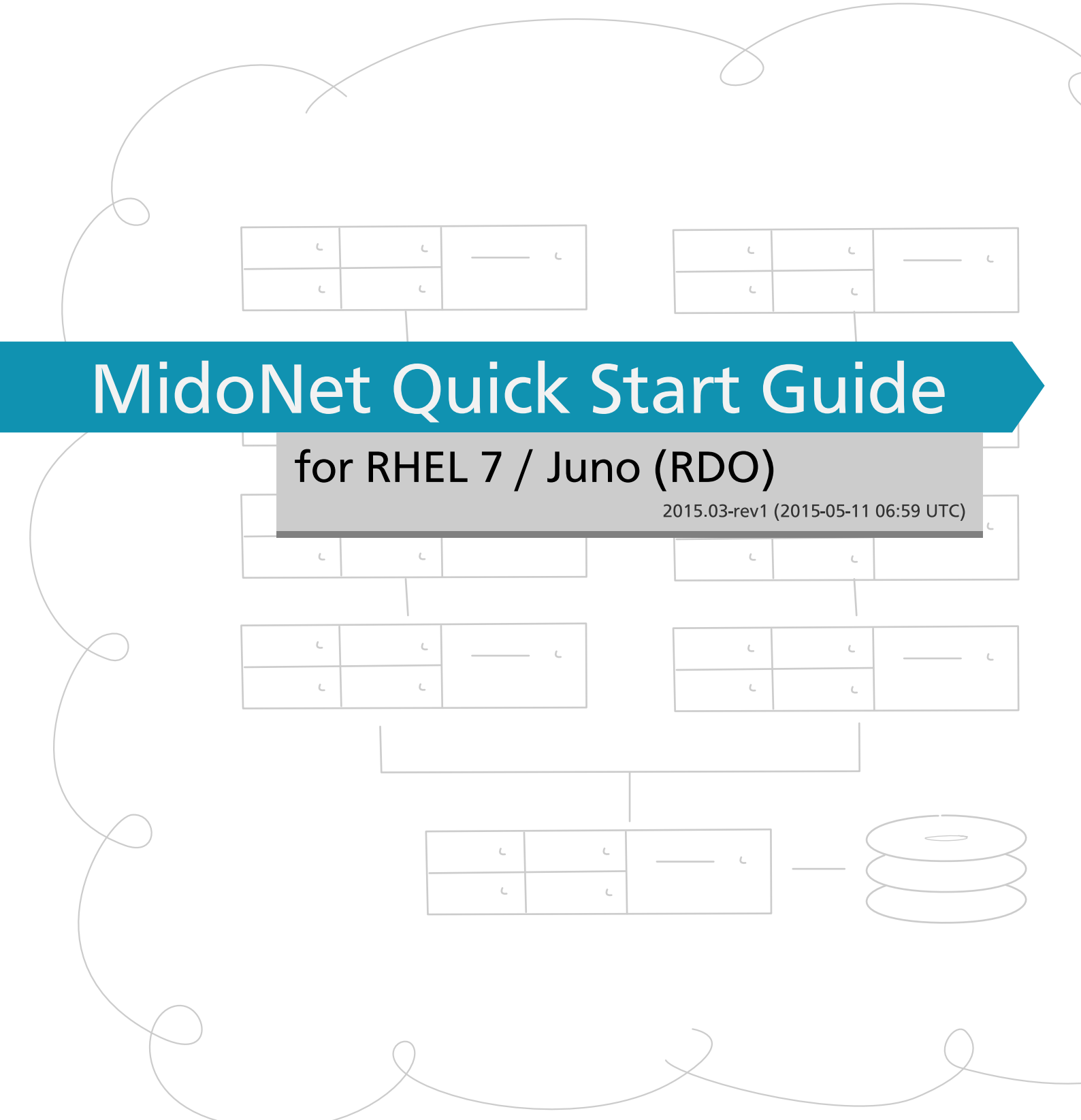

MidoNet Quick Start Guide

for RHEL 7 / Juno (RDO)

2015.03-rev1 (2015-05-11 06:59 UTC)

midonet

docs.midonet.org

MidoNet Quick Start Guide for RHEL 7 / Juno (RDO)

2015.03-rev1 (2015-05-11 06:59 UTC)

MidoNet is a network virtualization software for Infrastructure-as-a-Service (IaaS) clouds.

