

ONAP Installation in Vanilla OpenStack

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Overview

Prerequisites for Openstack

- 140+ GB RAM by combining all computes and around 60+ CPU cores
- Keystone v2 authentication is must
- Capable of creating 100GB cinder volume in Openstack cloud

Installing ONAP in vanilla OpenStack from command line is very similar to installing ONAP in Rackspace (see [Tutorial: Configuring and Starting Up the Base ONAP Stack](#)). The Heat templates that install ONAP in Rackspace and vanilla OpenStack are similar too. The main difference is the way resource-intensive VMs are defined. Unlike OpenStack, Rackspace requires to explicitly create a local disk for memory- or CPU-intensive VMs.

Currently, there are three different Heat templates for ONAP installation in vanilla OpenStack:

- *onap_openstack.yaml / onap_openstack.env*: ONAP VMs created out of this template have one vNIC. The vNIC has a private IP towards the Private Management Network and a floating IP. The floating IPs addresses are assigned during ONAP installation by OpenStack, based on floating IP availability. This template can be used when users do not know the set of floating IPs assigned to them or do not have OpenStack admin rights.
- *onap_openstack_float.yaml / onap_openstack_float.env*: ONAP VMs created out of this template have one vNIC. The vNIC has a private IP towards the Private Management Network and a floating IP. The floating IP addresses are specified ahead of time in the environment file. This template can be used when users always want to assign the same floating IP to an ONAP VM in different ONAP installation. **NOTES: 1) Running this template requires OpenStack admin rights; 2) Fixed floating IP assignment via Heat template is not supported in OpenStack Kilo and older releases.**
- *onap_openstack_nofloat.yaml / onap_openstack_nofloat.env*: ONAP VMs created out of this template have two vNICs: one has a private IP towards the Private Management Network and the other one has a public IP address towards the external network. From a network resource perspective, this template is similar to the Heat template used to build ONAP in Rackspace.

ALL TEMPLATES ABOVE SUPPORT DCAE DATA COLLECTION AND ANALYTICS PLATFORM INSTALLATION. In *onap_openstack.yaml / onap_openstack.env* and *onap_openstack_float.yaml / onap_openstack_float.env* you are required to manually allocate five (5) Floating IP addresses to your OpenStack project. To allocate those addresses, from the OpenStack horizon dashboard, click on Compute -> Access & Security -> Floating IPs. Then click "Allocate IP To Project" five times. OpenStack will assign five IPs to your project. Then, please assign the allocated Floating IPs to the following VMs defined in the Heat environment file:

dcae_coll_float_ip

dcae_hdp1_float_ip

dcae_hdp2_float_ip

dcae_hdp3_float_ip

dcae_db_float_ip

At run time, the DCAE controller will fetch those IPs from the underlying OpenStack platform and assign them to the VMs defined above. The "dcae_base_environment" parameter is set to 1-NIC-FLOATING-IPS.

