MCP Salt Formulas

version q4-18
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Preface

This documentation provides information on how to use Mirantis products to deploy cloud environments. The information is for reference purposes and is subject to change.

Intended audience

This documentation is intended for deployment engineers, system administrators, and developers; it assumes that the reader is already familiar with network and cloud concepts.

Documentation history

The following table lists the released revisions of this documentation:

<table>
<thead>
<tr>
<th>Revision date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 8, 2019</td>
<td>Q4`18 GA</td>
</tr>
</tbody>
</table>
List of Salt formulas supported in MCP

Salt formulas are pre-written Salt states. They are open-ended and can be used for such tasks as package installation, service configuration and starting, users and permissions setup, and others.

In MCP, the Salt formulas together with Salt are used as a configuration management tool that configures, deploys, and updates the MCP components. Each Salt formula defines a corresponding MCP component, such as the mysql formula for MySQL, rabbitmq formula for RabbitMQ, formulas for OpenStack services, and so on.

The Salt formulas supported in MCP includes:

- aodh
- apache
- aptcacher
- aptly
- artifactory
- avinetworks
- backupninja
- barbican
- baremetal-simulator
- bind
- cassandra
- ceilometer
- ceph
- cinder
- collectd
- designate
- docker
- dogtag
- elasticsearch
- etcd
- fluentd
- freeipa
- galera
- gerrit
- git
• glance
• glusterfs
• gnocchi
• grafana
• haproxy
• heat
• heka
• helm
• horizon
• influxdb
• iptables
• ironic
• isc-dhcp
• java
• jenkins
• keepalived
• keystone
• kibana
• kubernetes
• libvirt
• linux
• lldp
• logrotate
• maas
• memcached
• mongodb
• muranomysql
• neutron
• nginx
• nova
• ntp
• octavia
• opencontrail
- openldap
- openssh
- panko
- postgresql
- powerdns
- prometheus
- python
- rabbitmq
- reclass
- redis
- rsync
- rsyslog
- rundeck
- salt
- sensu
- sphinx
- statsd
- telegraf
- tftpd-hpa
- tinyproxy
- xtrabackup
- zookeeper
DEBMIRROR

Usage

This file provides the debmirror sample pillars configurations for different use cases.

See debmirror/schemas/*.yaml for all possible options A sample of one debmirror mirror configuration (Ubuntu):

```yaml
parameters:
debmirror:
    client:
        enabled: true
    mirrors:
        target01:
            enabled: true
            fetch_retry: 3
            http_proxy: "url"
            https_proxy: "url"
            ftp_proxy: "url"
            rsync_proxy: "url"
            no_proxy: ['val1', 'val2']
            force: False
            lock_target: True
            extra_flags: [ '--verbose', '--progress', '--nosource', '--no-check-gpg', '--rsync-extra=none' ]
    method: "rsync" # string
    arch: ['amd64']
    mirror_host: "mirror.mirantis.com" # rsync
    mirror_root: ':mirror/nightly/ubuntu/'
    cache_dir:="/var/www/mirror/.cache/ubuntu"
    target_dir:="/var/www/mirror/ubuntu/"
    log_file:="/var/www/mirror/target01_log.log"
    dist: [ xenial ] #, xenial-security, xenial-updates ]
    section: [ main ] #, multiverse, restricted, universe ]
    exclude_deb_section: [ 'games', gnome, Xfce, sound, electronics, graphics, hamradio , doc, localization, kde, video ]
    filter:
    00: "--exclude="/"
    01: "--exclude="/android**"
    02: "--exclude="/firefox**"
    03: "--exclude="/chromium-browser**"
    04: "--exclude="/ceph**"
    05: "--exclude="/wallpapers**"
    06: "--exclude="/language-pack-(?!en)"
    07: "--include="/main.(*)manpages""
    08: "--include="/main.(*)python-(.*)doc"
    09: "--include="/main.(*)python-(.*)network"
```

The cache_dir parameter is optional and can be used to avoid extra disk space usage for repos, which can have same packages, by using hardlinks to files.

Metadata schema specifications for debmirror client

Core Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables debmirror processing.</td>
</tr>
</tbody>
</table>
Mirrors

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dist</td>
<td>array</td>
<td>description_notset</td>
</tr>
<tr>
<td>target_dir</td>
<td>string</td>
<td>Destination folder for mirror</td>
</tr>
<tr>
<td>http_proxy</td>
<td>string</td>
<td>Specify proxy parameter.</td>
</tr>
<tr>
<td>ftp_proxy</td>
<td>string</td>
<td>Specify proxy parameter.</td>
</tr>
<tr>
<td>exclude_deb_section</td>
<td>array</td>
<td>Never download any files whose Debian Section (games, doc, oldlibs, science, etc.) match the regex.</td>
</tr>
<tr>
<td>rsync_proxy</td>
<td>string</td>
<td>Specify proxy parameter.</td>
</tr>
<tr>
<td>fetch_retry</td>
<td>integer</td>
<td>Number of retries, to fetch mirror. Works only with Salt 2017+.</td>
</tr>
<tr>
<td>force</td>
<td>boolean</td>
<td>Ignore lockfile</td>
</tr>
<tr>
<td>arch</td>
<td>array</td>
<td>description_notset</td>
</tr>
<tr>
<td>filter</td>
<td>object</td>
<td>Sorted list of any kind filtered options. Possible marks include:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• --ignore=regex Never delete any files whose filenames match the regex.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• --exclude=regex Never download any files whose filenames match the regex.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• --include=regex Don’t exclude any files whose filenames match the regex.</td>
</tr>
<tr>
<td>mirror_root</td>
<td>string</td>
<td>Specifies the directory on the remote host that is the root of the Ubuntu archive. The root directory has a dists subdirectory.</td>
</tr>
<tr>
<td>no_proxy</td>
<td>array</td>
<td>Specifies list of host-excludes for proxy.</td>
</tr>
<tr>
<td>mirror_host</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>section</td>
<td>array</td>
<td>Specifies the section of Ubuntu to mirror.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables exact mirror processing.</td>
</tr>
<tr>
<td>extra_flags</td>
<td>array</td>
<td>description_notset</td>
</tr>
<tr>
<td>lock_target</td>
<td>boolean</td>
<td>Creates lockfile inside target dic, to prevent future repo updates</td>
</tr>
<tr>
<td>Key</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>https_proxy</td>
<td>string</td>
<td>Specifies proxy parameter</td>
</tr>
<tr>
<td>log_file</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>method</td>
<td>string</td>
<td>Specifies the method to download files. Currently, supported methods are ftp, http, https, and rsync. The file method is experimentally supported.</td>
</tr>
</tbody>
</table>
NTP

Usage

The Network Time Protocol (NTP) formula is used to properly synchronize services across the nodes. This file provides the sample configurations for different use cases.

- [Deprecated] NTP client configuration, should not be used if the stratum parameter exists:

```yaml
ntp:
  client:
    enabled: true
    strata:
      - ntp.cesnet.cz
      - ntp.nic.cz
```

- The NTP client extended definition with auth:

```yaml
ntp:
  client:
    enabled: true
    stratum:
      primary:
        server: ntp.cesnet.cz
        key_id: 1
      secondary:
        server: ntp.nic.cz
        key_id: 2
```

- The NTP client with MD5 auth configuration:

```yaml
ntp:
  client:
    enabled: true
    auth:
      enabled: true
      secrets:
        1:
          secret_type: 'M'
          secret: 'Runrabbitrundigthath'
          trustedkey: true
        2:
          secret_type: 'M'
          secret: 'Howiwishyouwereherew'
          trustedkey: true
    stratum:
      primary:
        server: ntp.cesnet.cz
        trustedkey: true
```

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• The NTP server with MD5 auth configuration:

```
key_id: 1
secondary:
  server: ntp.nic.cz
key_id: 2
```

```
ntp:
  client:
    enabled: false
  server:
    enabled: true
    auth:
      enabled: true
    secrets:
      1:
        secret_type: 'M'
        secret: 'Runrabbitrundigitath'
        trustedkey: true
      2:
        secret_type: 'M'
        secret: 'Howiwishyouwereherew'
        trustedkey: true
  stratum:
    primary:
      server: ntp.cesnet.cz
      key_id: 1
    secondary:
      server: ntp.nic.cz
      key_id: 2
```

• A cleaning up of the NTP configurations left by DHCP:

```
ntp:
  client:
    enabled: true
    remove_dhcp_conf: true # default false
```

• The NTP server simple peering definition:

```
ntp:
  server:
    peers:
      - 192.168.0.241
      - 192.168.0.242
```

• The NTP server extended peering definition:
**ntp:**

```
server:
  peers:
    1:
      host: 192.168.31.1
    2:
      host: 192.168.31.2
    3:
      host: 192.168.31.3
```

* The NTP server definition enabling the listen and ignore actions on specific addresses:

```
ntp:
  server:
    1:
      value: wildcard
      action: ignore
    2:
      value: ::1
      action: listen
    3:
      value: 192.168.31.1
      action: listen
```

Read more


**Metadata schema specifications for NTP client**

**Core Properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mode7</td>
<td>boolean</td>
<td>Enables mode7 for the NTP server.</td>
</tr>
<tr>
<td>remove_dhcp_conf</td>
<td>boolean</td>
<td>Forcibly remove “/var/lib/ntp/ntp.conf.dhcp” file. WA for issue <a href="https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=600661">https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=600661</a></td>
</tr>
<tr>
<td>stratum</td>
<td>object</td>
<td>List of NTP stratums to keep the time in sync. If define used instead of strata. For details, see: ntp:common:stratum definition</td>
</tr>
<tr>
<td>logfile</td>
<td>string</td>
<td>NTP log file path.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables NTP client service.</td>
</tr>
<tr>
<td>strata</td>
<td>array</td>
<td>List of NTP stratums to keep the time in sync. For details, see: ntp:common:strata definition</td>
</tr>
<tr>
<td>secrets</td>
<td>object</td>
<td>Dict with secrets For details, see: ntp:common:secret definition</td>
</tr>
<tr>
<td>Name</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables NTP auth.</td>
</tr>
</tbody>
</table>

ntp:common:stratum definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>key_id</td>
<td>integer</td>
<td>description_notset</td>
</tr>
<tr>
<td>server</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

ntp:common:strata definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ntp:common:strata</td>
<td>string</td>
<td>Hostname or IP address of the stratum server.</td>
</tr>
</tbody>
</table>

ntp:common:secret definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>secret_type</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>secret</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>trustedkey</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

**Metadata schema specifications for NTP server**

**Core Properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>mode7</td>
<td>boolean</td>
<td>Enables mode7 for the NTP server.</td>
</tr>
<tr>
<td>peers</td>
<td>array</td>
<td>List of peered NTP stratum services. For details, see: ntp:server:peer definition</td>
</tr>
<tr>
<td>remove_dhcp_conf</td>
<td>boolean</td>
<td>Forcibly remove “/var/lib/ntp/ntp.conf.dhcp” file. WA for issue <a href="https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=600661">https://bugs.debian.org/cgi-bin/bugreport.cgi?bug=600661</a></td>
</tr>
<tr>
<td>orphan</td>
<td>number</td>
<td>Sets the orphan level of the NTP server.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables NTP server service.</td>
</tr>
<tr>
<td>strata</td>
<td>array</td>
<td>List of NTP stratums to keep the time in sync. For details, see: ntp:common:strata definition</td>
</tr>
<tr>
<td>secrets</td>
<td>object</td>
<td>Dict with secrets For details, see: ntp:common:secret definition</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables NTP auth.</td>
</tr>
<tr>
<td>restrict</td>
<td>array</td>
<td>List of subnets that servers gives time to. For details, see: ntp:server:restrict definition</td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>stratum</td>
<td>object</td>
<td>List of NTP stratums to keep the time in sync. If define used instead of strata For details, see: ntp:common:stratum definition</td>
</tr>
<tr>
<td>logfile</td>
<td>string</td>
<td>NTP log file path.</td>
</tr>
</tbody>
</table>

