

Dell EMC Ready Bundle for Red Hat OpenStack NFV Platform

Ease of Use Feature User Guide

Version 10.0.1



Dell EMC Service Provider Solutions

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Notes, Cautions, and Warnings

-  A **Note** indicates important information that helps you make better use of your system.
-  A **Caution** indicates potential damage to hardware or loss of data if instructions are not followed.
-  A **Warning** indicates a potential for property damage, personal injury, or death.

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Chapter 1

Feature description

Topics:

- [Introduction](#)
- [OpenStack projects](#)
- [OpenStack users](#)
- [Neutron networks](#)
- [Security Groups](#)
- [Automation of RC file](#)

This chapter discusses the OpenStack concepts of projects, users, neutron networks, security groups and explains their specifications in context with the Ease of Use feature.

Introduction

Ease of Use is used for the post-deployment customization of Dell EMC Ready Bundle for Red Hat OpenStack NFV Platform 10.0.1 for various use cases of NFV. Multiple projects, networks, and security groups can be created and deleted with great ease by running the Ease of Use playbooks. Cloud administrator has the flexibility to provide the VNF related information in an excel spreadsheet, which will then be used by the Ansible playbooks to deploy the virtual network functions.

This feature contains creation and deletion playbooks which take input from the excel spreadsheet. As the name suggests, the creation playbook is used to create the OpenStack resources. Multiple resources can be created using a single command. For example, if the spreadsheet contains details of 100 projects with 100 Users and 10 Security Groups for each of them, all of these resources can be created using a single Ansible creation command.

Similarly, deletion playbook is used for deleting the created projects. User can delete one project at a time by providing its name in the deletion command. Deleting a project also deletes all associated virtual resources.

What's new

Two new features have been introduced in this release:

1. A user no longer needs to source the RC file before running Ansible playbooks.
2. A user now has the functionality of defining security groups for various tenants along with the creation of networks and users.

OpenStack projects

Currently, Dell NFV deployment comes with only one project administrator. In Ease of Use feature, user can customize multiple projects. For example, multiple projects can be created based on the information provided in an excel spreadsheet.

An OpenStack project is a container that groups resources and objects. Depending on the service operator, a project might map to a customer, account, organization, or tenant. Every project can have a specific resource quota. For example 10 vCPUs, 10 virtual disks, 5 internal networks, 10 instances etc.

Each project created using Ease of Use feature can have up to three networks and a single router. Resources of a particular project will not be shared with other projects.

OpenStack users

An OpenStack user is a digital representation of a person, system, or service that uses OpenStack cloud services. Identity service validates that incoming requests are made by the user who claims to be making the call. Users have login credentials and can access resources by using assigned tokens. Users are assigned to a particular project and behave as if they are contained in that project. Ease of Use feature assigns all users to a member role.

Neutron networks

Each project will be assigned virtual networks and subnets as specified by the user in excel spreadsheet. User can input up to three networks for each project in the spreadsheet. VLANs provided by the user will not be configured on physical switches. Each project can be customized to have dedicated virtual router, an external network, and subnets.

Security Groups

By default, only one security group is present in each project. Default security group permits all egress traffic and intercommunication in the default group. Ingress traffic from outside is dropped. For proper communication, security groups need to be modified. Ease of Use feature allows the admin to create up to nine different security groups.

By design, Ease of Use feature allows the creation of multiple rules within an individual security group. They can be defined through port numbers and are limited to their specified project.



Note: By default, OpenStack allows ten security groups to be created by the user. One 'default' security group is created by OpenStack and user can create up to nine security groups.

Automation of RC file

OpenStack provides RC file with user credentials that can be sourced to use OpenStack commands. Previously, a cloud admin was needed to source this file for running Ease of Use. This file is needed to be sourced in each new session, making this process cumbersome and repetitive.

In this release, sourcing of RC file is automated. This saves cloud administrator from added workload and hassle of setting another variable and also reduces the latency of output.

Chapter 2

Design

Topics:

- [Overview](#)
- [Ansible playbooks](#)
- [Terminal output \(Ansible\)](#)
- [Excel spreadsheet](#)
- [Networks worksheet](#)
- [Users worksheet](#)
- [Security Group Worksheet](#)
- [Restrictions](#)
- [Validation checks](#)

This chapter introduces playbooks, applications and validation checks used in conjunction with Ease of Use that enable the feature to function smoothly. This chapter also highlights some of the restrictions that must be considered for an error-free experience of the application.