It decouples your IaaS cloud from your network hardware, creating an intelligent software abstraction layer between your end hosts and your physical network.

This guide walks through the minimum installation and configuration steps neccessary to use MidoNet with OpenStack.

Note

Please consult the MidoNet Mailing Lists or Chat if you need assistance.

Table of Contents

Preface

Conventions

The MidoNet documentation uses several typesetting conventions.

Notices

Notices take these forms:

Note

A handy tip or reminder.

Important

Something you must be aware of before proceeding.

Warning

Critical information about the risk of data loss or security issues.

Command prompts

$ prompt

Any user, including the root user, can run commands that are prefixed with the $ prompt.

 # prompt

The root user must run commands that are prefixed with the # prompt. You can also prefix these commands with the **sudo** command, if available, to run them.

1. Architecture

Table of Contents

Important

This guide assumes the following system architecture, based on Figure 2.1. Minimal architecture example with OpenStack Networking (neutron)—Network layout of the OpenStack Documentation. This architecture consists of three hosts:

- Controller Node (**controller**)
- Gateway Node (**network**)
- Compute Node (**compute1**)

The *MidoNet Network State Database (NSDB)* uses ZooKeeper and Cassandra to store network topology and state information. The NSDB components can be installed on separate hosts, but this guide assumes them to be installed on all three nodes (**controller**, **network**, **compute1**).

The *MidoNet Agent (Midolman)* has to be installed on all nodes where traffic enters or leaves the virtual topology, in this guide this are the **network** and **compute1** nodes.

The *Midonet API* can be installed on a separate host, but this guide assumes it to be installed on the **controller** node.

The *Midonet Command Line Interface (CLI)* can be installed on a separate host, but this guide assumes it to be installed on the **controller** node.

The *Midonet Neutron Plugin* replaces the ML2 Plugin and has to be installed on all three nodes (**controller**, **network**, **compute1**).

Hosts and Services

Controller Node (controller)

- General
  - Database (MariaDB)
  - Message Broker (RabbitMQ)
- OpenStack
  - Identity Service (Keystone)
  - Image Service (Glance)
  - Compute (Nova)

- Networking (Neutron)
- Dashboard (Horizon)

- MidoNet
  - API
  - CLI
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

Gateway Node (network)

- OpenStack
  - Networking (Neutron)
    - DHCP Agent
    - Metadata Agent
- MidoNet
  - Agent (Midolman)
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

Compute Node (compute1)

- OpenStack
  - Compute (Nova)
  - Networking (Neutron)
- MidoNet
  - Agent (Midolman)
  - Neutron Plugin
  - Network State Database (NSDB)
    - Network Topology (ZooKeeper)
    - Network State Information (Cassandra)

2. Basic Environment Configuration

Table of Contents

Networking Configuration

Important

All hostnames must be resolvable, either via DNS or locally.

SELinux Configuration

Important

This guide assumes that SELinux (if installed) is either in `permissive` state or `disabled`.

To change the mode, execute the following command:

```
# setenforce Permissive
```

To permanently change the SELinux configuration, edit the `/etc/selinux/config` file accordingly:

```
SELINUX=permissive
```

Repository Configuration

Configure necessary software repositories and update installed packages.

1. **Enable Red Hat base repository**

```
# subscription-manager repos --enable=rhel-7-server-rpms
```

2. **Enable additional Red Hat repositories**

```
# subscription-manager repos --enable=rhel-7-server-extras-rpms
# subscription-manager repos --enable=rhel-7-server-optional-rpms
```

3. **Enable repository priorization**

```
# yum install yum-plugin-priorities
```

4. **Enable EPEL repository**

```
# yum install http://dl.fedoraproject.org/pub/epel/7/x86_64/e/epel-
release-7-5.noarch.rpm
```

5. **Enable RDO repository**

```
# yum install http://rdo.fedorapeople.org/openstack-juno/rdo-release-
juno.rpm
```

6. **Enable DataStax repository**

   Create the `/etc/yum.repos.d/datastax.repo` file and edit it to contain the following:

```
# DataStax (Apache Cassandra)
[datastax]
name = DataStax Repo for Apache Cassandra
baseurl = http://rpm.datastax.com/community
enabled = 1
gpgcheck = 0
gpgkey = https://rpm.datastax.com/rpm/repo_key
```