**ntp:common:secret definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>secret_type</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>secret</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>trustedkey</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

**ntp:common:interface definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>action</td>
<td>string</td>
<td>Determines the action for addresses which match</td>
</tr>
<tr>
<td>value</td>
<td>string</td>
<td>That parameter specifies a class of addresses, or a specific interface name, or an address. In the address case, prefixlen determines how many bits must match for this rule to apply. Ignore prevents opening matching addresses, drop causes ntpd to open the address and drop all received packets without examination.</td>
</tr>
</tbody>
</table>

**ntp:common:stratum definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>key_id</td>
<td>integer</td>
<td>description_notset</td>
</tr>
<tr>
<td>server</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

**ntp:server:peer definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>key_id</td>
<td>integer</td>
<td>description_notset</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

**ntp:common:strata definition**
hostname or IP address of the stratum server.

### ntp:server:restrict definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>subnet</td>
<td>string</td>
<td>IP address of the network</td>
</tr>
<tr>
<td>mask</td>
<td>string</td>
<td>Subnet mask of the network</td>
</tr>
<tr>
<td>options</td>
<td>string</td>
<td>Additional options passed to the net [notrap nomodify]</td>
</tr>
</tbody>
</table>
OPENSSH

Usage

OpenSSH is a free version of the SSH connectivity tools that technical users of the Internet rely on. The passwords of Telnet, remote login (rlogin), and File Transfer Protocol (FTP) users are transmitted across the Internet unencrypted. OpenSSH encrypts all traffic, including passwords, to effectively eliminate eavesdropping, connection hijacking, and other attacks. Additionally, OpenSSH provides secure tunneling capabilities and several authentication methods, and supports all SSH protocol versions.

This file provides the sample pillars configurations for different use cases.

OpenSSH client

- The OpenSSH client configuration with a shared private key:

```yaml
openssh:
  client:
    enabled: true
    use_dns: False
    user:
      root:
        enabled: true
        private_key:
          type: rsa
          key: ${_param:root_private_key}
      user: ${linux:system:user:root}
```

- The OpenSSH client configuration with an individual private key and known host:

```yaml
openssh:
  client:
    enabled: true
    user:
      root:
        enabled: true
      user: ${linux:system:user:root}
    known_hosts:
      - name: repo.domain.com
        type: rsa
        fingerprint_hash_type: sha256|md5
```

- The OpenSSH client configuration with keep alive settings:

```yaml
openssh:
  client:
    alive:
```

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### OpenSSH server

- The OpenSSH server simple configuration:

```yaml
interval: 600
count: 3
```

```yaml
openssh:
  server:
    enabled: true
    permit_root_login: true
    public_key_auth: true
    password_auth: true
    host_auth: true
    banner: Welcome to server!
  bind:
    address: 0.0.0.0
    port: 22
```

- The OpenSSH server configuration with auth keys for users:

```yaml
openssh:
  server:
    enabled: true
    bind:
      address: 0.0.0.0
      port: 22
    ...
  user:
    newt:
      enabled: true
      user: \${linux:system:user:newt}
      public_keys:
        - \${public_keys:newt}
    root:
      enabled: true
      purge: true
      user: \${linux:system:user:root}
      public_keys:
        - \${public_keys:newt}
```

**Note**

Setting the purge parameter to true ensures that the exact authorized_keys contents will be filled explicitly from the model and undefined keys will be removed.
• The OpenSSH server configuration that binds OpenSSH on multiple addresses and ports:

```yaml
openssh:
  server:
    enabled: true
    binds:
      - address: 127.0.0.1
        port: 22
      - address: 192.168.1.1
        port: 2222
```

• The OpenSSH server with FreeIPA configuration:

```yaml
openssh:
  server:
    enabled: true
    bind:
      address: 0.0.0.0
      port: 22
    public_key_auth: true
    authorized_keys_command:
      command: /usr/bin/sss_ssh_authorizedkeys
      user: nobody
```

• The OpenSSH server configuration with keep alive settings:

```yaml
openssh:
  server:
    alive:
      keep: yes
      interval: 600
      count: 3
# will give you an timeout of 30 minutes (600 sec x 3)
```

• The OpenSSH server configuration with the DSA legacy keys enabled:

```yaml
openssh:
  server:
    dss_enabled: true
```

• The OpenSSH server configuration with the duo 2FA https://duo.com/docs/duounix with Match User 2FA can be bypassed for some accounts

```yaml
openssh:
  server:
    use_dns: false
    password_auth: false
```
challenge_response_auth: true

ciphers:
aes256-ctr:
  enabled: true
aes192-ctr:
  enabled: true
aes128-ctr:
  enabled: true

authentication_methods:
  publickey:
    enabled: true
keydata-interactive:
  enabled: true

match_user:
  jenkins:
    authentication_methods:
      publickey:
        enabled: true

• OpenSSH server configuration supports AllowUsers, DenyUsers, AllowGroup, DenyGroups via allow_users, deny_users, allow_groups, deny_groups keys respectively.

For example, here is how to manage AllowUsers configuration item:

  openssh:
    server:
      allow_users:
        <user_name>:
          enabled: true
        <pattern_list_name>:
          enabled: true
          pattern: <pattern>

Elements of allow_users are either user names or pattern list names:

• <user_name> goes to configurational file as is.
• <pattern list name> is not used directly - its main purpose is to provide a meaningful name for a pattern specified in ‘pattern’ key. Another advantage is that pattern can be overriden. <enabled> by default is ‘true’.

See PATTERNS in ssh_config(5) for more information on what <pattern> is.

CIS Compliance

There is a number of configuration options that make the OpenSSH service compliant with CIS Benchmark. These options can be found under metadata/service/server/cis, and are not enabled by default. For each CIS item a comprehensive description is provided with the pillar data.

See also https://www.cisecurity.org/cis-benchmarks/ for the details about the CIS Benchmark.

Read more
Metadata Schema Specifications for OpenSSH client

Core Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>known_hosts</td>
<td>array</td>
<td>List of pre-defined known hosts for ssh access. For details, see: openssh_known_hosts_object definition</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables openssh client configuration.</td>
</tr>
<tr>
<td>user</td>
<td>object</td>
<td>Dict of openssh user’s, to be configured. Private</td>
</tr>
<tr>
<td>alive</td>
<td>object</td>
<td>Configure ServerAlive* option</td>
</tr>
</tbody>
</table>

openssh_known_hosts_object definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>type</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>fingerprint</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

global_useradd_user definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>shell</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>sudo</td>
<td>boolean</td>
<td>Allow user to use sudo</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>full_name</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>home</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>password</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>email</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>uid</td>
<td>integer</td>
<td>description_notset</td>
</tr>
</tbody>
</table>
**openssh_client_user definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_openssh_client_user</td>
<td>object</td>
<td>Define exactly one openssh user. Private</td>
</tr>
</tbody>
</table>

**Metadata schema specifications for OpenSSH server**

**Core Properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>protocol</td>
<td>integer</td>
<td>Specifies the protocol versions sshd(8) supports. The possible values are “1” and “2”. Multiple versions must be comma-separated. The default is “2”. Protocol 1 suffers from a number of cryptographic weaknesses and should not be used. It is only offered to support legacy devices. Note that the order of the protocol list does not indicate preference, because the client selects among multiple protocol versions offered by the server. Specifying “2,1” is identical to “1,2”.</td>
</tr>
<tr>
<td>kerberos_auth</td>
<td>boolean</td>
<td>KerberosAuthentication Specifies whether the password provided by the user for PasswordAuthentication will be validated through the Kerberos KDC. To use this option, the server needs a Kerberos servtab which allows the verification of the KDC’s identity. The default is False (“no”).</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables / disabled specific algorithm.</td>
</tr>
<tr>
<td>force_command</td>
<td>string</td>
<td>Forces the execution of the command specified by ForceCommand, ignoring any command supplied by the client and ~/.ssh/rc if present.</td>
</tr>
<tr>
<td>syslog_facility</td>
<td>ERROR</td>
<td>SyslogFacility Gives the facility code that is used when logging messages from sshd(8). The possible values are: DAEMON, USER, AUTH, AUTHPRIV, LOCAL0, LOCAL1, LOCAL2, LOCAL3, LOCAL4, LOCAL5, LOCAL6, LOCAL7. The default is AUTH.</td>
</tr>
<tr>
<td>public_key_auth</td>
<td>boolean</td>
<td>PubkeyAuthentication Specifies whether public key authentication is allowed. The default is True (“yes”).</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables / disabled specific method.</td>
</tr>
<tr>
<td>password_auth</td>
<td>boolean</td>
<td>PasswordAuthentication Specifies whether password authentication is allowed. The default is True(“yes”).</td>
</tr>
<tr>
<td>Variable</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>permit_user_environment</td>
<td>boolean</td>
<td>Specifies whether ~/.ssh/environment and environment= options in ~/.ssh/authorized_keys are processed by sshd(8). The default is False (“no”). Enabling environment processing may enable users to bypass access restrictions in some configurations using mechanisms such as LD_PRELOAD.</td>
</tr>
<tr>
<td>banner</td>
<td>string</td>
<td>Banner</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The contents of the specified file are sent to the remote user before authentication is allowed. If the argument is “none” then no banner is displayed. By default, no banner is displayed.</td>
</tr>
<tr>
<td>login_grace_time</td>
<td>integer</td>
<td>LoginGraceTime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The server disconnects after this time if the user has not successfully logged in. If the value is 0, there is no time limit. The default is 120 seconds.</td>
</tr>
<tr>
<td>alive</td>
<td>object</td>
<td>Configure ClientAlive* option’s.</td>
</tr>
<tr>
<td>log_level</td>
<td>ERROR</td>
<td>LogLevel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gives the verbosity level that is used when logging messages from sshd(8). The possible values are: QUIET, FATAL, ERROR, INFO, VERBOSE, DEBUG, DEBUG1, DEBUG2, and DEBUG3. The default is INFO. DEBUG and DEBUG1 are equivalent. DEBUG2 and DEBUG3 each specify higher levels of debugging output. Logging with a DEBUG level violates the privacy of users and is not recommended.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>permit_empty_passwords</td>
<td>boolean</td>
<td>PermitEmptyPasswords</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When password authentication is allowed, it specifies whether the server allows login to accounts with empty password strings. The default is False (“no”).</td>
</tr>
<tr>
<td>port</td>
<td>integer</td>
<td>Specifies the local addresses sshd should listen on.</td>
</tr>
<tr>
<td>address</td>
<td>string</td>
<td>Specifies the port on which the server listens for connections. Multiple options are permitted.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables openssh server configurathion.</td>
</tr>
<tr>
<td>max_auth_tries</td>
<td>integer</td>
<td>MaxAuthTries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specifies the maximum number of authentication attempts permitted per connection. Once the number of failures reaches half this value, additional failures are logged. The default is 6.</td>
</tr>
<tr>
<td>use_dns</td>
<td>boolean</td>
<td>Specifies whether sshd should look up the remote host name, and to check that the resolved host name for the remote IP address maps back to the very same IP address.</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables / disabled specific method.</td>
</tr>
</tbody>
</table>
**host_auth**

boolean

HostbasedAuthentication

Specifies whether rhosts or /etc/hosts.equiv authentication together with successful public key client host authentication is allowed (host-based authentication). The default is False("no").

