



Department of Computer Science
Computer Networks Research Group

Technology Review



Management of ServiCes Across MultipLE clouds

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Paderborn, December 31, 2018

Contents

1	Introduction	3
2	Open Source MANO	4
2.1	Configuration requirements needed to run Open Source MANO (OSM) Release FOUR is a single server or VM:	4
2.2	Open Source Mano Installation	4
2.2.1	Steps for Installation:	4
2.2.2	verifying installation from the OSM GUI:	4
2.3	VIM Installation	5
2.3.1	Steps to install openstack using devstack are as follows:	5
2.4	Configure openstack for OSM	6
2.5	Deploying Network Service	8
3	OpenBaton	11
4	SONATA/PISHAHANG	12
4.1	Configuration requirements to run Pishahang on a single server or VM	12
4.2	Pishahang installation	13
4.3	Service Descriptor Packaging and uploading	14
4.4	Linking VIM to sonata	17
4.5	Network Service Instantiation	20

List of Figures

2.1	OSM GUI	4
2.2	Open Stack Dashboard	5
2.3	Creating a Network in Openstack	6
2.4	creating a valid tenant/user in openstack	7
2.5	creating a valid tenant/user in openstack	7
2.6	Uploading VM image to VIM in openstack	8
2.7	Adding VIMs to OSM	8
2.8	Adding VIMs to OSM	8
2.9	On-boarding of VNFD in OSM	9
2.10	On-boarding of NS in OSM	9
2.11	Initiating of NS in OSM	10
4.1	Sonata Dashboard	14
4.2	Add WIM	15
4.3	Add VIM	15
4.4	Select Router	16
4.5	Select IDs	16
4.6	VIM Details	17
4.7	Create user	18
4.8	Edit project quotas	19
4.9	Create router	20

List of Tables



Introduction

The aim of technology review was to understand the working of all the tools and technologies relevant for the project.

To achieve this tasks was assigned to each of the team to review few set of tools as below.

Technology Review		
Team	Members	Reviewed
1	Arkajit Dhar	Open Source Mano
	Suheel Nazeersab	
	Vivek Jaganath	
2	Sanket Kumar	Open Baton
	Harshitha Somashekaraiah	
3	Ashwin Prasad	Sonata
	Bhargavi Mohan	
	Deeksha Ramesh	

Together we have reviewed MANO framework's such as Open Source Mano, Sonata and Open Baton. We have also tried and worked on virtual infrastructure manager's such as Kubernetes and Open Stack.

The Mano framework's are up and running in virtual machines and we have established connections between MANO and VIM's.

The detailed explanation on installation and steps is given below in the document.

Open Source MANO

2.1 Configuration requirements needed to run Open Source MANO (OSM) Release FOUR is a single server or VM:

- MINIMUM: 2 CPUs, 4 GB RAM, 20GB disk and a single interface with Internet access
- RECOMMENDED: 2 CPUs, 8 GB RAM, 40GB disk and a single interface with Internet access
- Ubuntu16.04 (64-bit variant required) as base image (<http://releases.ubuntu.com/16.04/>)

2.2 Open Source Mano Installation

2.2.1 Steps for Installation:

- Downloading latest version of OSM

```
wget https://osm-download.etsi.org/ftp/osm-4.0-four/install_osm.sh
```

- Installing OSM

```
chmod +x install_osm.sh  
$ ./install_osm.sh 2>&1 | tee osm_install_log.txt
```

2.2.2 verifying installation from the OSM GUI:

- Accessing GUI:

Access <http://1.2.3.4>, replacing 1.2.3.4 with the IP address of your host.
Login using Userid : admin , password : admin

0.5

Figure 2.1: OSM GUI

- Verify 10 docker containers were created:

```
docker stack ps osm |grep -i running
docker service ls
```

2.3 VIM Installation

2.3.1 Steps to install openstack using devstack are as follows:

- Create a user “stack”

```
sudo useradd -s /bin/bash -d /opt/stack -m stack
echo "stack ALL=(ALL) NOPASSWD: ALL" | sudo tee /etc/sudoers.d/stack
sudo su -stack
```