openstack

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Project

Compute

Overview

Instances

Volumes

Images

Access & Security

Network

Orchestration

Access & Security

Security Groups

Key Pairs

Floating IPs

API Access

Success: Allocated Floating IP 47.203

Allocate IP To Project

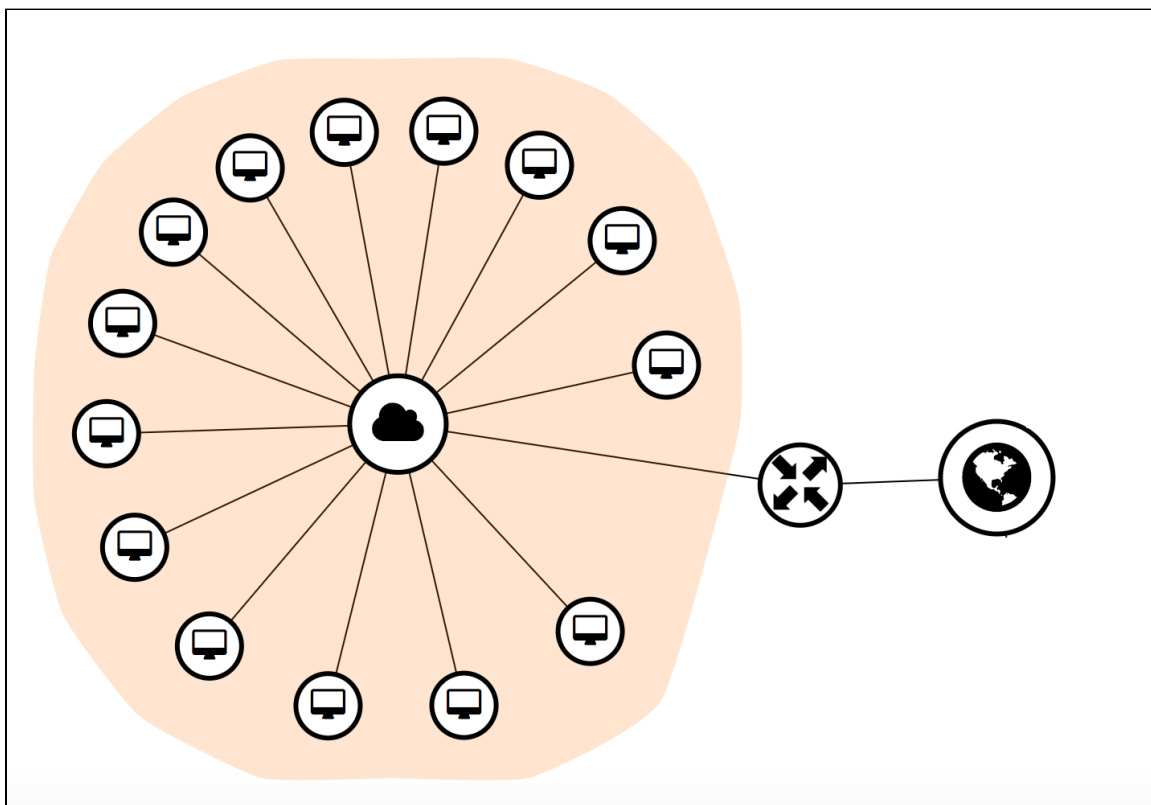
Release Floating IP

IP Address	Mapped Fixed IP Address	Pool	Status	Actions
<input type="checkbox"/> 0.247.203.	-	-	Down	Associate
<input type="checkbox"/> 0.247.203.	-	-	Down	Associate
<input type="checkbox"/> 0.247.203.	-	-	Down	Associate
<input type="checkbox"/> 0.247.203.	-	-	Down	Associate
<input type="checkbox"/> 0.247.203.	-	-	Down	Associate

For *onap_openstack_nofloat.yaml* / *onap_openstack_nofloat.env* no floating IP address allocation is required. OpenStack will assign public addresses to the DCAE VMs based on availability. In *onap_openstack_nofloat.env*, the "dcae_base_environment" parameter is set to 2-NIC.

Note that the DCAE controller handles only one set of IP addresses, either floating IPs or private IPs. As such, in the *onap_openstack.yaml* and *onap_openstack_float.yaml* templates, which use floating IPs, the private IP addresses assigned to the five additional VMs that DCAE creates off the Heat template will not be considered. OpenStack will assign them five private IPs in the Private Management Network based on availability. More details about DCAE setup available here: [DCAE Controller Development Guide](#).

The figure below shows the network setup created with *onap_openstack_float.yaml* / *onap_openstack_float.env*. As described above, ONAP VMs have a private IP address in the ONAP Private Management Network space and use floating IP addresses for remote access and connection to Gerrit and Nexus repositories. A router that connects the ONAP Private Management Network to the external network is also created.



Heat Template

In this section, we describe the structure of *onap_openstack_float.yaml*, which assigns fixed floating IPs to ONAP VMs. However, because the different Heat templates have a similar structure (except for the network setup), the same considerations apply also to *onap_openstack.yaml* and *onap_openstack_nofloat.yaml*.

The Heat template contains the parameters and resources (i.e. vCPUs, vNICs, RAM, local and external volumes, ...) necessary to build ONAP components. After ONAP VMs have been created, a post-instantiation bash script that installs software dependencies is ran in any VM. In release 1.0.0, this script was part of the Heat template. Since release 1.1.0, the bash script has been simplified: it only contains the operations necessary to pass configuration parameters to a VM, while the logic that downloads software dependencies and sets the execution environment up has been moved off to a new bash script that is downloaded from Nexus.