**permit_root_login**

boolean

PermitRootLogin

Specifies whether root can log in using ssh(1). The argument must be “yes”, “prohibit-password”, “without-password”, “forced-commands-only”, or “no”. The default is “prohibit-password”.

If this option is set to “prohibit-password” or “without-password”, password and keyboard-interactive authentication are disabled for root.

If this option is set to “forced-commands-only”, root login with public key authentication will be allowed, but only if the command option has been specified (which may be useful for taking remote backups even if root login is normally not allowed). All other authentication methods are disabled for root.

If this option is set to “no”, root is not allowed to log in.

# TODO Currently its only boolean option, however, support for other # values has been added recently to sshd_config template, now # it may use both booleans and strings. # Now the next step is to update reclass models and switch # from boolean values to strings.

**ignore_rhosts**

boolean

IgnoreRhosts

Specifies that .rhosts and .shosts files will not be used in RhostsRSAAuthentication or HostbasedAuthentication. /etc/hosts.equiv and /etc/ssh/shosts.equiv are still used. The default is True (“yes”).

**enabled**

boolean
description_notset

**challenge_response_auth**

boolean

ChallengeResponseAuthentication controls support for the ‘keyboard-interactive’ authentication scheme defined in RFC-4256.

The ‘keyboard-interactive’ authentication scheme could, in theory, ask a user any number of multi-faceted questions. It’s using for duo 2FA authorization.

**user**

object

List of openssh user’s, to be configured.

---

global_useradd_user definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Field</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>shell</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>sudo</td>
<td>boolean</td>
<td>Allow user to use sudo</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>full_name</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>home</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>password</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>email</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>uid</td>
<td>integer</td>
<td>description_notset</td>
</tr>
</tbody>
</table>
**APTLY**

**Usage**

The Apty formula configures and installs the Apty server and client.

The available states include:

- aptly.server
- aptly.publisher

The available metadata include:

- metadata.aptly.server.single
- metadata.aptly.client.publisher

This file provides the sample configurations for different use cases.
• Reclass examples:

  • The basic Aptly server configuration without repositories or mirrors:

    classes:
    - service.aptly.server.single

    parameters:
    aptly:
    server:
    enabled: true
    secure: true
    gpg_keypair_id: A76882D3
    gpg_passphrase:
    gpg_public_key: |
    -----BEGIN PGP PUBLIC KEY BLOCK-----
    Version: GnuPG v1
    ...
    gpg_private_key: |
    -----BEGIN PGP PRIVATE KEY BLOCK-----
    Version: GnuPG v1
    ...

  • The definition of an s3 endpoint:

    parameters:
    aptly:
    server:
    endpoint:
      mys3endpoint:
      engine: s3
      awsAccessKeyId: xxxx
      awsSecretAccessKey: xxxx
      bucket: test

  • Pillar examples:

    • The Aptly server basic configuration:

      aptly:
      server:
      enabled: true
      repo:
      myrepo:
      distribution: trusty
      component: main
      architectures: amd64
      comment: "Custom components"
      publisher:
      component: mycomponent
distributions:
- nightly/trusty

• The Aptly server mirrors configuration:

```
aptly:
  server:
    mirror:
      mirror_name:
        source: http://example.com/debian
        distribution: xenial
        components: main
        architectures: amd64
        gpgkeys: 460F3999
        filter: "!(Name (% *-dbg))"
        filter_with_deps: true
      publisher:
        component: example
        distributions:
          - xenial/repo/nightly
          - "s3:aptcdn:xenial/repo/nightly"
```

• The definition of the proxy environment variables in cron job for mirroring script:

```
aptly:
  server:
    enabled: true
    mirror_update:
      enabled: true
      http_proxy: "http://1.2.3.4:8000"
      https_proxy: "http://1.2.3.4:8000"
```

Read more


**Metadata schema specifications for aptly publisher**

Core properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine</td>
<td>string</td>
<td>Installation source for aptly publisher</td>
</tr>
<tr>
<td>image</td>
<td>string</td>
<td>Publisher full image name. Set if installation from docker is chosen</td>
</tr>
<tr>
<td>Name</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>root_dir</td>
<td>string</td>
<td>Root directory</td>
</tr>
<tr>
<td>secure</td>
<td>boolean</td>
<td>Enable secure aptly server.</td>
</tr>
<tr>
<td>repo</td>
<td>object</td>
<td>Repo map where key is repo name and value is a list of repo properties.</td>
</tr>
<tr>
<td>gpg_public_key</td>
<td>string</td>
<td>Public key to PGP repository</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
<td>Host to bind aptly API service</td>
</tr>
<tr>
<td>port</td>
<td>['string', 'integer']</td>
<td>Port to bind aptly API service</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables aptly API service</td>
</tr>
<tr>
<td>gid</td>
<td>integer</td>
<td>Group id for aptly user</td>
</tr>
<tr>
<td>group</td>
<td>string</td>
<td>Group name for aptly</td>
</tr>
<tr>
<td>name</td>
<td>string</td>
<td>User name for aptly</td>
</tr>
<tr>
<td>uid</td>
<td>integer</td>
<td>User id for aptly user</td>
</tr>
<tr>
<td>mirror</td>
<td>array</td>
<td>Mirror map where key is mirror name and value is a list of mirror properties: source, distribution, GPG keys and so on. For details, see: _aptly_mirror_object definition.</td>
</tr>
<tr>
<td>https_proxy</td>
<td>string</td>
<td>HTTPS Proxy for apt mirror access</td>
</tr>
<tr>
<td>http_proxy</td>
<td>string</td>
<td>HTTP Proxy for apt mirror access</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables aptly mirror</td>
</tr>
<tr>
<td>hour</td>
<td>['string', 'integer']</td>
<td>Hour parameter in cron job for aptly mirror update</td>
</tr>
<tr>
<td>minute</td>
<td>['string', 'integer']</td>
<td>Minute parameter in cron job for aptly mirror update</td>
</tr>
<tr>
<td>no_config</td>
<td>boolean</td>
<td>Start service without config</td>
</tr>
<tr>
<td>Name</td>
<td>Type</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>gpg_keypair_id</td>
<td>string</td>
<td>GPG keypair id</td>
</tr>
<tr>
<td>gpg_passphrase</td>
<td>string</td>
<td>Password phrase for GPG key</td>
</tr>
<tr>
<td>public_key</td>
<td>string</td>
<td>Public key to PGP repository</td>
</tr>
<tr>
<td>private_key</td>
<td>string</td>
<td>GPG Private key</td>
</tr>
<tr>
<td>homedir</td>
<td>string</td>
<td>GPG home directory</td>
</tr>
<tr>
<td>http_proxy</td>
<td>string</td>
<td>HTTP proxy to use for keys download</td>
</tr>
<tr>
<td>keyring</td>
<td>string</td>
<td>Keyring for GPG</td>
</tr>
<tr>
<td>keypair_id</td>
<td>string</td>
<td>GPG keypair id</td>
</tr>
<tr>
<td>passphrase</td>
<td>string</td>
<td>Password phrase for GPG key</td>
</tr>
<tr>
<td>keyserver</td>
<td>string</td>
<td>GPG key server</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables aptly server</td>
</tr>
<tr>
<td>home_dir</td>
<td>string</td>
<td>Home directory for aptly system user</td>
</tr>
<tr>
<td>engine</td>
<td>string</td>
<td>Installation source for aptly publisher. Can be one of ['pkg', 'docker']</td>
</tr>
<tr>
<td>image</td>
<td>string</td>
<td>Publisher full image name. Set if ‘source’ is ‘docker’</td>
</tr>
<tr>
<td>pkgs</td>
<td>array</td>
<td>List of packages to be installed. Set if ‘source’ is ‘pkg’</td>
</tr>
<tr>
<td>registry</td>
<td>string</td>
<td>Registry host for publisher image. Set if ‘source’ is ‘docker’</td>
</tr>
<tr>
<td>gpg_private_key</td>
<td>string</td>
<td>GPG Private key</td>
</tr>
</tbody>
</table>

/aptly_repo_object definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>comment</td>
<td>string</td>
<td>Comment for repo description</td>
</tr>
<tr>
<td>publisher</td>
<td>ERROR</td>
<td>description_notset For details, see: _aptly_mirror</td>
</tr>
<tr>
<td>distribution</td>
<td>string</td>
<td>OS distribution</td>
</tr>
<tr>
<td>component</td>
<td>string</td>
<td>Component type</td>
</tr>
<tr>
<td>architectures</td>
<td>ERROR</td>
<td>description_notset For details, see: _architectures definition</td>
</tr>
</tbody>
</table>

/aptly_mirror|repo_publisher_object definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>component</td>
<td>string</td>
<td>Publisher’s component</td>
</tr>
</tbody>
</table>
## distributions array

List of distributions for publisher

### _aptly_mirror_object definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>publisher</td>
<td>object</td>
<td>Parameters of publish mirror For details, see: _aptly_mirror</td>
</tr>
<tr>
<td>source</td>
<td>string</td>
<td>Source url for apt mirror</td>
</tr>
<tr>
<td>udebs</td>
<td>boolean</td>
<td>Download .udeb packages</td>
</tr>
<tr>
<td>filter</td>
<td>string</td>
<td>Filter for packages in mirror</td>
</tr>
<tr>
<td>sources</td>
<td>boolean</td>
<td>Download source packages in addition to binary packages</td>
</tr>
<tr>
<td>filter_with_deps</td>
<td>string</td>
<td>When filtering, include dependencies of matching packages as well</td>
</tr>
<tr>
<td>gpgkeys</td>
<td>string</td>
<td>GPG keys for apt mirror</td>
</tr>
<tr>
<td>architectures</td>
<td>ERROR</td>
<td>description_notset For details, see: _architectures definition</td>
</tr>
<tr>
<td>components</td>
<td>string</td>
<td>Component's types</td>
</tr>
<tr>
<td>distribution</td>
<td>string</td>
<td>OS distribution</td>
</tr>
</tbody>
</table>

### _architectures definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>architectures</td>
<td>string</td>
<td>Packages architecture</td>
</tr>
</tbody>
</table>
CINDER

Usage

Cinder provides an infrastructure for managing volumes in OpenStack. Originally, this project was the Nova component called nova-volume and starting from the Folsom OpenStack release it has become an independent project.