- Clone the devstack repository

```
git clone https://git.openstack.org/openstack-dev/devstack
cd devstack
```

- Create and configure the local.conf file

```
[[local|localrc]]
ADMIN_PASSWORD=password
DATABASE_PASSWORD=$ADMIN_PASSWORD
RABBIT_PASSWORD=$ADMIN_PASSWORD
SERVICE_PASSWORD=$ADMIN_PASSWORD
```

- Execute the command

```
./stack.sh
```

- After installation check and verify from openstack horizon GUI:

Access <http://1.2.3.4>, replacing 1.2.3.4 with the IP address of your host.
Login using Userid : admin , password : admin

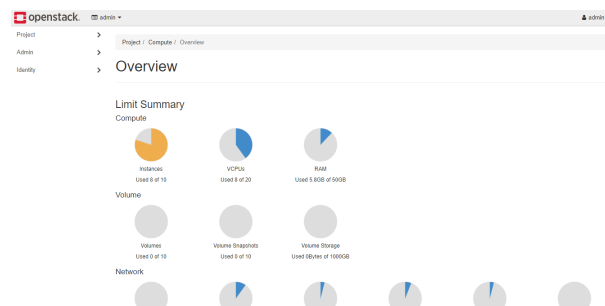


Figure 2.2: Open Stack Dashboard

2.4 Configure openstack for OSM

- Guarantee that Openstack API endpoints are reachable from OSM (particularly from RO container):

Login to openstack api access from the horizon gui.
 Click on DOWNLOAD OPENSTACK RC FILE (api version 3).
 Copy the OS_AUTH_URL variable value.
 Paste in the browser or do a curl from the VM where OSM is installed to check its reachability.

- Create a management network, with DHCP enabled, reachable from OSM (particularly from VCA container)

Login to openstack horizon gui.
 Go to admin-> create network.
 Give the project name as your project (default:admin)
 Give a network name -> mgmt.
 Give a network subnet name and network address (10.208.1.0/24).
 Keep the Network Address source as 'ENTER NETWORK ADDRESS MANUALLY'.
 Keep Gateway IP blank.
 In Allocation Pools, give the IPs: start=10.208.0.2,end=10.208.0.254.
 Leave DNS Name servers and Host Routes blank and click create.

The screenshot shows the 'Create Network' wizard in the Openstack Horizon GUI. The 'Network' tab is selected. The form contains the following fields and options:

- Name:** A text input field, currently empty.
- Project:** A dropdown menu with the text 'Select a project'.
- Provider Network Type:** A dropdown menu with 'Local' selected.
- Enable Admin State:** A checked checkbox.
- Shared:** An unchecked checkbox.
- External Network:** An unchecked checkbox.
- Create Subnet:** A checked checkbox.
- Availability Zone Hints:** A dropdown menu with 'nova' selected.

At the bottom right, there are three buttons: 'Cancel', '< Back', and 'Next >'.

Figure 2.3: Creating a Network in Openstack

- creating a valid tenant/user

Login to openstack horizon gui.
 Go to identity-> create user.
 Give the project name as your project (default:admin)
 Give a user name -> tenant.
 Give the role also as admin and click create.

CHAPTER 2. OPEN SOURCE MANO

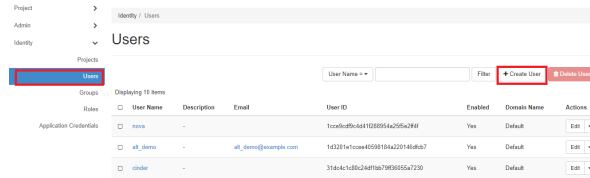


Figure 2.4: creating a valid tenant/user in openstack

Domain ID
default

Domain Name
Default

User Name *

Description

Email

Password *

Confirm Password *

Primary Project
Select a project

Role
member

☒ Enabled

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

Cancel Create User

Figure 2.5: creating a valid tenant/user in openstack

- Uploading VM image(s) to the VIM(s)

Download the image from the following link:

(http://download.cirros-cloud.net/0.3.4/cirros-0.3.4-x86_64-disk.img)

Login to openstack horizon gui.

