: `10.220.0.30/dashboard/project/routers/10d6193e-6e53-4c4c-a35b-839f4a34a5f1/`. The dashboard header includes the OpenStack logo, the company name 'XYZ Company', and the user 'student'. The left sidebar contains navigation tabs for 'Project', 'Compute', 'Network', and 'Identity'. The 'Network' tab is active, and 'Network Topology' is highlighted with a red box. The main content area is titled 'Routers / R1' and has tabs for 'Overview', 'Interfaces', and 'Static Routes'. The 'Interfaces' tab is selected, showing a table of interfaces for the router. The table has columns for 'Name', 'Fixed IPs', 'Status', 'Type', 'Admin State', and 'Actions'. Two interfaces are listed: one with ID (9e13d847-5bfc) and IP 10.220.0.11, and another with ID (cd5e32cc-e567) and IP 192.168.1.1. The 'Actions' column for the second interface has a 'Delete Interface' button.

<input type="checkbox"/>	Name	Fixed IPs	Status	Type	Admin State	Actions
<input type="checkbox"/>	(9e13d847-5bfc)	10.220.0.11	Build	External Gateway	UP	
<input type="checkbox"/>	(cd5e32cc-e567)	192.168.1.1	Active	Internal Interface	UP	Delete Interface

15. Both interfaces should be listed in the center pane. **Click on the Network Topology tab** in the left pane

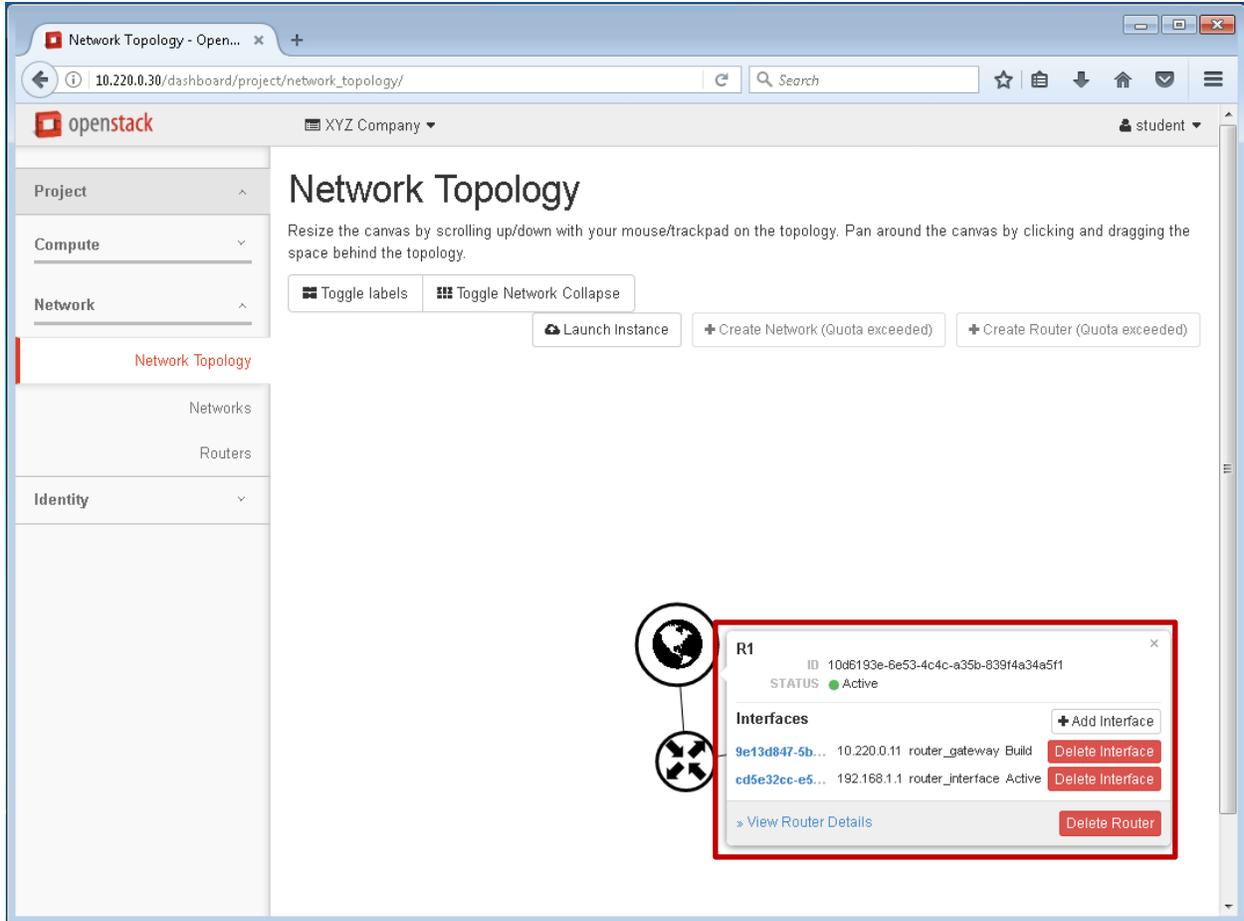
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16. The **Network Topology** pane has a graphic representation of your network. **Click** on the **center icon** with the four arrows.