7. **Enable MidoNet repositories**

   Create the `/etc/yum.repos.d/midonet.repo` file and edit it to contain the following:

```
[midonet]
name=MidoNet
baseurl=http://repo.midonet.org/midonet/v2015.03/RHEL/7/stable/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura

[midonet-openstack-integration]
name=MidoNet OpenStack Integration
baseurl=http://repo.midonet.org/openstack-juno/RHEL/7/stable/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura

[midonet-misc]
name=MidoNet 3rd Party Tools and Libraries
baseurl=http://repo.midonet.org/misc/RHEL/7/misc/
enabled=1
gpgcheck=1
gpgkey=http://repo.midonet.org/RPM-GPG-KEY-midokura
```

8. **Install available updates**

```
# yum clean all
# yum upgrade
```

9. **If necessary, reboot the system**

```
# reboot
```

3. OpenStack Installation

Table of Contents

Important

Follow the OpenStack Juno Installation Guide for Red Hat Enterprise Linux 7, but **note the following differences**.

Identity Service (Keystone)

Important

Follow the OpenStack documentation's Chapter 3. Add the Identity service instructions, but **note the following additions**.

1. **Create MidoNet API Service**

   As Keystone admin, execute the following command:

```
$ keystone service-create --name midonet --type midonet --description
 "MidoNet API Service"
```

2. **Create MidoNet Administrative User**

   As Keystone admin, execute the following commands:

```
$ keystone user-create --name midonet --pass MIDONET_PASS --tenant
 service
$ keystone user-role-add --user midonet --role admin --tenant service
```

Compute Services (Nova)

Important

Follow the OpenStack documentation's Chapter 5. Add the Compute service instructions, but **note the following differences**.

Controller Node

Note

Follow the OpenStack documentation's Install and configure controller node instructions as is.

Compute Node

Important

Follow the OpenStack documentation's Install and configure a compute node instructions, but **note the following additions**.

1. **Configure libvirt**

   Edit the `/etc/libvirt/qemu.conf` file to contain the following:

```
user = "root"
group = "root"

cgroup_device_acl = [
    "/dev/null", "/dev/full", "/dev/zero",
    "/dev/random", "/dev/urandom",
    "/dev/ptmx", "/dev/kvm", "/dev/kqemu",
    "/dev/rtc","/dev/hpet", "/dev/vfio/vfio",
    "/dev/net/tun"
]
```

2. **Restart the libvirt service**

```
# systemctl restart libvirtd.service
```

3. **Install nova-rootwrap network filters**

```
# yum install openstack-nova-network
# systemctl disable openstack-nova-network.service
```

4. **Restart the Compute service**

```
# systemctl restart openstack-nova-compute.service
```

Networking Service (Neutron)

Important

Follow the OpenStack documentation's Chapter 6. OpenStack Networking (neutron) instructions, but **note the following differences**.

Controller Node

Important

Follow the OpenStack documentation's Install and configure controller node instructions, but **note the following differences**.

1. **To configure prerequisites**

   Apply as is.

2. **To install the Networking components**

   Do **not** apply.

   Instead, install the following packages:

```
# yum install openstack-neutron python-neutron-plugin-midonet
```

3. **To configure the Networking server component**

   Do **not** apply step 'd. Enable the Modular Layer 2 (ML2) plug-in, router service, and overlapping IP addresses'.

   Instead, edit the `/etc/neutron/neutron.conf` file and add the following key to the `[DEFAULT]` section:

```
[DEFAULT]
...
core_plugin = midonet.neutron.plugin.MidonetPluginV2
```

4. **To configure the Modular Layer 2 (ML2) plug-in**

   Do **not** apply.

   Instead, perform the following steps.

   a. Create the directory for the MidoNet plugin:

```
# mkdir /etc/neutron/plugins/midonet
```

   b. Create the `/etc/neutron/plugins/midonet/midonet.ini` file and edit it to contain the following:

```
[DATABASE]
sql_connection = mysql://neutron:NEUTRON_DBPASS@controller/neutron

[MIDONET]
# MidoNet API URL
midonet_uri = http://controller:8080/midonet-api
# MidoNet administrative user in Keystone
username = midonet
password = MIDONET_PASS
# MidoNet administrative user's tenant
project_id = service
```

   c. Create a symbolic link to direct Neutron to the MidoNet configuration:

```
# ln -s /etc/neutron/plugins/midonet/midonet.ini /etc/neutron/plugin.
ini
```

5. **To configure Compute to use Networking**

   Apply as is.