Go to admin -> Compute -> Images and click on create image.

Give the image name 'cirros034'

Upload the downloaded image file in step 1.

Choose the image format as QCOW2 : QEMU Emulator

Click on create image.

2.4 CONFIGURE OPENSTACK FOR OSM

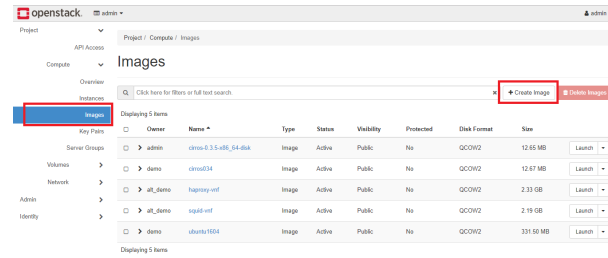


Figure 2.6: Uploading VM image to VIM in openstack

- Adding VIMs to OSM

Login to OSM and click on VIM Accounts.

Click on new VIM.

Give a name to your VIM instance and choose openstack from the type dropdown. Give the VIM URL as the OS_AUTH_URL variable value in openstacks rc file.

Enter the VIM userid and password as the login userid and password for openstack horizon gui.

Give the tenant name as admin/tenant.

Click on create.

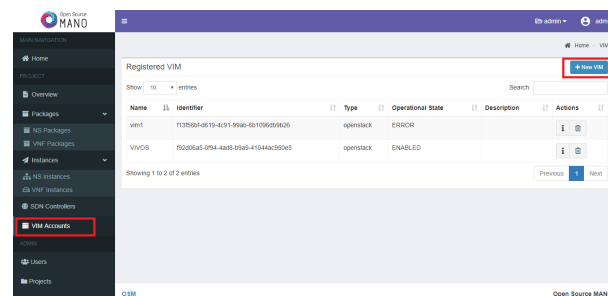


Figure 2.7: Adding VIMs to OSM

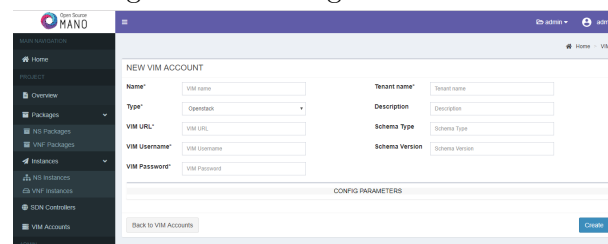


Figure 2.8: Adding VIMs to OSM

2.5 Deploying Network Service

First download the required VNF and NS packages from this URL: (https://osm-download.etsi.org/ftp/osm-3.0-three/examples/cirros_vnf_ns/)

- On-boarding a VNFD

From the UI , Go to Projects --> Admin --> VNF Packages (Open List)
 Click on the Onboard VNF button
 Drag and drop the VNF package file `cirros_vnf.tar.gz` in the importing area.

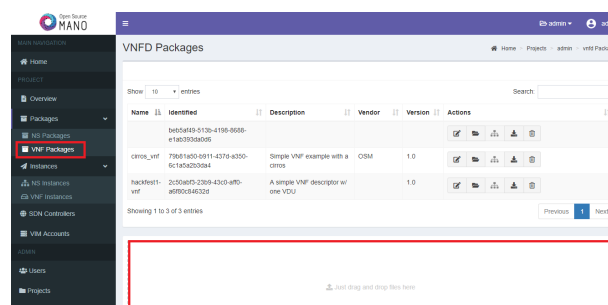


Figure 2.9: On-boarding of VNFD in OSM

- Onboarding a NS

From the UI, Go to Projects --> Admin --> NS Packages (Open List)
 Click on the Onboard NSD button
 Drag and drop the NS package file `cirros_2vnf_ns.tar.gz` in the importing area.