Note: The ICON with globe is the WAN (public network) and the ICON with the Cloud is the LAN (private network) if you click on either one, you will see the same type of popup with additional information as you do with the Router ICON.

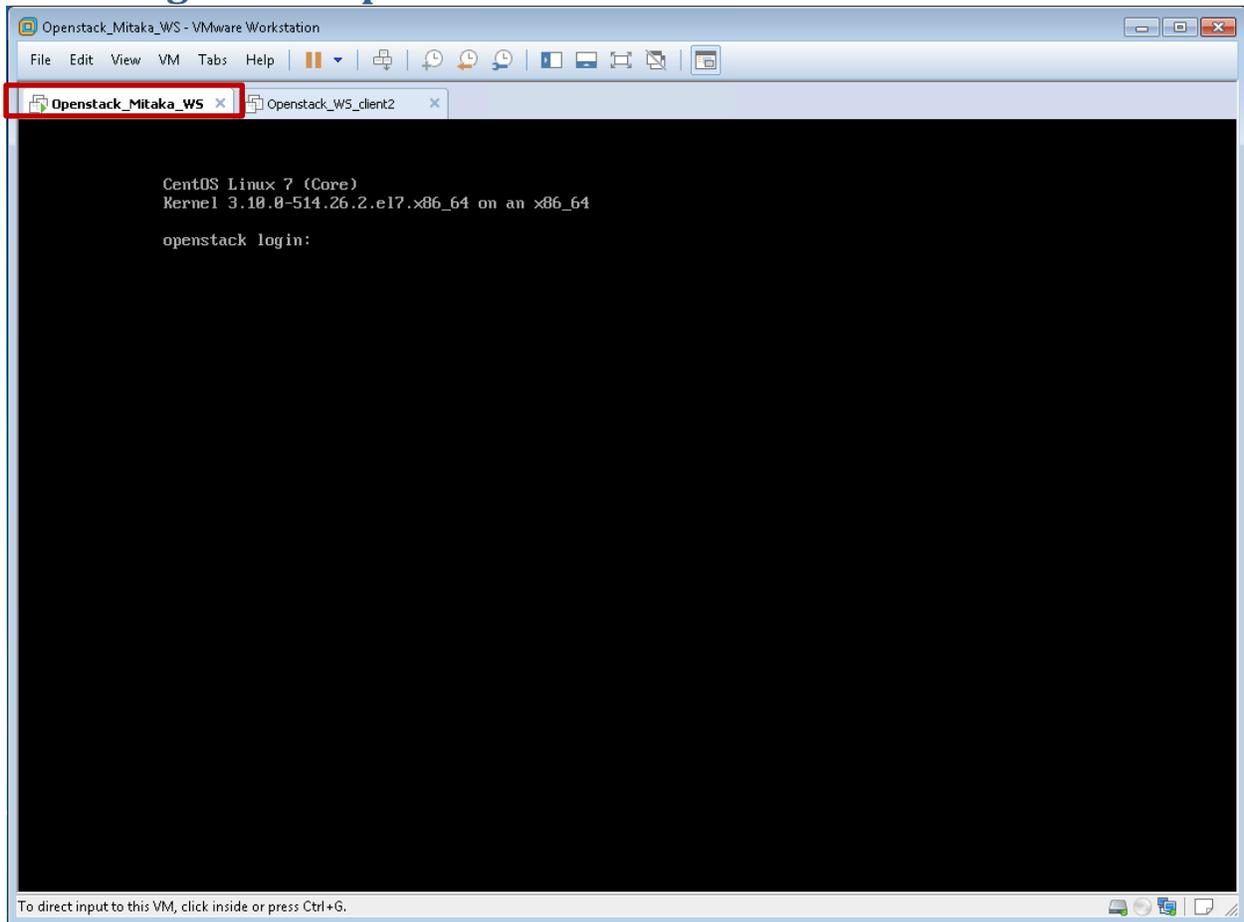
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17. You should see a popup with more information about your router along with options to **Add Interface, Delete Interface, Delete Router**. Additionally, a link to **View Router details**, which takes you back to the **Routers** tab.