6. **To finalize installation**

   Do **not** apply.

   Instead, perform the following steps.

   a. Populate the database:

```
# su -s /bin/sh -c "neutron-db-manage --config-file /etc/neutron/
neutron.conf --config-file /etc/neutron/plugins/midonet/midonet.ini
 upgrade juno" neutron
```

   b. Restart the Compute services:

```
# systemctl restart openstack-nova-api.service openstack-nova-
scheduler.service openstack-nova-conductor.service
```

c. Start the Networking service and configure it to start when the system boots:

```
# systemctl enable neutron-server.service
# systemctl start neutron-server.service
```

Gateway Node

Important

Follow the OpenStack documentation's Install and configure network node instructions, but **note the following differences**.

1. **To configure prerequisites**

   Apply as is.

2. **To install the Networking components**

   Do **not** apply.

   Instead, install the following package:

   ```
   # yum install openstack-neutron python-neutron-plugin-midonet
   ```

3. **To configure the Networking common components**

   Do **not** apply step 'd. Enable the Modular Layer 2 (ML2) plug-in, router service, and overlapping IP addresses'.

   Instead, edit the `/etc/neutron/neutron.conf` file and add the following key to the `[DEFAULT]` section:

   ```
   [DEFAULT]
   ...
   core_plugin = midonet.neutron.plugin.MidonetPluginV2
   ```

4. **To configure the Modular Layer 2 (ML2) plug-in**

   Do **not** apply.

5. **To configure the Layer-3 (L3) agent**

   Do **not** apply.

6. **To configure the DHCP agent**

   Do **not** apply.

   Instead, edit the `/etc/neutron/dhcp_agent.ini` file to contain the following:

   ```
   [DEFAULT]
   interface_driver = neutron.agent.linux.interface.MidonetInterfaceDriver
   dhcp_driver = midonet.neutron.agent.midonet_driver.DhcpNoOpDriver
   use_namespaces = True
   enable_isolated_metadata = True

   [MIDONET]
   ```

```
# MidoNet API URL
midonet_uri = http://controller:8080/midonet-api
# MidoNet administrative user in Keystone
username = midonet
password = MIDONET_PASS
# MidoNet administrative user's tenant
project_id = service
```

7. **To configure the metadata agent**

   Apply as is.

8. **To configure the Open vSwitch (OVS) service**

   Do **not** apply.

9. **To finalize the installation**

   Do **not** apply.

   Instead, enable and start the following services:

```
# systemctl enable neutron-dhcp-agent.service neutron-metadata-agent.
service neutron-ovs-cleanup.service
# systemctl start neutron-dhcp-agent.service neutron-metadata-agent.
service
```

Compute Node

Important

Follow the OpenStack documentation's Install and configure compute node instructions, but **note the following differences**.

1. **To configure prerequisites**

   Apply as is.

2. **To install the Networking components**

   Do **not** apply.

   Instead, install the following package:

```
# yum install openstack-neutron
```

3. **To configure the Networking common components**

   Do **not** apply step 'd. Enable the Modular Layer 2 (ML2) plug-in, router service, and overlapping IP addresses'.

4. **To configure the Modular Layer 2 (ML2) plug-in**

   Do **not** apply.

5. **To configure the Open vSwitch (OVS) service**

   Do **not** apply.

6. **To configure Compute to use Networking**

Apply as is.

7. **To finalize the installation**

   Do **not** apply.