The rationale behind this change is that ONAP will need to support multiple platforms (currently it supports Rackspace and vanilla OpenStack), which may require different Heat templates, while a VM installation script will remain unchanged. This will avoid to change a script multiple times, once for each Heat template.

Find below an example of the simplified post-instantiation bash script for MSO, with the list of all the configuration parameters passed to the VM and available in /opt/config:

```
template: |
#!/bin/bash

# Create configuration files
mkdir -p /opt/config
echo "__nexus_repo__" > /opt/config/nexus_repo.txt
echo "__nexus_docker_repo__" > /opt/config/nexus_docker_repo.txt
echo "__nexus_username__" > /opt/config/nexus_username.txt
echo "__nexus_password__" > /opt/config/nexus_password.txt
echo "__artifacts_version__" > /opt/config/artifacts_version.txt
echo "__dns_ip_addr__" > /opt/config/dns_ip_addr.txt
echo "__dmaap_topic__" > /opt/config/dmaap_topic.txt
echo "__openstack_username__" > /opt/config/openstack_username.txt
echo "__openstack_tenant_id__" > /opt/config/tenant_id.txt
echo "__openstack_api_key__" > /opt/config/openstack_api_key.txt
echo "__keystone_url__" > /opt/config/keystone.txt
echo "__docker_version__" > /opt/config/docker_version.txt
echo "__gerrit_branch__" > /opt/config/gerrit_branch.txt
echo "__cloud_env__" > /opt/config/cloud_env.txt

# Download and run install script
curl -k __nexus_repo__/org.openecomp.demo/boot/__artifacts_version__/mso_install.sh -o /opt/mso_install.sh
cd /opt
chmod +x mso_install.sh
./mso_install.sh
```

The post-instantiation bash script downloads (from Nexus) and runs an install script, mso_install.sh in the example above, which installs software dependencies like Git, Java, NTP daemon, docker-engine, docker-compose, etc. Finally, the install script downloads (from Nexus) and runs an init script, e.g. mso_vm_init.sh, which downloads and runs docker images. The rationale of having two bash scripts is that the install script runs only once, after a VM is created, while the init script runs after every VM (re)boot to pickup the latest changes in Gerrit and download and run the latest docker image for a specific ONAP component.

Heat Environment File

In order to correctly install ONAP in vanilla OpenStack, it is necessary to set the following parameters in the Heat environment file, based on the specific OpenStack environment:

- public_net_id: PUT YOUR NETWORK ID/NAME HERE
- ubuntu_1404_image: PUT THE UBUNTU 14.04 IMAGE NAME HERE
- ubuntu_1604_image: PUT THE UBUNTU 16.04 IMAGE NAME HERE
- flavor_small: PUT THE SMALL FLAVOR NAME HERE
- flavor_medium: PUT THE MEDIUM FLAVOR NAME HERE
- flavor_large: PUT THE LARGE FLAVOR NAME HERE
- flavor_xlarge: PUT THE XLARGE FLAVOR NAME HERE
- pub_key: PUT YOUR PUBLIC KEY HERE
- openstack_tenant_id: PUT YOUR OPENSTACK PROJECT ID HERE
- openstack_username: PUT YOUR OPENSTACK USERNAME HERE
- openstack_api_key: PUT YOUR OPENSTACK PASSWORD HERE
- horizon_url: PUT THE HORIZON URL HERE
- keystone_url: PUT THE KEYSTONE URL HERE
- dns_list: PUT THE ADDRESS OF THE EXTERNAL DNS HERE (e.g. a comma-separated list of IP addresses in your /etc/resolv.conf in UNIX-based Operating Systems)
- external_dns: PUT THE FIRST ADDRESS OF THE EXTERNAL DNS LIST HERE
- aai1_float_ip: PUT A&AI INSTANCE 1 FLOATING IP HERE
- aai2_float_ip: PUT A&AI INSTANCE 2 FLOATING IP HERE