This file provides the sample configurations for different use cases:

- Pillar sample of a basic Cinder configuration:

  The pillar structure defines cinder-api and cinder-scheduler inside the controller role and cinder-volume inside the to volume role.

```yaml
[cinder]
[controller]
  enabled: true
  version: juno
  cinder_uid: 304
  cinder_gid: 304
  nas_secure_file_permissions: false
  nas_secure_file_operations: false
  cinder_internal_tenant_user_id: f46924c112a14c80ab0a24a613d95eeef
  cinder_internal_tenant_project_id: b7455b8974bb4064ad247c8f375eae6c
  default_volume_type: 7k2SaS
  enable_force_upload: true
  availability_zone_fallback: True

[database]
  engine: mysql
  host: 127.0.0.1
  port: 3306
  name: cinder
  user: cinder
  password: pwd

[identity]
  engine: keystone
  host: 127.0.0.1
  port: 35357
  tenant: service
  user: cinder
  password: pwd

[message_queue]
  engine: rabbitmq
  host: 127.0.0.1
  port: 5672
  user: openstack
  password: pwd
  virtual_host: '/openstack'

[client]
```
connection_params:
  connect_retries: 50
  connect_retry_delay: 1
backend:
  7k2_SAS:
    engine: storwize
    type_name: slow-disks
    host: 192.168.0.1
    port: 22
    user: username
    password: pass
    connection: FC/iSCSI
    multipath: true
    pool: SAS7K2
audit:
  enabled: false
osapi_max_limit: 500
barbican:
  enabled: true
cinder:
  enabled: true
  version: juno
  cinder_uid: 304
  cinder_gid: 304
  nas_secure_file_permissions: false
  nas_secure_file_operations: false
  cinder_internal_tenant_user_id: f46924c112a14c80ab0a24a613d95eef
  cinder_internal_tenant_project_id: b7455b8974bb4064ad247c8f375eae6c
  default_volume_type: 7k2SaS
  enable_force_upload: true
  my_ip: 192.168.0.254
database:
  engine: mysql
  host: 127.0.0.1
  port: 3306
  name: cinder
  user: cinder
  password: pwd
identity:
  engine: keystone
  host: 127.0.0.1
  port: 35357
  tenant: service
  user: cinder
  password: pwd
message_queue:
   engine: rabbitmq
   host: 127.0.0.1
   port: 5672
   user: openstack
   password: pwd
   virtual_host: '/openstack'
backend:
   7k2_SAS:
      engine: storwize
      type_name: 7k2 SAS disk
      host: 192.168.0.1
      port: 22
      user: username
      password: pass
      connection: FC/iSCSI
      multihost: true
      multipath: true
      pool: SAS7K2
      audit:
         enabled: false
      barbican:
         enabled: true

Volume vmware related options:

```
cinder:
   volume:
      backend:
         vmware:
            engine: vmware
            host_username: vmware
            host_password: vmware
            cluster_names: vmware_cluster01,vmware_cluster02
```

- The CORS parameters enablement:

```
cinder:
   controller:
      cors:
         allowed_origin: https:localhost.local,http:localhost.local
         expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
         allow_methods: GET,PUT,POST,DELETE,PATCH
         allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
         allow_credentials: True
         max_age: 86400
```
• The client-side RabbitMQ HA setup for the controller:

```yaml
controller:
  members:
    - host: 10.0.16.1
    - host: 10.0.16.2
    - host: 10.0.16.3
  user: openstack
  password: pwd
  virtual_host: '/openstack'
```

• The client-side RabbitMQ HA setup for the volume component:

```yaml
volume:
  members:
    - host: 10.0.16.1
    - host: 10.0.16.2
    - host: 10.0.16.3
  user: openstack
  password: pwd
  virtual_host: '/openstack'
```

• Configuring TLS communications.

**Note**

By default, system-wide installed CA certs are used. Therefore, the cacert_file and cacert parameters are optional.

• RabbitMQ TLS:

```yaml
cinder:
  controller, volume:
    message_queue:
      port: 5671
      ssl:
        enabled: True
        cacert: cert body if the cacert_file does not exists
```
MySQL TLS:

```
cinder:
    controller:
    database:
    ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exist
        (optional) cacert_file: /etc/openstack/mysql-ca.pem
```

Openstack HTTPS API:

```
cinder:
    controller, volume:
    identity:
        protocol: https
        (optional) cacert_file: /etc/openstack/proxy.pem
    glance:
        protocol: https
        (optional) cacert_file: /etc/openstack/proxy.pem
```

Cinder setup with zeroing deleted volumes:

```
cinder:
    controller:
    enabled: true
    wipe_method: zero
```

Cinder setup with shredding deleted volumes:

```
cinder:
    controller:
    enabled: true
    wipe_method: shred
```

Configuration of policy.json file:

```
cinder:
    controller:
    ....
    policy:
    'volume:delete': 'rule:admin_or_owner'
```
# Add key without value to remove line from policy.json
\`volume:extend`:

- Default Cinder backend lvm_type setup:

```yaml
   cinder:
       volume:
           enabled: true
           backend:
               # Type of LVM volumes to deploy; (default, thin, or auto). Auto defaults to thin if thin is supported.
               lvm_type: auto
```

- Default Cinder setup with iSCSI target:

```yaml
   cinder:
       controller:
           enabled: true
           version: mitaka
           default_volume_type: lvmdriver-1
       database:
           engine: mysql
           host: 127.0.0.1
           port: 3306
           name: cinder
           user: cinder
           password: pwd
       identity:
           engine: keystone
           host: 127.0.0.1
           port: 35357
           tenant: service
           user: cinder
           password: pwd
       message_queue:
           engine: rabbitmq
           host: 127.0.0.1
           port: 5672
           user: openstack
           password: pwd
           virtual_host: '/openstack'
   backend:
       lvmdriver-1:
           engine: lvm
           type_name: lvmdriver-1
           volume_group: cinder-volume
```

- Cinder setup for IBM Storwize:
**cinder:**
- **volume:**
  - **enabled:** true
  - **backend:**
    - **7k2_SAS:**
      - **engine:** storwize
      - **type_name:** 7k2 SAS disk
      - **host:** 192.168.0.1
      - **port:** 22
      - **user:** username
      - **password:** pass
      - **connection:** FC/iSCSI
      - **multipath:** true
      - **pool:** SAS7K2
    - **10k_SAS:**
      - **engine:** storwize
      - **type_name:** 10k SAS disk
      - **host:** 192.168.0.1
      - **port:** 22
      - **user:** username
      - **password:** pass
      - **connection:** FC/iSCSI
      - **multipath:** true
      - **pool:** SAS10K
    - **15k_SAS:**
      - **engine:** storwize
      - **type_name:** 15k SAS
      - **host:** 192.168.0.1
      - **port:** 22
      - **user:** username
      - **password:** pass
      - **connection:** FC/iSCSI
      - **multipath:** true
      - **pool:** SAS15K

- **Cinder setup with NFS:**

  **cinder:**
  - **controller:**
    - **enabled:** true
    - **default_volume_type:** nfs-driver
  - **backend:**
    - **nfs-driver:**
      - **engine:** nfs
      - **type_name:** nfs-driver
**volume_group:** cinder-volume  
**path:** /var/lib/cinder/nfs  
**devices:**  
- 172.16.10.110:/var/nfs/cinder  
**options:** rw,sync

- Cinder setup with NetApp:

```yaml
cinder:
  controller:
    backend:
      netapp:
        engine: netapp
        type_name: netapp
        user: openstack
        vserver: vm1
        server_hostname: 172.18.2.3
        password: password
        storage_protocol: nfs
        transport_type: https
        lun_space_reservation: enabled
        use_multipath_for_image_xfer: True
        nas_secure_file_operations: false
        nas_secure_file_permissions: false
        devices:
          - 172.18.1.2:/vol_1
          - 172.18.1.2:/vol_2
          - 172.18.1.2:/vol_3
          - 172.18.1.2:/vol_4

linux:
  system:
    package:
      nfs-common:
        version: latest
```

- Cinder setup with Hitachi VPS:

```yaml
cinder:
  controller:
    enabled: true
  backend:
    hus100_backend:
      type_name: HUS100
      backend: hus100-backend
      engine: hitachi_vsp
      connection: FC
```

- Cinder setup with Hitachi VPS with defined ldev range:
Cinder setup with Ceph:

```yaml
  cinder:
    controller:
      enabled: true
    backend:
      ceph_backend:
        type_name: standard-iops
        backend: ceph_backend
        backend_host: ceph
        pool: volumes
        engine: ceph
        user: cinder
        secret_uuid: da74ccb7-aa59-1721-a172-0006b1aa4e3e
        client_cinder_key: AQDOavlU6BsSJhAAAnpFR906mvdpdfRqLHwu0Uw==
        report_discard_supported: True
        image_volume_cache_enabled: False
```

Note

Ceph official documentation

Cinder setup with HP3par:

```yaml
  cinder:
    controller:
      enabled: true
    backend:
      hp3par_backend:
        type_name: hp3par
        backend: hp3par_backend
        user: hp3paruser
        password: something
        url: http://10.10.10.10/api/v1
```
cpg: OpenStackCPG
host: 10.10.10.10
login: hp3paradmin
sanpassword: something
debug: True
snapcpg: OpenStackSNAPCPG

- Cinder setup with Fujitsu Eternus:

```yaml
cinder:
  volume:
    enabled: true
  backend:
    10kThinPro:
      type_name: 10kThinPro
      engine: fujitsu
      pool: 10kThinPro
      host: 192.168.0.1
      port: 5988
      user: username
      password: pass
      connection: FC/iSCSI
      name: 10kThinPro
    10k_SAS:
      type_name: 10k_SAS
      pool: SAS10K
      engine: fujitsu
      host: 192.168.0.1
      port: 5988
      user: username
      password: pass
      connection: FC/iSCSI
      name: 10k_SAS
```

- Cinder setup with IBM GPFS filesystem:

```yaml
cinder:
  volume:
    enabled: true
  backend:
    GPFS-GOLD:
      type_name: GPFS-GOLD
      engine: gpfs
      mount_point: '/mnt/gpfs-openstack/cinder/gold'
    GPFS-SILVER:
      type_name: GPFS-SILVER
      engine: gpfs
      mount_point: '/mnt/gpfs-openstack/cinder/silver'
```
• Cinder setup with HP LeftHand:

```yaml
cinder:
  volume:
    enabled: true
  backend:
    HP-LeftHand:
      type_name: normal-storage
      engine: hp_lefthand
      api_url: 'https://10.10.10.10:8081/lhos'
      username: user
      password: password
      clustername: cluster1
      iscsi_chap_enabled: false
```

• Extra parameters for HP LeftHand:

```
   cinder type-key normal-storage set hplh:data_pl=r-10-2 hplh:provisioning=full
```

• Cinder setup with Solidfire:

```yaml
cinder:
  volume:
    enabled: true
  backend:
    solidfire:
      type_name: normal-storage
      engine: solidfire
      san_ip: 10.10.10.10
      san_login: user
      san_password: password
      clustername: cluster1
      sf_emulate_512: false
      sf_api_port: 14443
      host: ctl01
      # for compatibility with old versions
      sf_account_prefix: PREFIX
```

• Cinder setup with Block Device driver:

```yaml
cinder:
  volume:
    enabled: true
  backend:
    bdd:
      engine: bdd
      enabled: true
      type_name: bdd
```
**devices:**
- sdb
- sdc
- sdd

- Enable cinder-backup service for ceph

```
cinder:
  controller:
    enabled: true
  version: mitaka
  backup:
    engine: ceph
    ceph_conf: "/etc/ceph/ceph.conf"
    ceph_pool: backup
    ceph_stripe_count: 0
    ceph_stripe_unit: 0
    ceph_user: cinder
    ceph_chunk_size: 134217728
    restore_discard_excess_bytes: false

  volume:
    enabled: true
    version: mitaka
    backup:
      engine: ceph
      ceph_conf: "/etc/ceph/ceph.conf"
      ceph_pool: backup
      ceph_stripe_count: 0
      ceph_stripe_unit: 0
      ceph_user: cinder
      ceph_chunk_size: 134217728
      restore_discard_excess_bytes: false
```

- Auditing filter (CADF) enablement:

```
cinder:
  controller:
    audit:
      enabled: true
      ....
      filter_factory: 'keystonemiddleware.audit:filter_factory'
      map_file: '/etc/pycadf/cinder_api_audit_map.conf'
      ....

  volume:
    audit:
      enabled: true
      ....
```
filter_factory: 'keystonemiddleware.audit:filter_factory'
map_file: '/etc/pycadf/cinder_api_audit_map.conf'

• Cinder setup with custom availability zones:

```
cinder:
  controller:
    default_availability_zone: my-default-zone
    storage_availability_zone: my-custom-zone-name
  volume:
    default_availability_zone: my-default-zone
    storage_availability_zone: my-custom-zone-name
```

The default_availability_zone is used when a volume has been created, without specifying a zone in the create request as this zone must exist in your configuration.