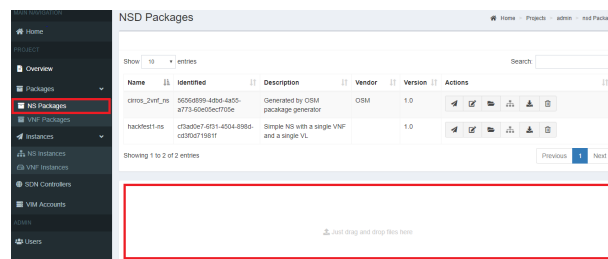
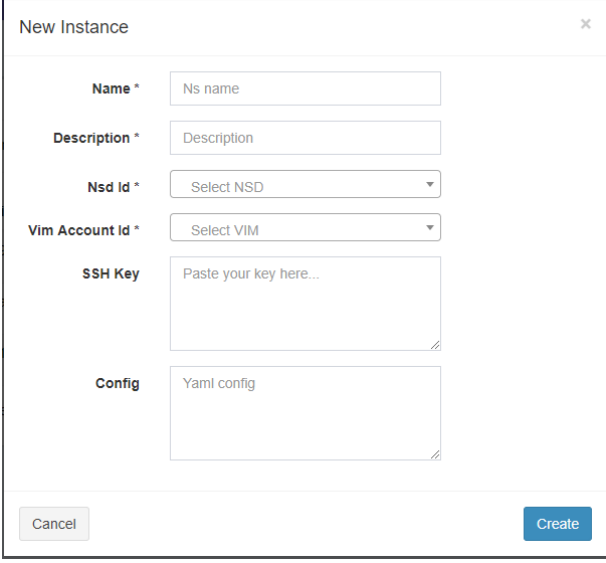


Figure 2.10: On-boarding of NS in OSM

- Instantiating the NS

From the UI, Go to Projects --> Admin --> NS Packages (Open List)
 Next the NS descriptor to be instantiated, click on Launch
 Fill the form, adding at least a name and selecting the VIM



The image shows a 'New Instance' dialog box with a close button (X) in the top right corner. It contains several input fields and buttons:

- Name ***: A text input field with the placeholder text 'Ns name'.
- Description ***: A text input field with the placeholder text 'Description'.
- Nsd Id ***: A dropdown menu with the text 'Select NSD' and a downward arrow.
- Vim Account Id ***: A dropdown menu with the text 'Select VIM' and a downward arrow.
- SSH Key**: A text area with the placeholder text 'Paste your key here...' and a small icon in the bottom right corner.
- Config**: A text area with the placeholder text 'Yaml config' and a small icon in the bottom right corner.
- Buttons**: A 'Cancel' button on the bottom left and a 'Create' button on the bottom right.

Figure 2.11: Initiating of NS in OSM

3

OpenBaton

SONATA/PISHAHANG

4.1 Configuration requirements to run Pishahang on a single server or VM

- Operating System: Ubuntu 16.04 as base image (<http://releases.ubuntu.com/16.04/>)
- Minimum Requirements: 4GB RAM, 40GB hard disk and a non-root user account

We set up an OpenStack environment using DevStack, which is installed via a configuration file named local.conf. The installation guide can also be found at <https://docs.openstack.org/devstack/latest/>

- Other references ^{1 2}

Steps of installation:

- Create a user “stack”

```
sudo useradd -s /bin/bash -d /opt/stack -m stack
echo "stack ALL=(ALL) NOPASSWD: ALL" | sudo tee \ /etc/sudoers.d/stack
sudo su - stack
```

- Clone the devstack repository

```
git clone https://git.openstack.org/openstack-dev/devstack -b stable/ocata
cd devstack
```

¹Refer DevStack heat documentation to enable heat service

²Refer DevStack networking-sfc documentation for service chaining

- Create and configure the local.conf file

```
[[local|localrc]]
ADMIN\_PASSWORD=password
DATABASE\_PASSWORD=$ADMIN\_PASSWORD
RABBIT\_PASSWORD=$ADMIN\_PASSWORD
SERVICE\_PASSWORD=$ADMIN\_PASSWORD
```