- appc_float_ip: PUT APP-C FLOATING IP HERE
- dcae_float_ip: PUT DCAE FLOATING IP HERE
- dcae_coll_float_ip: PUT DCAE COLLECTOR FLOATING IP HERE
- dcae_db_float_ip: PUT DCAE DATABASE FLOATING IP HERE
- dcae_hdp1_float_ip: PUT DCAE HADOOP VM1 FLOATING IP HERE
- dcae_hdp2_float_ip: PUT DCAE HADOOP VM2 FLOATING IP HERE
- dcae_hdp3_float_ip: PUT DCAE HADOOP VM3 FLOATING IP HERE
- dns_float_ip: PUT DNS FLOATING IP HERE
- mso_float_ip: PUT MSO FLOATING IP HERE
- mr_float_ip: PUT MESSAGE ROUTER FLOATING IP HERE
- policy_float_ip: PUT POLICY FLOATING IP HERE
- portal_float_ip: PUT PORTAL FLOATING IP HERE
- robot_float_ip: PUT ROBOT FLOATING IP HERE
- sdc_float_ip: PUT SDC FLOATING IP HERE
- sdnc_float_ip: PUT SDN-C FLOATING IP HERE
- vid_float_ip: PUT VID FLOATING IP HERE

Note:

A&AI now has two (2) instances. One has the docker containers that run the A&AI logic and one has databases and third-party software dependencies.

Getting ENV options

Image list

```
$ glance image-list | grep buntu
| c60d00b6-d03e-492b-9eed-e6580b438619 | Ubuntu_16.04_xenial |
```

Instance flavors

```
$ openstack flavor list | grep onap
| 123 | onap_small | 4192 | 0 | 0 | 1 | True |
| 124 | onap_medium | 8192 | 0 | 0 | 1 | True |
| 125 | onap_large | 8192 | 0 | 0 | 2 | True |
| 126 | onap_xlarge | 16192 | 0 | 0 | 2 | True |
```

List floating ips

```
$ openstack floating ip list
+-----+-----+-----+-----+-----+-----+
| ID | Floating IP Address | Fixed IP Address | Port | Floating Network | Project |
+-----+-----+-----+-----+-----+-----+
| 03ffffff0-07f5-4172-a71d-fb1394e1f7b4 | 44.253.254.255 | None | None | ffffff-59f0-415c-880d-d05ec86ff8f0 | fffffc6575bda4525b49433a38e697e22 |
etc...
```

Public network

```
$ openstack network list | grep public
| b4f41afd-1f08-47f8-851b-ca536bffff | public | d4902035-2d4c-40cc-8a05-e916401ffff |
```

Note:

Be careful not to use private address space 172.18.0.0/16 for the setup of vanilla openstack and/or the provider network and the floating addresses therein.

Some containers create a route in the hosting VM from 172.18.0.0/16 to a br-<some-hex-string> bridge which means these containers cannot connect to any other VM and/or container in the 172.18.0.0/16 space. DCAE might be the most prominent victim for that. See also [Undocumented network 172.18.0.0/16 in some ONAP VMs - can it be re-configured](https://wiki.onap.org/questions/16%20in%20some%20ONAP%20VMs%20-%20can%20it%20be%20re-configured) in <https://wiki.onap.org/questions>

Note:

Neutron may require that the dns_nameservers property of a OS::Neutron::Subnet resource be explicitly set, in order to allow VMs in the subnet to access the external network. dns_nameservers is a list of DNS IP addresses. However, some OpenStack installations do not support lists is the "user_data" section of a Heat template, which is used to build configuration files that are used during ONAP installation. As such, we define two different parameters: 1) dns_list is a list of DNS IP addresses that is provided to Neutron; 2) external_dns is a string that contains one of the DNS IP addresses in the list and can be used in the "user_data" section. In many cases, when only one DNS address is provided, these two parameters will be set to the same value.

All the other parameters in the environment file are set and can be left untouched.

Note that the IP addresses in the ONAP Private Management Network are also set, but they can be changed at will, still making sure that they are consistent with the private network CIDR.