The storage_availability_zone is an actual zone where the node belongs to and must be specified per each node.

• Cinder setup with custom non-admin volume query filters:

```
cinder:
  controller:
    query_volume_filters:
      - name
      - status
      - metadata
      - availability_zone
      - bootable
```

• public_endpoint and osapi_volume_base_url:

  • public_endpoint
    Used for configuring versions endpoint
  • osapi_volume_base_URL
    Used to present Cinder URL to users

These parameters can be useful when running Cinder under load balancer in SSL.

```
cinder:
  controller:
    public_endpoint_address: https://${_param:cluster_domain}:8776
```

• Client role definition:

```
cinder:
  client:
```
enabled: true
identity:
  host: 127.0.0.1
  port: 35357
  project: service
  user: cinder
  password: pwd
  protocol: http
  endpoint_type: internalURL
  region_name: RegionOne
connection_params:
  connect_retries: 5
  connect_retry_delay: 1
backend:
  ceph:
    type_name: standard-iops
    engine: ceph
    key:
      conn_speed: fibre-10G

• Barbican integration enablement:

cinder:
  controller:
    barbican:
      enabled: true

• Keystone API version specification (v3 is default):

cinder:
  controller:
    identity:
      api_version: v2.0

Enhanced logging with logging.conf

By default logging.conf is disabled. You can enable per-binary logging.conf by setting the following parameters:

• openstack_log_appender
  Set to true to enable log_config_append for all OpenStack services
• openstack_fluentd_handler_enabled
  Set to true to enable FluentHandler for all OpenStack services
• openstack_ossyslog_handler_enabled
  Set to true to enable OSSysLogHandler for all Openstack services

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.

To configure this functionality with pillar:
Enable x509 and ssl communication between Cinder and Galera cluster

By default communication between Cinder and Galera is unsecure.

You can set custom certificates in pillar:
For more details, see: OpenStack documentation.

Cinder service on compute node with memcached caching and security strategy:

```
cinder:
  volume:
    enabled: true
    ...  
  cache:
    engine: memcached
    members:
    - host: 127.0.0.1
      port: 11211
    - host: 127.0.0.1
      port: 11211
  security:
    enabled: true
    strategy: ENCRYPT
    secret_key: secret
```

Cinder service on controller node with memcached caching and security strategy:

```
cinder:
  controller:
    enabled: true
    ...  
  cache:
    engine: memcached
    members:
    - host: 127.0.0.1
      port: 11211
    - host: 127.0.0.1
      port: 11211
  security:
    enabled: true
    strategy: ENCRYPT
    secret_key: secret
```

Cinder service to define iscsi_helper for lvm backend:

```
cinder:
  volume:
    ...  
```
backend:
  lvm:
    ...  
    engine: lvm
    iscsi_helper: tgtadm

Cinder service to define scheduler_default_filters and which filter class names to use for filtering hosts when not specified in the request:

cinder:
  volume:
    ...
    scheduler_default_filters: (filters)

cinder:
  controller:
    ...
    scheduler_default_filters: (filters)

Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.pre</code></td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade</code></td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.post</code></td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.post</code></td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.verify</code></td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>
DOCKER

Usage
Docker is a platform for developers and system administrators for developing, shipping, and running applications. Docker enables you to quickly assemble applications from components and eliminates the friction that can come when shipping the code. Also, with Docker, you get your code tested and deployed into production as fast as possible.

This file provides the sample configurations for different use cases.

Docker host configuration samples

• Docker host sample pillar configuration:

```yaml
docker:
  host:
    enabled: true
    options:
      bip: 172.31.255.1/16
      insecure-registries:
        - 127.0.0.1
        - 10.0.0.1
      log-driver: json-file
      log-opts:
        max-size: 50m
```

• Proxy configuration for Docker host:

```yaml
docker:
  host:
    proxy:
      enabled: true
      http: http://user:pass@proxy:3128
      https: http://user:pass@proxy:3128
      no_proxy:
        - localhost
        - 127.0.0.1
        - docker-registry
```

Docker Swarm configuration samples
Role can be master, manager, or worker. Master is the first manager that will initialize the swarm.

• Metadata for manager (the first node):
`docker`:
  `host`:
    `enabled`: true
  `swarm`:
    `role`: manager
    `advertise_addr`: 192.168.1.5
  `bind`:
    `address`: 192.168.1.5
    `port`: 2377

• Metadata for worker:

`docker`:
  `host`:
    `enabled`: true
  `swarm`:
    `role`: worker
  `master`:
    `host`: 192.168.1.5
    `port`: 2377

The token to join to the master node is obtained from grains using `salt.mine`. In case of any `join_token` undefined issues, verify that you have `docker_swarm_grains` available.

Docker client configuration samples

• Container:

  `docker`:
  `client`:
    `container`:
      `jenkins`:
        # Don't start automatically
        `start`: false
        `restart`: unless-stopped
        `image`: jenkins:2.7.1
        `ports`:
          - 8081:8080
          - 50000:50000
        `environment`:
          `JAVA_OPTS`: "-Dhudson.footerURL=https://www.example.com"
        `volumes`:
          - /srv/volumes/jenkins:/var/jenkins_home

• Docker compose:

  The states providing this functionality include:

  • `docker.client.stack`
• docker.client.compose
Stack is new and works with Docker Swarm Mode. Compose is legacy and works only if node is not a member of Swarm. Metadata for both states are similar and differs only in implementation.

• Stack:

```yaml
docker:
  client:
    stack:
      django_web:
        enabled: true
        update: true
        environment:
          SOMEVAR: somevalue
        version: "3.1"
        service:
          db:
            image: postgres
          web:
            image: djangoapp
            volumes:
              - /srv/volumes/django:/srv/django
            ports:
              - 8000:8000
            depends_on:
              - db
```

• Compose
You can install docker-compose using one of the following options:

• Distribution package (default)
• Using Pip
• Using Docker container

Install docker-compose using Docker (default is distribution package):

```yaml
docker:
  client:
    compose:
      source:
        engine: docker
        image: docker/compose:1.8.0
    django_web:
      # Run up action, any positional argument to docker-compose CLI
      # If not defined, only docker-compose.yml is generated
      status: up
      # Run image pull every time state is run triggering container
      # restart in case it's changed
      pull: true
```
Docker Service configuration samples

To deploy service in Swarm mode, you can use docker.client.service:

```yaml
parameters:
  docker:
    client:
      service:
        postgresql:
          environment:
            POSTGRES_USER: user
            POSTGRES_PASSWORD: password
            POSTGRES_DB: mydb
          restart:
            condition: on-failure
          image: "postgres:9.5"
          ports:
            - 5432:5432
          volume:
```
Docker Registry configuration samples

- Basic Docker Registry configuration:

```yaml
data:
  type: bind
  source: /srv/volumes/postgresql/maas
  destination: /var/lib/postgresql/data

docker:
  registry:
    log:
      level: debug
      formatter: json
    cache:
      engine: redis
      host: localhost
    storage:
      engine: filesystem
      root: /srv/docker/registry
    bind:
      host: 0.0.0.0
      port: 5000
    hook:
      mail:
        levels:
        - panic
        # Options are rendered as yaml as is so use hook-specific options here
        options:
          smtp:
            addr: smtp.sendhost.com:25
            username: sendernamename
            password: password
            insecure: true
            from: name@sendhost.com
            to:
              - name@receivehost.com

- Docker login to private registry:

```yaml

docker:
  host:
    enabled: true
  registry:
    first:
      address: private.docker.com
      user: username
```
password: password
second:
  address: private2.docker.com
  user: username2
password: password2

Docker container service management configuration samples

- Start a service in a container:

```yaml
contrail_control_started:
dockerng_service.start:
  - container: f020d0d3ef8a
  - service: contrail-control
```

or

```yaml
contrail_control_started:
dockerng_service.start:
  - container: contrail_controller
  - service: contrail-control
```

- Stop a service in a container:

```yaml
contrail_control_stoped:
dockerng_service.stop:
  - container: f020d0d3ef8a
  - service: contrail-control
```

- Restart a service in a container:

```yaml
contrail_control_restart:
dockerng_service.restart:
  - container: f020d0d3ef8a
  - service: contrail-control
```

- Enable a service in a container:

```yaml
contrail_control_enable:
dockerng_service.enable:
  - container: f020d0d3ef8a
  - service: contrail-control
```

- Disable a service in a container:
contrail_control_disable:
dockerng_service.disable:
- container: f020d0d3efa8
- service: contrail-control

See also
- https://docs.docker.com/installation/ubuntu-linux/
- https://github.com/saltstack-formulas/docker-formula

Metadata schema specifications for Docker client

Core properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>engine</td>
<td>string</td>
<td>Docker compose installation engine</td>
</tr>
<tr>
<td>image</td>
<td>string</td>
<td>Docker compose image</td>
</tr>
<tr>
<td>version</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>pkgs</td>
<td>array</td>
<td>List of Docker compose packages to be installed</td>
</tr>
<tr>
<td>base</td>
<td>string</td>
<td>base directory to store application compose files</td>
</tr>
<tr>
<td>container</td>
<td>object</td>
<td>Docker containers configuration</td>
</tr>
<tr>
<td>network</td>
<td>object</td>
<td>Docker networks configuration</td>
</tr>
<tr>
<td>service</td>
<td>object</td>
<td>description_notset</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Docker client configuration</td>
</tr>
<tr>
<td>pkgs</td>
<td>array</td>
<td>List of Docker client packages to be installed</td>
</tr>
<tr>
<td>images</td>
<td>array</td>
<td>List of images to pull to the node</td>
</tr>
<tr>
<td>stack</td>
<td>object</td>
<td>description_notset</td>
</tr>
<tr>
<td>registry</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

_target_registr_y

_registry

_name

_target_registr_y

_endpoint

_metadata_schema

_data

_docker_service definition
## Metadata schema specifications for Docker host

### Core properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>service</td>
<td>string</td>
<td>docker service name</td>
</tr>
<tr>
<td>pkgs</td>
<td>array</td>
<td>List of Docker packages to be installed</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Docker host configuration</td>
</tr>
<tr>
<td>no_proxy</td>
<td>array</td>
<td>description_notset</td>
</tr>
<tr>
<td>http</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>https</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>insecure_registries</td>
<td>ERROR</td>
<td>description_notset</td>
</tr>
<tr>
<td>insecure_registries</td>
<td>ERROR</td>
<td>description_notset</td>
</tr>
<tr>
<td>experimental</td>
<td>ERROR</td>
<td>description_notset</td>
</tr>
<tr>
<td>experimental</td>
<td>ERROR</td>
<td>description_notset</td>
</tr>
<tr>
<td>registry</td>
<td>object</td>
<td>description_notset</td>
</tr>
</tbody>
</table>

_for details, see: _insecure_registries definition._

_for details, see: _experimental definition._

### _experimental definition

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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_experimenta_

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>docker</td>
<td>object</td>
<td>experimental options</td>
</tr>
</tbody>
</table>

_insecure_registries definition_

<table>
<thead>
<tr>
<th>Name</th>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>insecure_registries</td>
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<td>description_notset</td>
</tr>
</tbody>
</table>

**Metadata schema specifications for Docker registry**

**Core properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>formatter</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>level</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>hooks</td>
<td>object</td>
<td>description_notset</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>secret</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>port</td>
<td>[‘integer’, ‘string’]</td>
<td>description_notset</td>
</tr>
<tr>
<td>engine</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>password</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>db</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>port</td>
<td>[‘integer’, ‘string’]</td>
<td>description_notset</td>
</tr>
<tr>
<td>engine</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>root</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Docker registry configuration</td>
</tr>
<tr>
<td>pkgs</td>
<td>array</td>
<td>List of Docker registry packages to be installed</td>
</tr>
</tbody>
</table>

**Metadata schema specifications for Docker Swarm**

**Core properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
</table>

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<table>
<thead>
<tr>
<th>join_token</th>
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<th>description_notset</th>
</tr>
</thead>
<tbody>
<tr>
<td>network</td>
<td>object</td>
<td>description_notset</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>port</td>
<td>['integer', 'string']</td>
<td>description_notset</td>
</tr>
<tr>
<td>port</td>
<td>['integer', 'string']</td>
<td>description_notset</td>
</tr>
<tr>
<td>address</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>role</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Docker Swarm configuration</td>
</tr>
<tr>
<td>advertise_addr</td>
<td>string</td>
<td>description_notset</td>
</tr>
</tbody>
</table>
GALERA

Usage
Galera Cluster for MySQL is a true Multimaster Cluster based on synchronous replication. Galera Cluster is an easy-to-use, high-availability solution, which provides high system uptime, no data loss and scalability for future growth.

Sample pillars
Galera cluster master node

galera:
  version:
    mysql: 5.6
    galera: 3
master:
  enabled: true
  name: openstack
  bind:
    address: 192.168.0.1
    port: 3306
members:
  - host: 192.168.0.1
    port: 4567
  - host: 192.168.0.2
    port: 4567
admin:
  user: root
  password: pass
sst:
  user: sstuser
  password: sstpassword
database:
  name:
    encoding: 'utf8'
  users:
    - name: 'username'
      password: 'password'
      host: 'localhost'
      rights: 'all privileges'
      database: '*.*'

Galera cluster slave node

galera:
  slave:
    enabled: true
name: openstack
bind:
  address: 192.168.0.2
  port: 3306
members:
- host: 192.168.0.1
  port: 4567
- host: 192.168.0.2
  port: 4567
admin:
  user: root
  password: pass
sst:
  user: sstuser
  password: sstpassword

Enable TLS support:

galera:
  slave or master:
    ssl:
      enabled: True
ciphers:
    DHE-RSA-AES128-SHA:
      enabled: True
    DHE-RSA-AES256-SHA:
      enabled: True
    EDH-RSA-DES-CBC3-SHA:
      name: EDH-RSA-DES-CBC3-SHA
      enabled: True
    AES128-SHA:AES256-SHA:
      name: AES128-SHA:AES256-SHA
      enabled: True
    DES-CBC3-SHA:
      enabled: True

# path
cert_file: /etc/mysql/ssl/cert.pem
key_file: /etc/mysql/ssl/key.pem
ca_file: /etc/mysql/ssl/ca.pem

# content (not required if files already exists)
key: << body of key >>
cert: << body of cert >>
cacert_chain: << body of ca certs chain >>

Additional mysql users:
```yaml
mysql:
  server:
    users:
      - name: clustercheck
        password: clustercheck
        database: '*.*'
        grants: PROCESS
      - name: inspector
        host: 127.0.0.1
        password: password
        databases:
          mydb:
            - database: mydb
            - table: mytable
            - grant_option: True
            - grants:
              - all privileges

Additional mysql SSL grants:

```yaml
mysql:
  server:
    users:
      - name: clustercheck
        password: clustercheck
        database: '*.*'
        grants: PROCESS
        ssl_option:
          - SSL: True
          - X509: True
          - SUBJECT: <subject>
          - ISSUER: <issuer>
          - CIPHER: <cipher>

Additional check params:

```yaml
galera:
  clustercheck:
    - enabled: True
    - user: clustercheck
    - password: clustercheck
    - available_when_donor: 0
    - available_when_readonly: 1
    - port 9200

Configurable soft parameters
```
• galera_innodb_buffer_pool_size
  Default is 3138M
• galera_max_connections
  Default is 20000
• galera_innodb_read_io_threads
  Default is 8
• galera_innodb_write_io_threads
  Default is 8
• galera_wsrep_slave_threads
  Default is 8
• galera_xtrabackup_parallel
  Default is 4
• galera_error_log_enabled
  Default is true
• galera_error_log_path
  Default is /var/log/mysql/error.log

When the following parameters are set to 0, their defaults will be calculated automatically based on the number of CPU cores:

• galera_innodb_read_io_threads
• galera_innodb_write_io_threads
• galera_wsrep_slave_threads

Usage:

```plaintext
_param:
galera_innodb_buffer_pool_size: 1024M
galera_max_connections: 200
galera_innodb_read_io_threads: 16
galera_innodb_write_io_threads: 16
galera_wsrep_slave_threads: 8
galera_xtrabackup_parallel: 2
galera_error_log_enabled: true
galera_error_log_path: /var/log/mysql/error.log
```

Usage

MySQL Galera check scripts

```sql
mysql> SHOW STATUS LIKE 'wsrep%';
mysql> SHOW STATUS LIKE 'wsrep_cluster_size';
```

Galera monitoring command, performed from extra server
garbd -a gcomm://ipaddrofone:4567 -g my_wsrep_cluster -l /tmp/1.out -d

1. salt-call state.sls mysql
2. Comment everything starting wsrep* (wsrep_provider, wsrep_cluster, wsrep_sst)
3. Service mysql start
4. Run on each node mysql_secure_install and filling root password.

   Enter current password for root (enter for none):
   OK, successfully used password, moving on...

   Setting the root password ensures that nobody can log into the MySQL root user without the proper authorisation.

   Set root password? [Y/n] y
   New password:
   Re-enter new password:
   Password updated successfully!
   Reloading privilege tables..
   ... Success!

   By default, a MySQL installation has an anonymous user, allowing anyone to log into MySQL without having to have a user account created for them. This is intended only for testing, and to make the installation go a bit smoother. You should remove them before moving into a production environment.

   Remove anonymous users? [Y/n] y
   ... Success!

   Normally, root should only be allowed to connect from 'localhost'. This ensures that someone cannot guess at the root password from the network.

   Disallow root login remotely? [Y/n] n
   ... skipping.

   By default, MySQL comes with a database named 'test' that anyone can access. This is also intended only for testing, and should be removed before moving into a production environment.

   Remove test database and access to it? [Y/n] y
   - Dropping test database...
   ... Success!
   - Removing privileges on test database...
   ... Success!

   Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
... Success!

Cleaning up...

5. Service mysql stop
6. Uncomment all wsrep* lines except first server, where leave only in my.cnf
   wsrep_cluster_address='gcomm://';
7. Start first node
8. Start third node which is connected to first one
9. Start second node which is connected to third one
10. After starting cluster, it must be change cluster address at first starting node without restart
    database and change config my.cnf.

   mysql> SET GLOBAL wsrep_cluster_address='gcomm://10.0.0.2';

Read more

- https://github.com/CaptTofu/ansible-galera
GERRIT

Usage
Gerrit provides web based code review and repository management for the Git version control system.

Sample pillars

Simple gerrit service

```yaml
gerrit:
  server:
    enabled: true
    source:
      engine: http
      hash: 2e17064b8742c4622815593ec496c571
```

Full service setup

```
gerrit:
  server:
    enabled: true
    canonical_web_url: http://10.10.10.148:8082/
    email_private_key: 
    token_private_key: 
    initial_user:
      full_name: John Doe
      email: mail@jdoe.com
      username: jdoe
  plugin:
    download-commands:
      engine: gerrit
    replication:
      engine: gerrit
    reviewnotes:
      engine: gerrit
    singleusergroup:
      engine: gerrit
  sshd:
    threads: 64
    batch_threads: 16
    max_connections_per_user: 64
  database:
    engine: postgresql
    host: localhost
    port: 5432
    name: gerrit
    user: gerrit
    password: ${_param:postgresql_gerrit_password}
    pool_limit: 250
    pool_max_idle: 16
```

Gerrit LDAP authentification

```yaml
gerrit:
  server:
    enable: true
    auth:
      engine: LDAP
      ldap_server: ldap://ldap.mycompany.net
      ldap_account_base: dc=company,dc=net
      ldap_group_base: ou=Groups,dc=company,dc=net
      ldap_account_pattern: uid=${username}
      ldap_group_pattern: (cn=${groupname})
      ldap_group_query: true
      ldap_group_member_pattern: (memberUid=${username})
```

Gerrit change auto abandon
Gerrit client enforcing groups

```yaml
gerrit:
  server:
    change_cleanup: abandone_after: 3months
```

Gerrit client enforcing users, install using pip

```yaml
gerrit:
  client:
    group:
      Admin001:
        description: admin 01
      Admin002:
        description: admin 02
```

Gerrit client enforcing projects

```yaml
gerrit:
  client:
    enabled: True
  server:
    host: 10.10.10.148
    user: newt
    key: |
      -----BEGIN RSA PRIVATE KEY-----
      MIIEowIBAAKCAQEAs0Y8mxS3dfs5zG8Du5vdBkfOCONCg11UEmFZlirJ8oBglOd54
      QgmKDFB7oP9eTCg29k/rix1uJWhhVCMBzrWzH5IODO+tyy/tK66pv2BwTfTDBa
      ...y
      l1UrxQKBgEklBTuEiDRibKGXQBvAYvK2He09hWpqtpt9/DVeI6s4A1bbTDHyoP
      jvMXms60ID/A5OpG33LWHNNzQBP4865xG75LB+Xs5sp5j2/b7VF5LJhGjv9Mk
      ydby8iuuvati2uF133kALLqnrWFVTYQq/1OfW5gl0v1L6kv94dU
      -----END RSA PRIVATE KEY-----
```
email: "Project Creator <infra@lists.domain.com>"

project:
  test_salt_project:
    enabled: true

Gerrit client enforcing project, full project example

gerrit:
  client:
    enabled: True
  project:
    test_salt_project:
      enabled: true
      access:
        "refs/heads/*":
          actions:
            - name: abandon
              group: openstack-salt-core
            - name: create
              group: openstack-salt-release
        labels:
          - name: Code-Review
            group: openstack-salt-core
            score: -2..+2
          - name: Workflow
            group: openstack-salt-core
            score: -1..+1
        "refs/tags/*":
          actions:
            - name: pushSignedTag
              group: openstack-salt-release
              force: true
          inherit_access: All-Projects
          require_change_id: true
          require_agreement: true
          merge_content: true
          action: "fast forward only"

  client:
    enabled: True
  group:
    groupname:
      enabled: true
      members:
        - username
    account:
<table>
<thead>
<tr>
<th>Key</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>username:</td>
<td></td>
</tr>
<tr>
<td>enabled:</td>
<td>true</td>
</tr>
<tr>
<td>full_name:</td>
<td>User Example</td>
</tr>
<tr>
<td>email:</td>
<td><a href="mailto:mail@newt.cz">mail@newt.cz</a></td>
</tr>
<tr>
<td>public_key:</td>
<td>rsassh</td>
</tr>
<tr>
<td>http_password</td>
<td>passwd</td>
</tr>
</tbody>
</table>

Gerrit client proxy