- Execute the command

```
./stack.sh
```

- After installation check and verify from openstack horizon GUI

Access <http://1.2.3.4>, replace 1.2.3.4 with the IP address of your host Login using user id: admin, password: admin

4.2 Pishahang installation

The Below steps of installation are performed from the non-root user account

- Installing packages

```
sudo apt-get install -y software-properties-common
sudo apt-add-repository -y ppa:ansible/ansible
sudo apt-get update
sudo apt-get install -y git ansible
```

- Clone repository

```
git clone https://github.com/CN-UPB/Pishahang.git
cd Pishahang/son-install
echo sonata | tee ~/.ssh/.vault_pass
```

- Start Installation Replace "<your_ip4_address>" with the IP address SONATA should be available at , also check the command

```
ansible-playbook utils/deploy/sp.yml -e \ "target=localhost
public_ip=<your_ip4_address>" -v
```

- Verify Installation Open your browser and navigate to http://public_ip. Login using the username sonata and password 1234. If the installation was successful, you should now see the dashboard of the service platform
- Installation of son-cli The SONATA CLI toolset can also be installed via the Python setup script

```
git clone https://github.com/sonata-nfv/son-cli.git
cd son-cli
python3 setup.py install
```

- Test if its working by invoking

```
son-workspace -h
son-package -h
son-publish -h
son-push -h
son-monitor -h
```

Reference Link - <https://github.com/sonata-nfv/son-cli#all-dists-using-setuptools>

4.3 Service Descriptor Packaging and uploading

We also need the son-cli to be installed and son-examples repository to be cloned in the environment

- Add WIM
 - Open your browser and navigate to http://public_ip
 - Open the "WIM/VIM Settings" tab

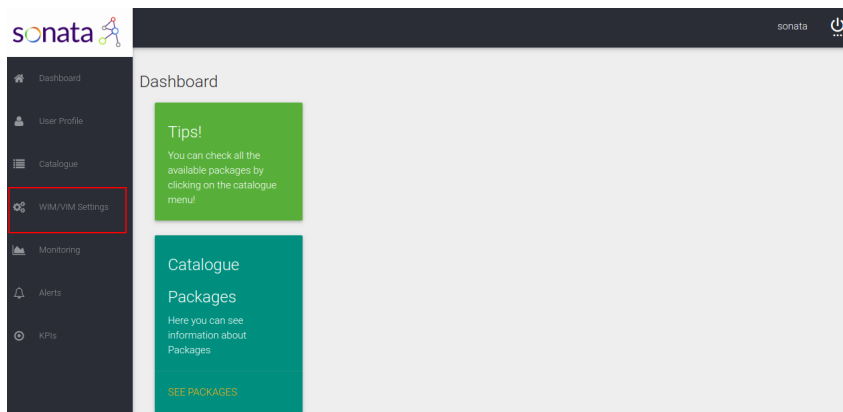


Figure 4.1: Sonata Dashboard

- click on add a WIM
- Select "Mock" WIM vendor
- Enter any WIM name(e.g. Sonata Test), WIM address(e.g. local host), username(e.g., Sonata) and password(e.g. 1234)
- Confirm by clicking "SAVE"

New Wim

Wim Name
SonataTest

Wim vendor
MOCK

Wim address
localhost

Username
Sonata

Password
....

CANCEL SAVE

Figure 4.2: Add WIM

- Adding OpenStack VIM
 - Click on add a VIM
 - Enter the VIM name(e.g. DevStack) , select the WIM just created, enter the country(e.g. germany) and city(Paderborn)
 - Select "Heat" VIM vendor

New Vim

General Configuration

VIM Name
DevStavk

Select WIM
e1265246-51e7-491e-9134

Country
Germany

City
Paderborn

Compute Configuration

Vim Vendor
Heat

Networking Configuration

Network configuration VIM Type
Select vim vendor

CANCEL SAVE

Figure 4.3: Add VIM

- Tenant ID: DevStack project id (e.g. sonatademo), Tenant External Network ID: DevStack ID of the public network and Tenant External Router ID: DevStack ID of the router created under sonatademo user i.e. sonata-router as shown below