- oam_network_cidr: 10.0.0.0/8

- aai1_ip_addr: 10.0.1.1
- aai2_ip_addr: 10.0.1.2
- appc_ip_addr: 10.0.2.1
- dcae_ip_addr: 10.0.4.1
- dns_ip_addr: 10.0.100.1
- mso_ip_addr: 10.0.5.1
- mr_ip_addr: 10.0.11.1
- policy_ip_addr: 10.0.6.1
- portal_ip_addr: 10.0.9.1
- robot_ip_addr: 10.0.10.1
- sdc_ip_addr: 10.0.3.1
- sdnc_ip_addr: 10.0.7.1
- vid_ip_addr: 10.0.8.1

Finally, the Heat environment file contains some DCAE-specific parameters. Some of them are worth mentioning:

- dcae_base_environment: 1-NIC-FLOATING-IPS
- dcae_zone, dcae_state: The location in which DCAE is deployed
- openstack_region: The OpenStack Region in which DCAE is deployed (**also used by MSO**)

dcae_base_environment specifies the DCAE networking configuration and shouldn't be modified (see above for a description of the DCAE network configuration, i.e. 1-NIC-FLOATING-IPS vs. 2-NIC). openstack_region must reflect the OpenStack OS_REGION_NAME environment variable (please refer to [Tutorial: Configuring and Starting Up the Base ONAP Stack](#) for cloud environment variables), while dcae_zone and dcae_state can contain any meaningful location information that helps the user distinguish between different DCAE deployments. For example, if an instance of DCAE is deployed in a data center in New York City, the two parameters can assume the following values:

- dcae_zone: nyc01
- dcae_state: ny

How to use both v2 and v3 Openstack Keystone API

As some ONAP components still currently use v2 Keystone API you should have both, v2 and v3 configured in your environment. That means to have endpoints url without any version at the end.

If you have already installed keystone identity component and created endpoints, you can modify them directly in Maria DB. To do this, run the following commands in red (id should refer to the 3 endpoints, internal, public and admin you have created):

```
root@onap-openstack-ctrl:/# mysql
Welcome to the MariaDB monitor. Commands end with; or \g.
Your MariaDB connection id is 41028
Server version: 10.0.29-MariaDB-0ubuntu0.16.04.1 Ubuntu 16.04
Copyright (c) 2000, 2016, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
MariaDB [(none)]> use keystone;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A
```

```
Database changed
MariaDB [keystone]> select * from endpoint;
```