Overview

Ansible has been used as an automation language to speed up the customization of above-mentioned tasks on DELL NFV 10.0.1.

Design comprises of Ansible playbooks and an excel spreadsheet. excel spreadsheet is used as an input for the playbooks. It is easy to add multiple projects, users and related information in the excel spreadsheet using the fill handle.

There are two Ansible playbooks for creation and deletion tasks. Each playbook can be executed by simply running a single creation or deletion command in the terminal, resulting in a one-line summary of the tasks performed by the playbooks.

Validation checks are provided for every field in the excel spreadsheet, but it is still the responsibility of the user to add correct values to the spreadsheet. Addition of an invalid value in the spreadsheet such as an invalid IP address can cause an error to occur in the playbook. To run the playbooks successfully, it is the responsibility of the user to correct the invalid value. Design aspects are discussed in detail below.

Ansible playbooks

Ansible scripts are called playbooks and each playbook contains one or more plays, that map hosts to a certain function. Ansible does this through tasks, which are basically module calls. Creation and deletion playbooks in our case would run on localhost i.e. director node.

Terminal output (Ansible)

When the Ansible playbooks are executed, task execution results are shown on the console in real time. Results of each task in Ansible playbooks are shown in different colors on the console. For example, results of failed tasks are shown in red, unchanged tasks in green, changed tasks in yellow and skipped tasks in cyan.

The user can also see stdout and stderr for each task if `-vvv` flag is passed to `ansible-playbook` on the command line.

For example, for creation command, `-vvv` flag is used in the command below:

```
$ ansible-playbook --vvv creation/main_create.yml --extra-vars \
  "path=<path to excel spreadsheet> rc_file=<path to RC file>" \
  |& python <Path to Ease-of-Use dir.> \
  /supporting_scripts/eou_summarization.py
```

-  **Note:** In this release, the command for running ansible playbook has been changed. The user has to provide the RC file in the `--extra-vars` as `rc_file=<path to RC file>`. If the file has not been provided, the playbooks will fail.
-  **Note:** User needs to provide a valid syntax for ansible playbooks. For example, `rc-file` instead of `rc_file` will cause the playbook to fail.

Excel spreadsheet

A sub-directory present in Ease of Use directory contains the sample excel input spreadsheet. User can add all the required information for virtual resource creation and deletion in this excel spreadsheet. This spreadsheet has three worksheets in it called Networks, Users, and Security Groups. Networks worksheet contains the information for each project, and its resources, Users worksheet contains the information for Users, and their attributes, and Security Groups worksheet contains the information about security groups of each project.

The provided sample excel spreadsheet in sample directory has a specific format. All the column heads are locked and are not to be edited. Cells under green column heads are editable, similarly, the cells under red column heads are not editable.

User can add up to five hundred projects and users in the excel spreadsheet.

 **Note:** Tenant Name cannot start with a dash in the spreadsheet, as excel uses it as a unary function converting -(true/false) into -1/0.

Networks worksheet

Networks worksheet contains information about all the projects and associated networks and virtual routers.

There are following columns present in the Networks worksheet:

- Tenant Name
- Network Name
- VLAN
- Network Address
- Netmask
- GW (Gateway)
- Subnet Name
- DHCP Range
- Router Name
- Router Interface
- External Network

Example figure below is an extract from the sample Network worksheet which contains all the columns mentioned above:

	A	B	C	D	E	F	G	H	I	J	K
1	Tenant Name	Network Name	VLAN	Network Address	Netmask	GW	Subnet Name	DHCP Range	Router Name	Router Interface	External Network
2	tenant2	tenant2-vmm-vnet	3020	10.22222.5.0	255.255.0.0	10.2.0.254	tenant2-vmm-vnet-subnet	10.2.5.30-200	tenant2-router	Yes	public
3		tenant2-left-vnet	3021	172.16.2.0	255.255.255.0	N/A	tenant2-left-vnet-subnet	172.16.2.199-200	tenant2-router	No	
4		tenant2-right-vnet	3022	172.17.2.0	255.255.255.0	N/A	tenant2-right-vnet-subnet	172.17.2.30-200	tenant2-router	No	
5	tenant3	tenant3-vmm-vnet	1003	10.3.5.0	255.255.0.0	10.3.0.254	tenant3-vmm-vnet-subnet	10.3.5.30-200	tenant3-router	Yes	public
6		tenant3-left-vnet	3031	172.16.3.0	255.255.255.0	N/A	tenant3-left-vnet-subnet	172.16.3.30-200	tenant3-router	No	
7		tenant3-right-vnet	3032	172.17.3.0	255.255.255.0	N/A	tenant3-right-vnet-subnet	172.17.3.30-200	tenant3-router	No	
8	tenant4	tenant4-vmm-vnet	1004	10.4.5.0	255.255.0.0	10.4.0.254	tenant4-vmm-vnet-subnet	10.4.5.30-200	tenant4-router	Yes	public
9		tenant4-left-vnet	3041	172.16.4.0	255.255.255.0	N/A	tenant4-left-vnet-subnet	172.16.4.30-200	tenant4-router	No	
10		tenant4-right-vnet	3042	172.17.4.0	255.255.255.0	N/A	tenant4-right-vnet-subnet	172.17.4.30-200	tenant4-router	No	

Figure 1: Network worksheet

Users worksheet

Users worksheet contains the information about all the users and their attributes.

There are following columns present in the Users worksheet:

- User Name
- Password
- Tenant Name
- User Role

Example figure below is an extract from the sample User worksheet which contains all the columns mentioned above:

	A	B	C	D
1	User Name	Password	Tenant Name	User Role
2	tenant2	1234	tenant2	_member_
3	tenant3	1235	tenant3	_member_
4	tenant4	1236	tenant4	_member_

Figure 2: User worksheet

Security Group Worksheet

Security Group worksheet contains information about all the security groups associated with an individual project along with their rules.

Following columns are present in the Security Group worksheet:

- Tenant Name
- Security Group
- Protocol
- Port/Port Ranges
- Remote Security Group

Example figure below is an extract from the sample Security Group worksheet which contains all the columns mentioned above:

	1	2	3	4	5
1	Tenant Name	Security_group	Protocol	Port/Port Ranges	Remote Security Group
2	tenant2	tenant2-SG1	icmp	55	N/A
3		tenant2-SG2	tcp, icmp	22, 0-255	tenant2-SG1
4		tenant2-SG3		112	N/A
5		tenant2-SG4	udp,tcp, tcp	1-200,228,343	N/A
6		tenant2-SG5	tcp	80	tenant2-SG6
7		tenant2-SG6	tcp	143	N/A
8		tenant2-SG7	udp	636	tenant2-SG3
9		tenant2-SG8	udp	389	N/A
10		tenant2-SG9	udp	161	tenant2-SG6

Figure 3: Security Group worksheet

Restrictions

There are certain restrictions put on certain columns to keep its format intact for the automation scripts. Below is the list of columns which are locked in Networks sheet.

- Network Name
- Subnet Name
- Router Name

There are two locked columns in the Users sheet:

- Tenant Name
- User Role

There are two locked columns in Security Group sheet:

- Tenant Name
- Security Group Name

The only allowed special characters for Tenant Name and User Name are a dash and underscore. All other special characters generate a warning message.

 **Note:** For user password, there are no such restrictions.

Validation checks

Validation checks are present for every editable column in the spreadsheet. The user is expected to enter valid values in Networks, User, and Security group sheet columns, otherwise, a warning message is displayed with suggestions. For example, an IP address with an invalid IP format causes a warning message.

If the user proceeds with invalid values, the error will print the invalid value and the cell address for the user.

Chapter

3

How to create or delete playbooks

Topics:

- [Overview](#)
- [Pre-Requisite](#)
- [Steps to execute creation/deletion playbooks](#)

This chapter provides step by step procedure of installing the libraries and playbooks required to execute the creation/deletion playbook. It further delineates the steps of executing the script that automatically creates/deletes OpenStack projects, users, routers etc.

Overview

Ease of Use feature supports addition of up to five hundred projects and users in the excel spreadsheet.

Select the last cell of the columns which are locked and are in red color, drag the fill handle down to fill the new cells.

For **Network Name** column user has to select last three cells and then drag the fill handle down to populate the new cells. For all the other columns in Networks and Users worksheet, user can type the required information in the new rows or use fill handle as well.