4.3 SERVICE DESCRIPTOR PACKAGING AND UPLOADING

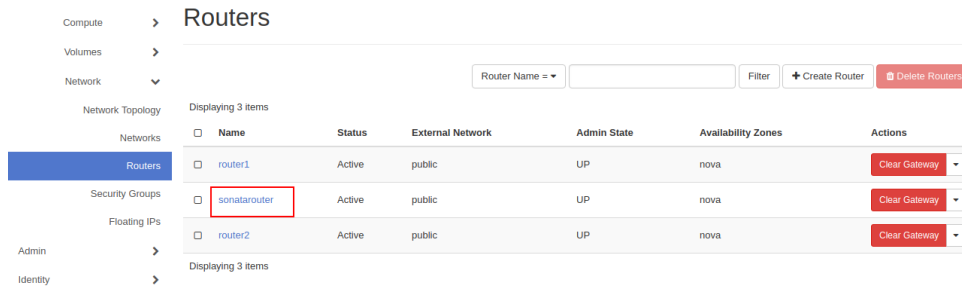


Figure 4.4: Select Router

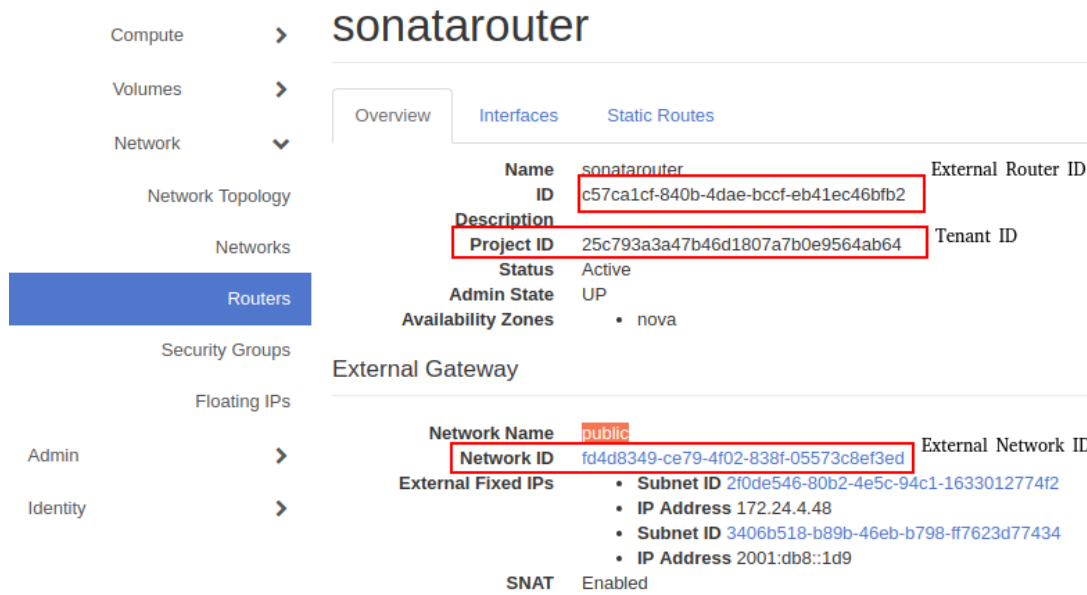


Figure 4.5: Select IDs

- VIM Address: DevStack (131.234.29.34)
- Vim Vendor: “OVS”,Username: sonatademo,Password: password of the user sonatademo (e.g. sonata),Domain: Default
- Click on "Save"

Compute Configuration		Networking Configuration	
Vim Vendor Heat		Network configuration VIM Type Select vim vendor	
Tenant ID e3cf6987c0ff43c48	Vim address 131.234.29.112	OVS	
Tenant External Network ID fd4d8349-ce79-4f0...	Tenant External Router ID c57ca1cf-840b-4da...	Vim address 131.234.29.112	
Username sonatademo	Password *****	Username sonatademo	Password *****
Domain Default			
		CANCEL SAVE	