id	legacy_endpoint_id	interface	service_id	url	extra	enabled	region_id
110b04f9f9e1a40d29b2477500026960a	NULL	internal	e0786cdf4944eac8b0d886f427f6e2e	http://controller:8774/v2.1		1	RegionOne
11a39f1c2384081b770764e03004945	NULL	admin	c1861cbcdc934a41ab4f6e4303a8896	http://controller:8000/v1		1	RegionOne
24b2a62f8e3c41518745b78909f590b	NULL	admin	250309ee30d04da0a479568d0f7c3a5	http://controller:9696		1	RegionOne
23bf4e40206e4750c23f9f18415395	NULL	public	f4008432093490a4fc9a33a276e6d	http://controller:8776		1	RegionOne
27072eb0db0b45b0b0c3c0501b5e2e	NULL	public	2444398e6094f45aeba5c0a6001850d	http://controller:8776/v2/(tenant_id)s		1	RegionOne
27672d5a9c4fe98e8dc0cf22e6afcc	NULL	admin	db8c750071a54905a97b01d5b6d883a4	http://controller:35357/v3		1	RegionOne
300b726c49a4e111ec77fa56c0d8a7	NULL	internal	1c38008947e2af4150b7f931207b79	http://controller:8776/v1/(tenant_id)s		1	RegionOne
315b0d052a04f5d5f6ec8e6ff73a57	NULL	internal	250309ee30d04da0a479568d0f7c3a5	http://controller:9696		1	RegionOne
5138a070ef1c59c38a4e9a3c0f98760	NULL	public	250309ee30d04da0a479568d0f7c3a5	http://controller:9696		1	RegionOne
5644986c62b45988808981dc4c0918	NULL	admin	c1d15717f4514ba6952ce483484e290a	http://controller:8804/v1/(tenant_id)s		1	RegionOne
647710087747466b0b4a69730dc4ca5	NULL	internal	30c7d70f4a46ca83fc4ba26ec431a	http://controller:9320		1	RegionOne
662961e85a064ded8f18d6e97ad0f386	NULL	public	c1861cbcdc934a41ab4f6e4303a8896	http://controller:8000/v1		1	RegionOne
7956a0ab30c3270821910f4426da0cb	NULL	internal	f4008432093490a4fc9a33a276e6d	http://controller:8776		1	RegionOne
834c3a4c8104062ba166520c1fe34ec	NULL	admin	db8c750071a54905a97b01d5b6d883a4	http://controller:35357/v3		1	RegionOne
86e7449ff5f1779273c0b9439021a	NULL	public	db8c750071a54905a97b01d5b6d883a4	http://controller:35000/v3		1	RegionOne
8051a14035f7f1518b6d6f795c060a01	NULL	admin	30c7d70f4a46ca83fc4ba26ec431a	http://controller:9320		1	RegionOne
87af1a573a6a64cf180762776a286	NULL	internal	db8c750071a54905a97b01d5b6d883a4	http://controller:35000/v3		1	RegionOne
9c1a489f0774b30c75c9f7f6a0a003	NULL	internal	2444398e6094f45aeba5c0a6001850d	http://controller:8776/v2/(tenant_id)s		1	RegionOne
9e77e9da05420d8a4af88f534dc813	NULL	admin	e0786cdf4944eac8b0d886f427f6e2e	http://controller:8774/v2.1		1	RegionOne
a10673d1d5234d50cf6566c3c041a2b	NULL	admin	f4008432093490a4fc9a33a276e6d	http://controller:8776		1	RegionOne
a78982596a11436d9d9d0e8e320a2e1	NULL	internal	c1861cbcdc934a41ab4f6e4303a8896	http://controller:8000/v1		1	RegionOne
b0300a0d7e0940e711136f7e8db4fc0	NULL	admin	1c38008947e2af4150b7f931207b79	http://controller:8776/v1/(tenant_id)s		1	RegionOne
b0fc0fc84be4609b07b1b470be7495d	NULL	public	db8c750071a54905a97b01d5b6d883a4	http://controller:35000/v3		1	RegionOne
c0a870a7363474961208838c1a8e64	NULL	internal	db8c750071a54905a97b01d5b6d883a4	http://controller:35000/v3		1	RegionOne
c14bf7b8b03440b1f7853c67c26077	NULL	internal	c1d15717f4514ba6952ce483484e290a	http://controller:8804/v1/(tenant_id)s		1	RegionOne
d548099224284e2ab05046c7c76d018	NULL	admin	2444398e6094f45aeba5c0a6001850d	http://controller:8776/v2/(tenant_id)s		1	RegionOne
d5c1f57a744468a4e6a4a77f1f986c	NULL	public	30c7d70f4a46ca83fc4ba26ec431a	http://controller:9320		1	RegionOne
e1e07ab7746721a9b4dc5e1e43cf	NULL	public	c1d15717f4514ba6952ce483484e290a	http://controller:8804/v1/(tenant_id)s		1	RegionOne
f0641a234a54187f108473f435a0b9	NULL	public	1c38008947e2af4150b7f931207b79	http://controller:8776/v1/(tenant_id)s		1	RegionOne
f733c293a5240d7b69e10ef0e31c18	NULL	internal	c1861cbcdc934a41ab4f6e4303a8896	http://controller:8000/v1		1	RegionOne
fe093121002d4f1c3b3e76aa397ce94	NULL	public	e0786cdf4944eac8b0d886f427f6e2e	http://controller:8774/v2.1		1	RegionOne

```
MariaDB [keystone]> update endpoint set url='http://controller:35357' where id='27f67f2d5a9c48fe898cd0cdf32e6afc';
Query OK, 1 row affected (0.00 sec)
Rows matched: 1 Changed: 1 Warnings: 0
```

```
MariaDB [keystone]> update endpoint set url='http://controller:35357' where id='834c3a94c8104062ba166520c1fe34ec';
Query OK, 1 row affected (0.00 sec)
Rows matched: 1 Changed: 1 Warnings: 0
```

```
MariaDB [keystone]> update endpoint set url='http://controller:5000' where id='8be7f449ff5d5437792792cadb439021a';
Query OK, 1 row affected (0.00 sec)
Rows matched: 1 Changed: 1 Warnings: 0
```

```
MariaDB [keystone]> quit
Bye
```