```yaml
gerrit:
  client:
    proxy:
      http_proxy: http://192.168.10.15:8000
      https_proxy: http://192.168.10.15:8000
      no_proxy: 192.168.10.90
```

Sample project access

```yaml
[access "refs/*"]
  read = group Administrators
  read = group Anonymous Users
[access "refs/for/refs/*"]
  push = group Registered Users
  pushMerge = group Registered Users
[access "refs/heads/*"]
  create = group Administrators
  create = group Project Owners
  forgeAuthor = group Registered Users
  forgeCommitter = group Administrators
  forgeCommitter = group Project Owners
  push = group Administrators
  push = group Project Owners
  label-Code-Review = -2..+2 group Administrators
  label-Code-Review = -2..+2 group Project Owners
  label-Code-Review = -1..+1 group Registered Users
  label-Verified = -1..+1 group Non-Interactive Users
  submit = group Administrators
  submit = group Project Owners
  editTopicName = +force group Administrators
  editTopicName = +force group Project Owners
[access "refs/meta/config"]
  exclusiveGroupPermissions = read
  read = group Administrators
  read = group Project Owners
  push = group Administrators
  push = group Project Owners
  label-Code-Review = -2..+2 group Administrators
  label-Code-Review = -2..+2 group Project Owners
```

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submit = group Administrators
submit = group Project Owners
[access "refs/tags/*"]
pushTag = group Administrators
pushTag = group Project Owners
pushSignedTag = +force group Administrators
pushSignedTag = group Project Owners
[label "Code-Review"]
    function = MaxWithBlock
    copyMinScore = true
    value = -2 This shall not be merged
    value = -1 I would prefer this is not merged as is
    value = 0 No score
    value = +1 Looks good to me, but someone else must approve
    value = +2 Looks good to me, approved
[label "Verified"]
    function = MaxWithBlock
    copyMinScore = true
    value = -1 Fails
    value = 0 No score
    value = +1 Verified

Gerrit replication enable

gerrit:
    server:
        plugin:
            replication:
                engine: gerrit
                replication:
                    gerrit2.localdomain:
                        remote_url: user@gerrit2.localdomain:/var/lib/gerrit
                        remote_port: 22
                        replication_user: gerrit2

For creating ssh keys use openssh state

Gerrit hide CI

gerrit:
    server:
        hideci:
            ci_user_name: ci_user

Read more

- https://www.gerritcodereview.com/
• https://gerrit-review.googlesource.com/Documentation/
• https://github.com/openstack-infra/puppet-gerrit/
• https://gerrit-ci.gerritforge.com/
• https://github.com/morucci/exzuul
GLANCE

Usage

The Glance project provides services for discovering, registering, and retrieving virtual machine images. Glance has a RESTful API that allows querying of VM image metadata as well as retrieval of the actual image.

Sample pillars

```yaml
glance:
  server:
    enabled: true
    version: juno
    workers: 8
  glance_uid: 302
  glance_gid: 302
  policy:
    publicize_image:
      - "role:admin"
      - "role:image_manager"
  database:
    engine: mysql
    host: 127.0.0.1
    port: 3306
    name: glance
    user: glance
    password: pwd
  identity:
    engine: keystone
    host: 127.0.0.1
    port: 35357
    tenant: service
    user: glance
    password: pwd
  message_queue:
    engine: rabbitmq
    host: 127.0.0.1
    port: 5672
    user: openstack
    password: pwd
    virtual_host: '/openstack'
  storage:
    engine: file
  images:
    - name: "CirrOS 0.3.1"
      format: qcow2
      file: cirros-0.3.1-x86_64-disk.img
```
The pagination is controlled by the `api_limit_max` and `limit_param_default` parameters as shown above:

- `api_limit_max`
  
  Defines the maximum number of records that the server will return.

- `limit_param_default`
  
  The default limit parameter that applies if the request didn’t define it explicitly.

Configuration of the policy.json file:

```json
glance:
  server:
    ...
    policy:
      publicize_image: "role:admin"
      # Add key without value to remove line from policy.json
      add_member:
```

Keystone and cinder region

```json
glance:
  server:
    enabled: true
    version: kilo
    ...
    identity:
      engine: keystone
      host: 127.0.0.1
      region: RegionTwo
      ...
```

Ceph integration glance

```json
glance:
  server:
    enabled: true
    version: juno
    storage:
```
**engine**: rbd,http  
**user**: glance  
**pool**: images  
**chunk_size**: 8  
**client_glance_key**: AQDOavlU6BsSjhAAmpFR906mvdgdfRqLHu0Uw==

**VMware integration:**

```yaml
**glance**:
  **server**:
    **storage**:
      **engine**: vmware  
      **default_store**: vsphere  
      **vmware**:
        enabled: true  
        **server_host**: 1.2.3.4  
        **server_username**: vmware_username  
        **server_password**: vmware_password  
      **datastores**:
        **data1**:
          name: datastore_name1  
          enabled: true  
          path: datacenter_name  
          weight: 10  
        **data2**:
          name: datastore_name2  
          enabled: true  
          path: datacenter_name
```

**RabbitMQ HA setup**

```yaml
**glance**:
  **server**:
    ....  
    **message_queue**:
      **engine**: rabbitmq  
      **members**:
      - **host**: 10.0.16.1  
        - **host**: 10.0.16.2  
        - **host**: 10.0.16.3  
      **user**: openstack  
      **password**: pwd  
      virtual_host: '/openstack'
    ....
```

**Quota Options**
glance:
  server:
    ....
    quota:
      image_member: -1
      image_property: 256
      image_tag: 256
      image_location: 15
      user_storage: 0
    ....

Configuring TLS communications

Note
By default, system wide installed CA certs are used, so cacert_file param is optional, as well as cacert.

- **RabbitMQ TLS**

  glance:
  server:
    message_queue:
      port: 5671
    ssl:
      enabled: True
      (optional) cacert: cert body if the cacert_file does not exists
      (optional) cacert_file: /etc/openstack/rabbitmq-ca.pem
      (optional) version: TLSv1_2

- **MySQL TLS**

  glance:
  server:
    database:
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/mysql-ca.pem

- **Openstack HTTPS API**

  Set the https as protocol at glance:server sections:
glance:
  server:
    identity:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
    registry:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
    storage:
      engine: cinder, swift
      cinder:
        protocol: https
        (optional) cacert_file: /etc/openstack/proxy.pem
      swift:
        store:
          (optional) cafile: /etc/openstack/proxy.pem

Enable Glance Image Cache:

glance:
  server:
    image_cache:
      enabled: true
      enable_management: true
      directory: /var/lib/glance/image-cache/
      max_size: 21474836480

Enable auditing filter (CADF):

glance:
  server:
    audit:
      enabled: true

    filter_factory: 'keystonemiddleware.audit:filter_factory'
    map_file: '/etc/pycadf/glance_api_audit_map.conf'

Swift integration glance

```yaml
glance:
  server:
    enabled: true
    version: mitaka
    storage:
      engine: swift,http
```
Another way, which also supports multiple swift backends, can be configured like this:

```yaml
swift:
  store:
    auth:
      address: http://keystone.example.com:5000/v2.0
      version: 2
      endpoint_type: publicURL
      container: glance
      create_container_on_put: true
      retry_get_count: 5
      user: 2ec7966596504f59acc3a76b3b9d9291:glance-user
      key: someRandomPassword

references:
  my_objectstore_reference_1:
    auth:
      address: http://keystone.example.com:5000/v2.0
      version: 2
      user: 2ec7966596504f59acc3a76b3b9d9291:glance-user
      key: someRandomPassword

Enable CORS parameters:

```yaml
glance:
  server:
    cors:
      expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_methods: GET,PUT,POST,DELETE,PATCH
      allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_credentials: True
      max_age: 86400
```

Enable Viewing Multiple Locations
If you want to expose all locations available (for example when you have multiple backends configured), then you can configure this like so:

```
glance:
  server:
    show_multiple_locations: True
    location_strategy: store_type
    store_type_preference: rbd,swift,file
```

Note
The `show_multiple_locations` option is deprecated since Newton and is planned to be handled by policy files only starting with the Pike release.

This feature is convenient in a scenario when you have swift and rbd configured and want to benefit from rbd enhancements.

Barbican integration glance

```
glance:
  server:
    barbican:
      enabled: true
```

Adding cron-job

```
glance:
  server:
    cron:
      cache_pruner:
        special_period: '@daily'
      cache_cleaner:
        hour: '5'
        minute: '30'
        daymonth: '*/2'
```

Image cache settings

```
glance:
  server:
    image_cache:
      max_size: 10737418240
      stall_time: 86400
      directory: '/var/lib/glance/image-cache/'
```
Client role

Glance images

```yaml
glance:
  client:
    enabled: true
  server:
    profile_admin:
      image:
        cirros-test:
          visibility: public
          protected: false
          location: http://download.cirros-cloud.net/0.3.4/cirros-0.3.4-i386-disk.img
```

Enhanced logging with logging.conf

By default logging.conf is disabled.

That is possible to enable per-binary logging.conf with new variables:

- `openstack_log_appender`
  Set to true to enable log_config_append for all OpenStack services

- `openstack_fluentd_handler_enabled`
  Set to true to enable FluentHandler for all Openstack services

- `openstack_ossyslog_handler_enabled`
  Set to true to enable OSSysLogHandler for all Openstack services

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.

Also, it is possible to configure this with pillar:

```yaml
glance:
  server:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
          enabled: true
        fluentd:
          enabled: true
        ossyslog:
          enabled: true
```

Enable x509 and ssl communication between Glance and Galera cluster

By default, communication between Glance and Galera is unsecure:
glance:
  server:
    database:
      x509:
        enabled: True

You can set custom certificates in pillar:

glance:
  server:
    database:
      x509:
        cacert: (certificate content)
        cert: (certificate content)
        key: (certificate content)

You can read more about it here
https://docs.openstack.org/security-guide/databases/database-access-control.html

Glance services on controller node with memcached caching and security strategy:

glance:
  server:
    enabled: true
  ...
  cache:
    engine: memcached
    members:
      - host: 127.0.0.1
        port: 11211
      - host: 127.0.0.1
        port: 11211
    security:
      enabled: true
      strategy: ENCRYPT
      secret_key: secret

Show all image locations when returning an image. This configuration option indicates whether
to show all the image locations when returning image details to the user.

glance:
  server:
    enabled: true
  ...
    show_multiple_locations: True

Usage
1. Import new public image:

   ```
   glance image-create --name 'Windows 7 x86_64' --is-public true --container-format bare --disk-format qcow2 < ./win7.qcow2
   ```

2. Change new image’s disk properties

   ```
   glance image-update "Windows 7 x86_64" --property hw_disk_bus=ide
   ```

3. Change new image’s NIC properties

   ```
   glance image-update "Windows 7 x86_64" --property hw_vif_model=rtl8139
   ```

Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.upgrade.pre</td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td><strong>&lt;app&gt;.upgrade.upgrade</strong></td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>&lt;app&gt;.upgrade.upgrade.post</strong></td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td><strong>&lt;app&gt;.upgrade.post</strong></td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td><strong>&lt;app&gt;.upgrade.verify</strong></td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>

**Read more**

GLUSTERFS

Usage
Installs and configures GlusterFS server and client.