Figure 4.6: VIM Details

– On-boarding Service Package

```
git clone \ https://github.com/sonata-nfv/son-examples.git

son-workspace --init

son-validate --project \ son-examples/service-projects/sonata-demo

son-package --project \ son-examples/service-projects/sonata-demo
-n \ service_package

son-access config --platform_id ServicePlatform \ --new --url
http://131.234.29.102 --default

son-access auth -u sonata -p 1234

son-access push --upload service_package.son
```

Reference video - <https://www.youtube.com/watch?v=RsXUIt4rzF0>

4.4 Linking VIM to sonata

Login to the DevStack dashboard: <http://131.234.29.34/dashboard>. There are two users created during installation admin and demo. Password for both users is sonata

- Create New User and Project

- Login as admin user in domain Default and create new user (e.g. sonatademo)
- In the menu, go to Identity->User (Create User)
- Give the admin role to the new user

Create User

Domain ID

default

Domain Name

Default

User Name *

sonatademo

Description

Email

Password *

Confirm Password *

Primary Project

sonatademo

Role

admin

☒ Enabled

Description:

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

Cancel

Create User

Figure 4.7: Create user

- Add a new project with the below details
 - Project name/tenant name: sonatademo
 - Allocate maximum number of resources for that project under Quotas tab

Edit Quotas ✕

Compute * **Volume *** **Network ***

Instances * 100|

VCPUs * 100

RAM (MB) * 51200

Metadata Items * 128

Key Pairs * 100

Server Groups * 10

Server Group Members * 10

Injected Files * 50

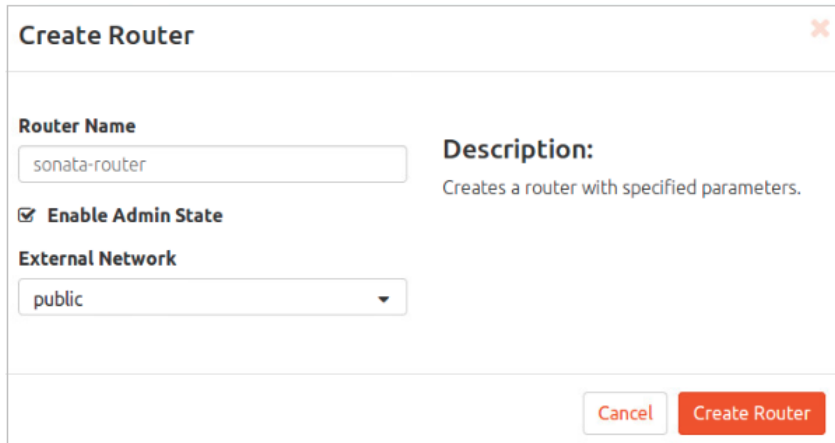
Injected File Content (Bytes) * 52100

Length of Injected File Path * 255

Cancel Save

Figure 4.8: Edit project quotas

- Create Private Network
 - Login as new user(e.g. sonatademo)
 - Create a network(e.g. sonata-priv) and add the subnet as well (e.g. sonata-priv-sub)
 - Add the router
 - Use any private network address, for example 192.168.x.0/24. While creating the router select the External Network as public (Error: Reference source not found). Add the sonata-priv-sub as the interface to the router

A modal window titled "Create Router" with a close button (X) in the top right corner. The form contains the following fields: "Router Name" with a text input containing "sonata-router"; "Description:" with the text "Creates a router with specified parameters."; a checked checkbox labeled "Enable Admin State"; and "External Network" with a dropdown menu showing "public". At the bottom right, there are two buttons: "Cancel" and "Create Router".

Create Router

Router Name
sonata-router

Description:
Creates a router with specified parameters.

☒ **Enable Admin State**

External Network
public

Cancel Create Router

Figure 4.9: Create router

4.5 Network Service Instantiation

- Open your browser and navigate to `http://public_ip:25001`
- Open the "Available Complex Services" tab
- Click the "Instantiate" button of the service you want to deploy
- Confirm the instantiate modal (ingress and egress can be empty)