This completes Lab 8, continue to grading script

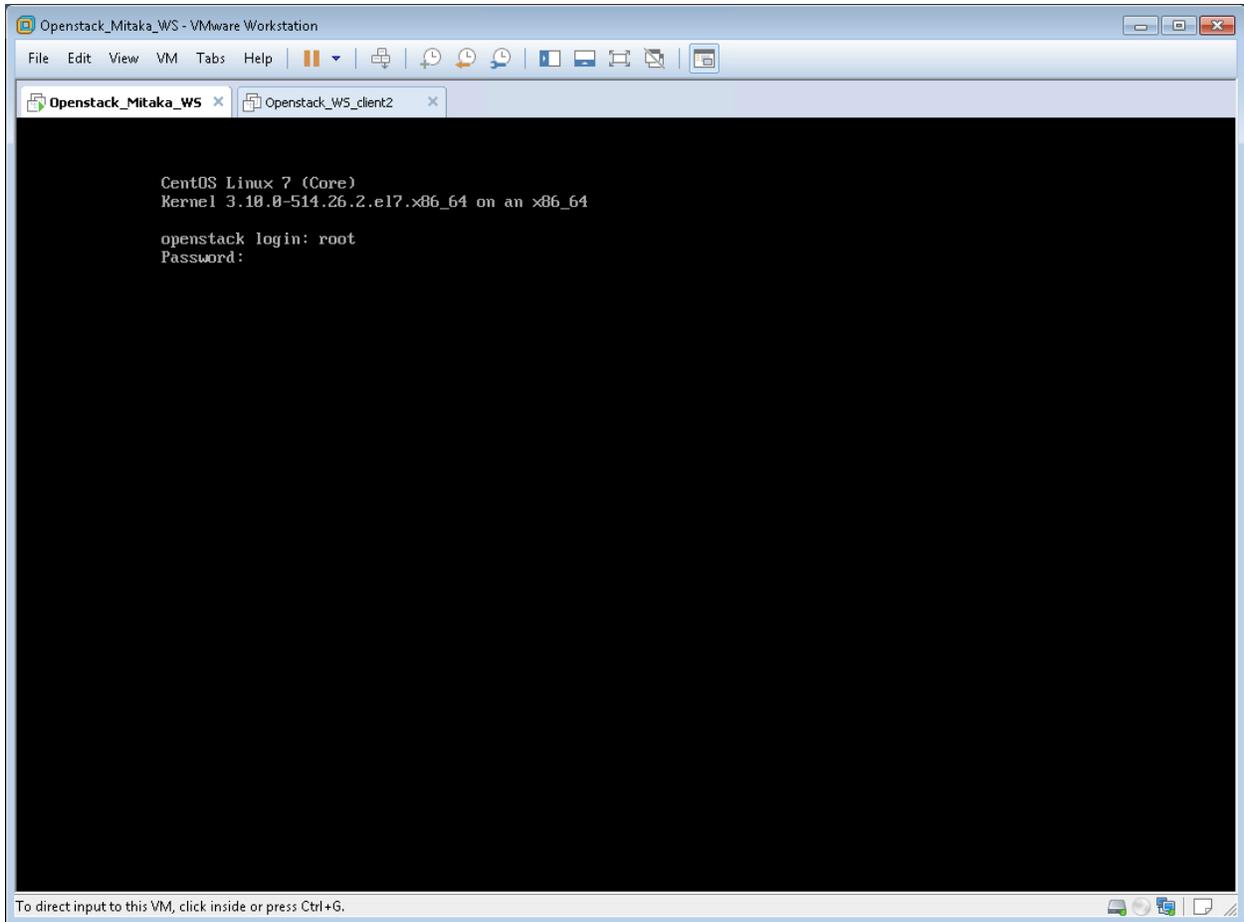
Run the grade script



1. Return to Workstation and **Click on OpenStack_Mitaka_WS VM**

Note: The OpenStack_Mitaka_WS console may still be open on your desktop from when you ran the setup script