   Instead, restart the following service:

   ```
   # systemctl restart openstack-nova-compute.service
   ```

4. MidoNet Installation

Table of Contents

NSDB Nodes

ZooKeeper Installation

1. **Install ZooKeeper packages**

```
# yum install zookeeper zkdump nmap-ncat
```

2. **Configure ZooKeeper**

   a. **Common Configuration**

   Edit the `/etc/zookeeper/zoo.cfg` file to contain the following:

```
server.1=controller:2888:3888
server.2=network:2888:3888
server.3=compute1:2888:3888
```

   Create data directory:

```
# mkdir /var/lib/zookeeper/data
# chown zookeeper:zookeeper /var/lib/zookeeper/data
```

   b. **Node-specific Configuration**

      i. **Controller Node**

      Create the `/var/lib/zookeeper/myid` file and edit it to contain the host's ID:

```
# echo 1 > /var/lib/zookeeper/data/myid
```

      ii. **Gateway Node**

      Create the `/var/lib/zookeeper/myid` file and edit it to contain the host's ID:

```
# echo 2 > /var/lib/zookeeper/data/myid
```

      iii. **Compute Node**

      Create the `/var/lib/zookeeper/myid` file and edit it to contain the host's ID:

```
# echo 3 > /var/lib/zookeeper/data/myid
```

3. **Create Java Symlink**

```
# mkdir -p /usr/java/default/bin/
# ln -s /usr/lib/jvm/jre-1.7.0-openjdk/bin/java /usr/java/default/bin/
java
```

4. **Enable and start ZooKeeper**

```
# systemctl enable zookeeper.service
# systemctl start zookeeper.service
```

5. **Verify ZooKeeper Operation**

   After installation of all nodes has been completed, verify that ZooKeeper is operating properly.

   A basic check can be done by executing the `ruok` (Are you ok?) command on all nodes. This will reply with `imok` (I am ok.) if the server is running in a non-error state:

```
$ echo ruok | nc 127.0.0.1 2181
imok
```

   More detailed information can be requested with the `stat` command, which lists statistics about performance and connected clients:

```
$ echo stat | nc 127.0.0.1 2181
Zookeeper version: 3.4.5--1, built on 06/10/2013 17:26 GMT
Clients:
 /127.0.0.1:34768[0](queued=0,recved=1,sent=0)
 /192.0.2.1:49703[1](queued=0,recved=1053,sent=1053)

Latency min/avg/max: 0/4/255
Received: 1055
Sent: 1054
Connections: 2
Outstanding: 0
Zxid: 0x260000013d
Mode: follower
Node count: 3647
```

Cassandra Installation

1. **Install Cassandra packages**

```
# yum install dsc20-2.0.10-1
# echo "exclude=dsc20 cassandra20" >> /etc/yum.conf
```

2. **Configure Cassandra**

   a. **Common Configuration**

   Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# The name of the cluster.
cluster_name: 'midonet'

...

# Addresses of hosts that are deemed contact points.
seed_provider:
    - class_name: org.apache.cassandra.locator.SimpleSeedProvider
      parameters:
```

```
          - seeds: "controller,network,compute1"
```

b. **Node-specific Configuration**

i. **Controller Node**

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: controller

...

# The address to bind the Thrift RPC service.
rpc_address: controller
```

ii. **Gateway Node**

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: network

...

# The address to bind the Thrift RPC service.
rpc_address: network
```

iii. **Compute Node**

Edit the `/etc/cassandra/conf/cassandra.yaml` file to contain the following:

```
# Address to bind to and tell other Cassandra nodes to connect to.
listen_address: compute1

...

# The address to bind the Thrift RPC service.
rpc_address: compute1
```

3. **Enable and start Cassandra**

```
# systemctl enable cassandra.service
# systemctl start cassandra.service
```

4. **Verify Cassandra Operation**

After installation of all nodes has been completed, verify that Cassandra is operating properly.

A basic check can be done by executing the `nodetool status` command. This will reply with `UN` (Up / Normal) in the first column if the servers are running in a non-error state:

```
$ nodetool -host 127.0.0.1 status
[...]
Status=Up/Down
|/ State=Normal/Leaving/Joining/Moving
--  Address    Load       Tokens  Owns   Host ID
       Rack
```

```
UN  192.0.2.1  123.45 KB  256     33.3%
 11111111-2222-3333-4444-555555555555  rack1
UN  192.0.2.2  234.56 KB  256     33.3%
 22222222-3333-4444-5555-666666666666  rack1
UN  192.0.2.3  345.67 KB  256     33.4%
 33333333-4444-5555-6666-777777777777  rack1
```

Controller Node

MidoNet API Installation

1. **Install MidoNet API package**

```
# yum install midonet-api
```

2. **Configure MidoNet API**

   Edit the `/usr/share/midonet-api/WEB-INF/web.xml` file to contain the following:

```
<context-param>
    <param-name>rest_api-base_uri</param-name>
    <param-value>http://controller:8080/midonet-api</param-value>
</context-param>
```

```
<context-param>
    <param-name>keystone-service_host</param-name>
    <param-value>controller</param-value>
</context-param>
```

```
<context-param>
    <param-name>keystone-admin_token</param-name>
    <param-value>ADMIN_TOKEN</param-value>
</context-param>
```

```
<context-param>
    <param-name>zookeeper-zookeeper_hosts</param-name>
    <param-value>controller:2181,network:2181,compute1:2181</param-
value>
</context-param>
```

```
<context-param>
    <param-name>midobrain-properties_file</param-name>
    <param-value>/var/lib/tomcat/webapps/host_uuid.properties</param-
value>
</context-param>
```

3. **Install Tomcat package**

```
# yum install tomcat
```

4. **Configure Tomcat's Maximum HTTP Header Size**

   Edit the `/etc/tomcat7/server.xml` file and adjust the maximum header size for the HTTP connector:

```
<Connector port="8080" protocol="HTTP/1.1"
           connectionTimeout="20000"
           URIEncoding="UTF-8"
           redirectPort="8443"
           maxHttpHeaderSize="65536" />
```

5. **Configure MidoNet API context**

Create the `/etc/tomcat/Catalina/localhost/midonet-api.xml` file and edit it to contain the following:

```
<Context
    path="/midonet-api"
    docBase="/usr/share/midonet-api"
    antiResourceLocking="false"
    privileged="true"
/>
```

6. **Start Tomcat**

```
# systemctl enable tomcat.service
# systemctl start tomcat.service
```

MidoNet CLI Installation

1. **Install MidoNet CLI package**

```
# yum install python-midonetclient
```

2. **Configure MidoNet CLI**

Create the `~/.midonetrc` file and edit it to contain the following:

```
[cli]
api_url = http://controller:8080/midonet-api
username = admin
password = ADMIN_PASS
project_id = admin
```

Midolman Installation

The Midolman agent shall be installed on all network and compute nodes.

1. **Install Midolman package**

```
# yum install midolman
```

2. **Set up mn-conf**

Edit /etc/midolman/midolman.conf to point mn-conf to the ZooKeeper cluster:

```
[zookeeper]
zookeeper_hosts = controller:2181,network:2181,compute1:2181
```

3. **Configure access to the NSDB for all agents**

This step needs to happen only once, it will set up access to the NSDB for all MidoNet nodes. Run the following command to set the cloud-wide values for the ZooKeeper and Cassandra server addresses:

```
$ echo << EOF | mn-conf set -t default
zookeeper {
    zookeeper_hosts = $CONTROLLER:2181,$NETWORK:2181,$COMPUTE1:2181
}

cassandra {
    servers = $CONTROLLER,$NETWORK,$COMPUTE1
}
EOF
```

4. **Start Midolman**

```
# systemctl start midolman.service
```

MidoNet Host Registration

1. **Launch MidoNet CLI**

```
$ midonet-cli
midonet>
```

2. **Create tunnel zone**

MidoNet supports the Virtual Extensible LAN (VXLAN) and Generic Routing Encapsulation (GRE) protocols to communicate to other hosts within a tunnel zone.

To use the VXLAN protocol, create the tunnel zone with type 'vxlan':

```
midonet> tunnel-zone create name tz type vxlan
tzone0
```

To use the GRE protocol, create the tunnel zone with type 'gre':

```
midonet> tunnel-zone create name tz type gre
tzone0
```

3. **Add hosts to tunnel zone**

```
midonet> list tunnel-zone
tzone tzone0 name tz type vxlan

midonet> list host
host host0 name network alive true
host host1 name compute1 alive true

midonet> tunnel-zone tzone0 add member host host0
 address ip_address_of_host0
zone tzone0 host host0 address ip_address_of_host0

midonet> tunnel-zone tzone0 add member host host1
 address ip_address_of_host1
zone tzone0 host host1 address ip_address_of_host1
```

5. Further Steps

MidoNet installation and integration into OpenStack is completed.

You can now continue with the creation of initial networks in Neutron.

Note

Consult the **Operation Guide** for further instructions on operating MidoNet.