For **Tenant Name** column in Security Group sheet, user has to select Tenant Name column separately and then drag the fill handle down to populate the new cells. For all the other columns in Security group worksheet, user can use fill handle separately as well.

Pre-Requirement

Before running the Ansible playbooks, Ansible has to be installed on the Director Node.

- Use the following command to install pip:

```
$ easy_install pip
```

- Install Openpyxl (Python library for reading/writing excel files) using the following command:

```
$ pip install openpyxl
```

- Use the following command to install Ansible version 2.3.2 on OpenStack:

```
$ yum install ansible-2.3.2.0-2.el7
```

Steps to execute creation/deletion playbooks

Following steps are to be followed to run creation/deletion playbooks successfully.

1. Login into the Director node of the OpenStack.
2. Download the **ease-of-use** directory and place it wherever you desire on Director Node.
3. Once inside the **ease-of-use** directory, run the main_create playbook using the following command.

```
$ ansible-playbook creation/main_create.yml \
  --extra-vars "path=<path to excel spreadsheet> \
  rc_file=<path to RC file>"
```

Command creates the projects, users, security groups, networks, and routers provided in the excel spreadsheet.



Note: Path to the spreadsheet with its name and extension is required in the creation command. A sample excel spreadsheet is present in sample directory and can be referenced using the above command.

Logging is disabled by default in Ansible. To enable logging, uncomment the line `#log_path = /var/log/ansible.log` in `/etc/ansible/ansible.cfg` file.

4. User can delete a specific project along with its user, security group, router, and networks. Name of the project is to be specified as an argument for this purpose. Path to excel spreadsheet with the

spreadsheet name is also required. For example, to delete a project named 'tenant1-project', following command should be used:

```
$ ansible-playbook deletion/main_delete.yml \
  --extra-vars "project=tenant1-project path=<path to excel spreadsheet> \
  rc_file=<path to RC file>"
```

Project specified in the argument must exist in the excel spreadsheet. If the specified project is not present in the spreadsheet and was not created in the creation step, deletion will fail. An error will indicate that the specified project does not exist in the excel spreadsheet.

 **Note:** All the commands in section 4 and 4.1 are for the bash shell. To switch from a shell other than bash, command `/bin/shell` can be used.

Creation and deletion of resources can be verified from horizon dashboard. Projects and Users are listed under Identity tab. Similarly, Networks and Routers are listed under Admin tab. For Security groups, an admin needs to log into tenant's project with tenant's credentials and see under Access and Security.

Chapter 4

Edit Spreadsheet Workflow

Topics:

- [Adding new projects, Security Groups, and users](#)
- [Resource creation workflow](#)

In the sample excel spreadsheet provided, five hundred projects and users can be added. To add the projects, users, and security groups, a certain procedure is to be followed which is described in this chapter. Also, the Ansible tasks execution flow is described.

Adding new projects, Security Groups, and users



Caution: Ease of Use feature can support the creation of up to 500 projects. However, the `network_vlan_range` in `/etc/neutron/plugins/ml2/ml2_conf.ini` file on each controller node must be at least four times the number of projects being created. VLAN IDs from this range are used for the HA networks created along with the projects/routers.

If the `network_vlan_range` contains fewer VLAN IDs than the number of projects being created, increase the range on each controller node and restart the `neutron-server` service using the following command:

```
$ systemctl restart neutron-server.service
```

Resource creation workflow

In the creation workflow, projects are created first followed by the creation of users, networks, routers, and security groups. Every step depends on successful completion of the previous step. For example, if the first nine projects are created successfully and the tenth project fails during the creation process, users, networks, routers, and security groups for first nine successfully created projects will not be created. In this case, user has to provide valid values for the tenth project in order to create the remaining virtual resources associated with all projects.

Ansible prints out a one-line summary of all the tasks executed in the playbook. There are four categories in the summary, and a count is maintained for each category for the related tasks. For example in the figure below, `ok=95` represents the number of tasks which were successful in the execution of the playbook. From these 95 successful tasks, only 26 were changed. Because all other tasks had already been performed in previous playbook runs, there was no need to change these tasks once again.