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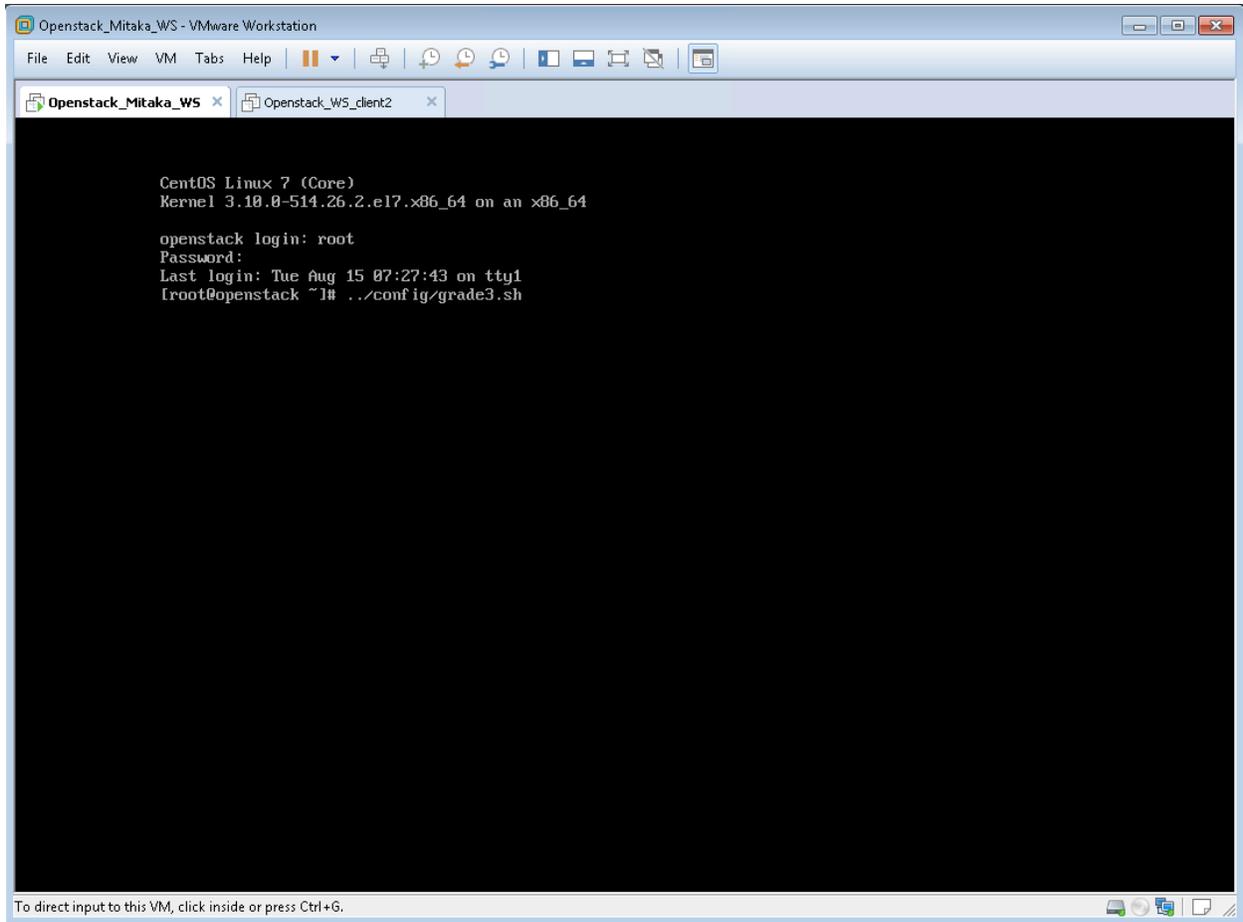