A count is maintained for the tasks which failed because of an unreachable host error. In the example below, `unreachable=0`, because all the tasks were able to reach the localhost on which the Ease of Use playbooks are run.

```
PLAY RECAP *****
127.0.0.1           : ok=95   changed=26  unreachable=0  failed=0
```

Figure 4: Ansible summary (Success)

Similarly, there is another category keeping the count of the failed tasks. In the figure below we have one failed task in red.

```
PLAY RECAP *****
127.0.0.1           : ok=16   changed=2   unreachable=0  failed=1
```

Figure 5: Ansible summary (Failure)

Chapter 5

Summarization filter

Topics:

- [How to use summarization filter](#)

This chapter provides user with the steps needed to run creation/deletion script with the summarization filter. Instead of displaying Ansible output on the console, this filter allows for a short summary to be displayed, indicates the project, users, networks, subnets, routers and security groups that are created or deleted.

How to use summarization filter

To print out only the summary of successfully created resources on the console, run the following command to execute the creation playbook:

```
$ ansible-playbook creation/main_create.yml \
  --extra-vars "path=<path to excel spreadsheet> \
  rc_file=<path to RC file> " \
  |& python supporting_scripts/eou_summarization.py

$ ansible-playbook creation/main_create.yml \
  --extra-vars "path=<path to excel spreadsheet> \
  rc_file=<path to RC file>" \
  |& python supporting_scripts/eou_summarization.py
```

In this case, output of Ansible playbook will not be printed on the console. Instead, a summary of all the created or failed projects will be displayed. The summary appears on the screen only when all the tasks in Ansible playbook are complete.

Similarly, to print out only the summary of successfully deleted projects on the console, run the following two commands one after another:

```
$ ansible-playbook deletion/main_delete.yml \
  --extra-vars "project=tenant1-project path=<path to excel spreadsheet> \
  rc_file=<path to RC file>" \
  |& python supporting_scripts/eou_summarization.py
```

In this case, the output of the Ansible playbook will also not be printed on the console. Instead, a summary of all the deleted or failed projects will be printed. Summary will appear on the screen only when all the tasks in Ansible playbook get completed. Above command can be used if you do not want to see the Ansible output on the console.

The figure below represents the summary of a successfully executed creation playbook. There are two lists for every resource, one listing the successfully created resources and other the failed resources. All the resources were successfully created, hence, we have **None** in the failed lists. Summary lists successfully created and failed projects, users, networks, subnets, and routers.

```
Projects created successfully: tenant2, tenant3, tenant4
Projects create failed: None

Users created successfully: tenant2, tenant3, tenant4
Users create failed: None

Networks created successfully: tenant2-vmv-vnet, tenant2-left-vnet, tenant2-right-vnet, tenant3-vmv-vnet, tenant3-left-vnet, tenant3-right-vnet, tenant4-vmv-vnet, tenant4-left-vnet, tenant4-right-vnet
Networks create failed: None

Subnets created successfully: tenant2-vmv-vnet-subnet, tenant2-left-vnet-subnet, tenant2-right-vnet-subnet, tenant3-vmv-vnet-subnet, tenant3-left-vnet-subnet, tenant3-right-vnet-subnet, tenant4-vmv-vnet-subnet, tenant4-left-vnet-subnet, tenant4-right-vnet-subnet
Subnets create failed: None

Routers created successfully: tenant2-router, tenant3-router, tenant4-router
Routers create failed: None
```

Figure 6: Summarization filter output (Success)

Similarly, in case of creation or deletion errors, all the resources that failed to create or delete are listed in the failed list. The figure below shows the deletion of two networks `tenant3-right-vnet` and `tenant3-left-vnet` failed. These networks are listed in the **Networks delete failed** title.

```
Routers deleted successfully: tenant3-router
Routers delete failed: None

Networks deleted successfully: tenant3-vmm-vnet
Networks delete failed: tenant3-right-vnet, tenant3-left-vnet
Users deleted successfully: None

Users delete failed: None

Projects deleted successfully: None

Projects delete failed: None
```

Figure 7: Summarization filter output (Failure)

Appendix

A

References

Topics:

- [To Learn More](#)

Additional information can be obtained at <http://www.dell.com/en-us/work/learn/openstack-cloud> or by e-mailing openstack@dell.com.

If you need additional services or implementation help, please contact your Dell EMC sales representative.

To Learn More

For more information on the Dell EMC Ready Bundle for Red Hat OpenStack NFV Platform visit <http://www.dell.com/learn/us/en/04/solutions/red-hat-openstack>.

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