2. Log in as root with the Password: P@ssword

Note: The password is NOT visible as you type it



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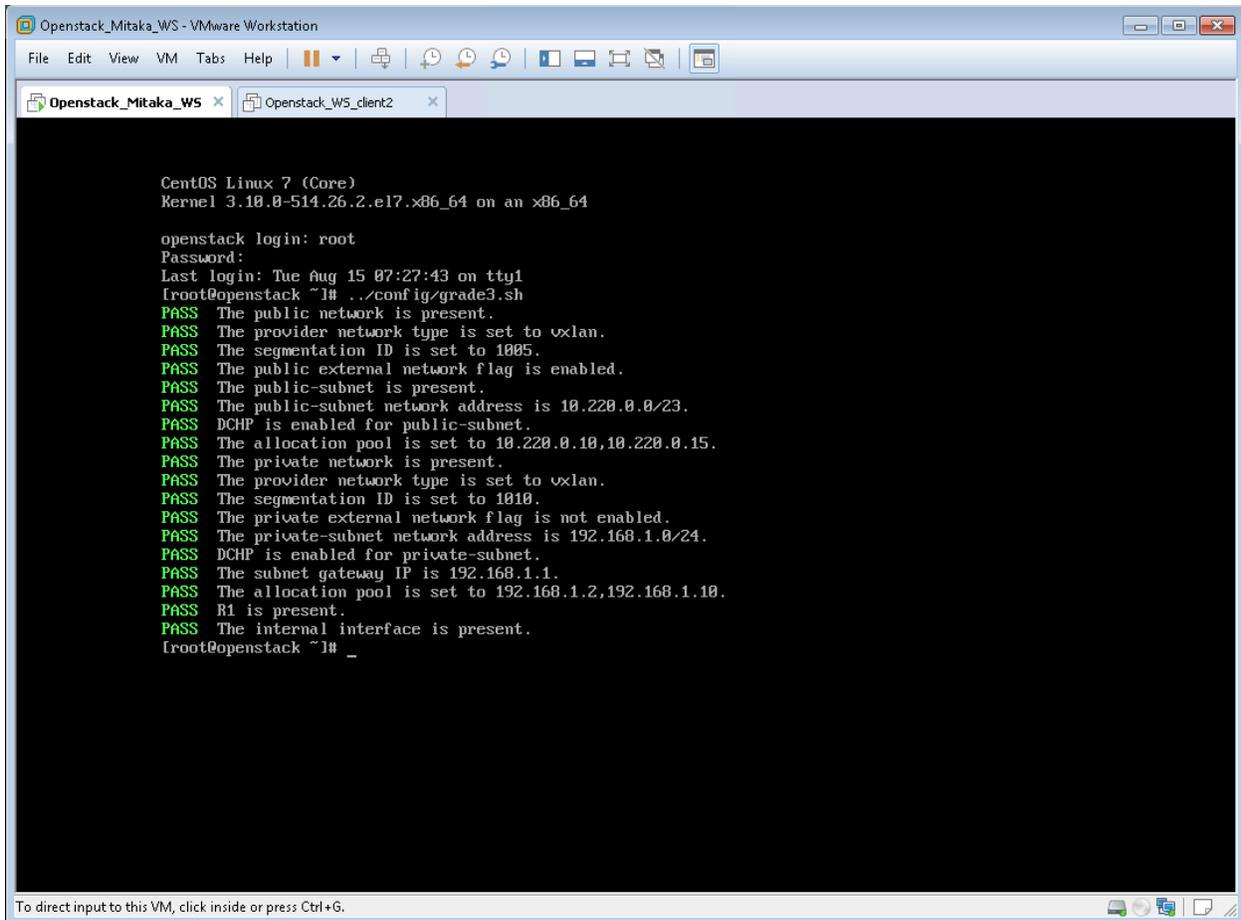
```
CentOS Linux 7 (Core)
Kernel 3.10.0-514.26.2.el7.x86_64 on an x86_64

openstack login: root
Password:
Last login: Tue Aug 15 07:27:43 on tty1
root@openstack ~]# ./config/grade3.sh
```

3. Enter the command; `./config/grade3.sh` and **press Enter**



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```
Openstack_Mitaka_WS - VMware Workstation
File Edit View VM Tabs Help
Openstack_Mitaka_WS x Openstack_WS_client2 x

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 07:27:43 on tty1
root@openstack ~]# ./config/grade3.sh
PASS The public network is present.
PASS The provider network type is set to vxlan.
PASS The segmentation ID is set to 1005.
PASS The public external network flag is enabled.
PASS The public-subnet is present.
PASS The public-subnet network address is 10.220.0.0/23.
PASS DHCP is enabled for public-subnet.
PASS The allocation pool is set to 10.220.0.10,10.220.0.15.
PASS The private network is present.
PASS The provider network type is set to vxlan.
PASS The segmentation ID is set to 1010.
PASS The private external network flag is not enabled.
PASS The private-subnet network address is 192.168.1.0/24.
PASS DHCP is enabled for private-subnet.
PASS The subnet gateway IP is 192.168.1.1.
PASS The allocation pool is set to 192.168.1.2,192.168.1.10.
PASS R1 is present.
PASS The internal interface is present.
root@openstack ~]# _

To direct input to this VM, click inside or press Ctrl+G.
```

4. The grading script will produce an output with **PASS** or **FAIL** for each of the categories, similar to the screen capture above. If you receive a **FAIL** on one or more of the categories, you can go back and fix the issue and run the grading script again, or you can revert the OpenStack_Mitaka_WS VM to the base snapshot and start over again.

This completes Module 3, continue to conclusion



Conclusion:

The customer now has the minimum network requirements needed configured to successfully launch an instance. After an instance has been launched, additional configuration will be required, to the network management rules, to allow a connection to the server from the public network. Your next field visit to XYZ Company will be to launch a Linux server cloud instance.