Available states

- glusterfs.server
  Sets up GlusterFS server (including both service and setup)
- glusterfs.server.service
  Sets up and start GlusterFS server service
- glusterfs.server.setup
  Sets up GlusterFS peers and volumes
- glusterfs.client
  Sets up GlusterFS client

Available metadata

- metadata.glusterfs.server
  Sets up basic server
- metadata.glusterfs.client
  Sets up client only

Example Reclass
Example for distributed Glance images storage where every control node is gluster peer.

```
  classes:
  - service.glusterfs.server
  - service.glusterfs.client

  _param:
    cluster_node01_address: 192.168.1.21
    cluster_node02_address: 192.168.1.22
    cluster_node03_address: 192.168.1.23

  parameters:
    glusterfs:
      server:
        peers:
          - ${_param:cluster_node01_address}
          - ${_param:cluster_node02_address}
          - ${_param:cluster_node03_address}

      volumes:
```

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glance:
  storage: /srv/glusterfs/glance
  replica: 3
  bricks:
  - ${_param:cluster_node01_address}:/srv/glusterfs/glance
  - ${_param:cluster_node02_address}:/srv/glusterfs/glance
  - ${_param:cluster_node03_address}:/srv/glusterfs/glance
  options:
    cluster.readdir-optimize: On
    nfs.disable: On
    network.remote-dio: On
    diagnostics.client-log-level: WARNING
    diagnostics.brick-log-level: WARNING
  client:
    volumes:
      glance:
        path: /var/lib/glance/images
        server: ${_param:cluster_node01_address}
        user: glance
        group: glance

Example pillar

Server

clusterfs:
  server:
    peers:
      - 192.168.1.21
      - 192.168.1.22
      - 192.168.1.23
    volumes:
      glance:
        storage: /srv/glusterfs/glance
        replica: 3
        bricks:
          - 172.168.1.21:/srv/glusterfs/glance
          - 172.168.1.21:/srv/glusterfs/glance
          - 172.168.1.21:/srv/glusterfs/glance
        enabled: true

Server with forced peer UUID (for peer recovery)

clusterfs:
  server:
    recover_peers:
      kvm03.testserver.local:
enabled: true
uuid: ab6ac060-68f1-4f0b-8de4-70241dfb2279

Client

```
glusterfs:
client:
volumes:
  glance:
    path: /var/lib/glance/images
    server: 192.168.1.21
    user: glance
    group: glance
    enabled: true
```

Read more

- [https://www.gluster.org/](https://www.gluster.org/)
HAPROXY

Usage
The reliable, high-performance TCP/HTTP load balancer.

Sample pillars

Simple admin listener:

```yaml
haproxy:
  proxy:
    enabled: True
    listen:
      admin_page:
        type: admin
        binds:
          - address: 0.0.0.0
            port: 8801
            user: fsdfdsf
            password: dsfdsf
```

Simple stats listener:

```yaml
haproxy:
  proxy:
    enabled: True
    listen:
      admin_page:
        type: stats
        binds:
          - address: 0.0.0.0
            port: 8801
```

Sample pillar with admin:

```yaml
haproxy:
  proxy:
    enabled: True
    mode: http/tcp
    logging: syslog
    maxconn: 1024
    timeout:
      connect: 5000
      client: 50000
      server: 50000
    listen:
      https-in:
```
```yaml
binds:
  - address: 0.0.0.0
    port: 443
servers:
  - name: server1
    host: 10.0.0.1
    port: 8443
  - name: server2
    host: 10.0.0.2
    port: 8443
params: 'maxconn 256'
```

Sample pillar with custom logging:

```yaml
haproxy:
  proxy:
    enabled: True
    mode: http/tcp
    logging: syslog
    maxconn: 1024
    timeout:
      connect: 5000
      client: 50000
      server: 50000
    listen:
      https-in:
        binds:
          address: 0.0.0.0
          port: 443
        servers:
          - name: server1
            host: 10.0.0.1
            port: 8443
          - name: server2
            host: 10.0.0.2
            port: 8443
        params: 'maxconn 256'

haproxy:
  proxy:
    enabled: true
    mode: tcp
    logging: syslog
    max_connections: 1024
    listen:
      mysql:
        type: mysql
```
```yaml
binds:
- address: 10.0.88.70
  port: 3306
servers:
- name: node1
  host: 10.0.88.13
  port: 3306
  params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3
- name: node2
  host: 10.0.88.14
  port: 3306
  params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3 backup
- name: node3
  host: 10.0.88.15
  port: 3306
  params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3 backup

rabbitmq:
  type: rabbitmq
  binds:
  - address: 10.0.88.70
    port: 5672
  servers:
  - name: node1
    host: 10.0.88.13
    port: 5673
    params: check inter 5000 rise 2 fall 3
  - name: node2
    host: 10.0.88.14
    port: 5673
    params: check inter 5000 rise 2 fall 3 backup
  - name: node3
    host: 10.0.88.15
    port: 5673
    params: check inter 5000 rise 2 fall 3 backup

keystone-1:
  type: general-service
  binds:
  - address: 10.0.106.170
    port: 5000
  servers:
  - name: node1
    host: 10.0.88.13
    port: 5000
    params: check

haproxy:
proxy:
  enabled: true
```
mode: tcp
logging: syslog
max_connections: 1024
listen:
  mysql:
    type: mysql
    binds:
      - address: 10.0.88.70
        port: 3306
    servers:
      - name: node1
        host: 10.0.88.13
        port: 3306
        params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3
      - name: node2
        host: 10.0.88.14
        port: 3306
        params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3 backup
      - name: node3
        host: 10.0.88.15
        port: 3306
        params: check inter 15s fastinter 2s downinter 1s rise 5 fall 3 backup

rabbitmq:
  type: rabbitmq
  binds:
    - address: 10.0.88.70
      port: 5672
  servers:
    - name: node1
      host: 10.0.88.13
      port: 5673
      params: check inter 5000 rise 2 fall 3
    - name: node2
      host: 10.0.88.14
      port: 5673
      params: check inter 5000 rise 2 fall 3 backup
    - name: node3
      host: 10.0.88.15
      port: 5673
      params: check inter 5000 rise 2 fall 3 backup

keystone-1:
  type: general-service
  binds:
    - address: 10.0.106.170
      port: 5000
  servers:
    - name: node1
      host: 10.0.88.13
Sample pillar with port range and port offset:

This is useful in listen blocks for definition of multiple servers that differ only by port number in port range block. This situation can be result of multiple single-thread servers deployed in multi-core environment to better utilize the available cores.

For example, five contrail-api workers occupy ports 9100-9104. This can be achieved by using port_range_length in the pillar, port_range_length: 5 in this case. For skipping first worker (worker_id 0), because it has other responsibilities and to avoid overloading it by http requests use the port_range_start_offset in the pillar, port_range_start_offset: 1 in this case, it will only use ports 9101-9104 (Skipping 9100).

- port_range_length parameter is used to calculate port range end
- port_range_start_offset will skip first n ports in port range

For backward compatibility, the name of the first server in port range has no pN suffix.

The sample will result in the following output:

```
listen contrail_api
  bind 172.16.10.252:8082
  balance leastconn
  server ntw01p1 172.16.10.95:9101 check inter 2000 rise 2 fall 3
  server ntw01p2 172.16.10.95:9102 check inter 2000 rise 2 fall 3
  server ntw01p3 172.16.10.95:9103 check inter 2000 rise 2 fall 3
  server ntw01p4 172.16.10.95:9104 check inter 2000 rise 2 fall 3
  server ntw02 172.16.10.96:9100 check inter 2000 rise 2 fall 3
  server ntw02p1 172.16.10.96:9101 check inter 2000 rise 2 fall 3
  server ntw02p2 172.16.10.96:9102 check inter 2000 rise 2 fall 3
  server ntw02p3 172.16.10.96:9103 check inter 2000 rise 2 fall 3
  server ntw02p4 172.16.10.96:9104 check inter 2000 rise 2 fall 3
  server ntw03 172.16.10.94:9100 check inter 2000 rise 2 fall 3
  server ntw03p1 172.16.10.94:9101 check inter 2000 rise 2 fall 3
  server ntw03p2 172.16.10.94:9102 check inter 2000 rise 2 fall 3
  server ntw03p3 172.16.10.94:9103 check inter 2000 rise 2 fall 3
  server ntw03p4 172.16.10.94:9104 check inter 2000 rise 2 fall 3
```

```
haproxy:
  proxy:
    listen:
      contrail_api:
        type: contrail-api
        service_name: contrail
        balance: leastconn
        binds:
```
- **address**: 10.10.10.10  
  **port**: 8082  
**servers**:  
- **name**: ntw01  
  **host**: 10.10.10.11  
  **port**: 9100  
  **port_range_length**: 5  
  **port_range_start_offset**: 1  
  **params**: check inter 2000 rise 2 fall 3  
- **name**: ntw02  
  **host**: 10.10.10.12  
  **port**: 9100  
  **port_range_length**: 5  
  **port_range_start_offset**: 0  
  **params**: check inter 2000 rise 2 fall 3  
- **name**: ntw03  
  **host**: 10.10.10.13  
  **port**: 9100  
  **port_range_length**: 5  
  **params**: check inter 2000 rise 2 fall 3

Sample pillar with a custom and more complex listener (for Artifactory and sub-domains for docker Registries):

```yaml
haproxy:
  proxy:
    listen:
      artifactory:
        mode: http
        options:
          - forwardfor
          - forwardfor header X-Real-IP
          - httpchk
          - httpclose
          - httplog
        sticks:
          - stick on src
          - stick-table type ip size 200k expire 2m
        acl:
          is_docker: "path_reg ^/v[12][/.]*"  
        http_request:
          - action: "set-path /artifactory/api/docker/%[req.hdr(host),lower,field(1,'.')][path]"
          - condition: "if is_docker"
          balance: source
        binds:
          - **address**: ${_param:cluster_vip_address}  
            **port**: 8082  
          ssl:
```

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# This PEM file needs to contain key, cert, CA and possibly intermediate certificates

```
enabled: true
```

```
# This PEM file needs to contain key, cert, CA and possibly intermediate certificates

pem_file: /etc/haproxy/ssl/server.pem
```

```
servers:
  - name: ${_param:cluster_node01_name}
    host: ${_param:cluster_node01_address}
    port: 8082
    params: check
  - name: ${_param:cluster_node02_name}
    host: ${_param:cluster_node02_address}
    port: 8082
    params: backup check
```

You can also use multiple certificates for one listener, for example, when it is bind on multiple interfaces:

```
haproxy:
  proxy:
    listen:
      dummy_site:
        mode: http
        binds:
          - address: 127.0.0.1
            port: 8080
            ssl:
              enabled: true
              key: |
                my super secret key follows
              cert: |
                certificate
              chain: |
                CA chain (if any)
          - address: 127.0.1.1
            port: 8081
            ssl:
              enabled: true
              key: |
                my super secret key follows
              cert: |
                certificate
              chain: |
                CA chain (if any)
```

The definition above results in creation of `/etc/haproxy/ssl/dummy_site` directory with files `1-all.pem` and `2-all.pem` (per binds).

Sample pillar with a custom listener with HTTP-check options specified:
Sample pillar with a custom listener with the tcp-check options specified (for Redis cluster with Sentinel):

```yaml
haproxy:
  proxy:
    enabled: true
  forwardfor:
    enabled: true
    except: 127.0.0.1
    header: X-Forwarded-For
    if-none: false
  listen:
    glance_api:
      binds:
        - address: 192.168.2.11
          port: 9292
          ssl:
            enabled: true
            pem_file: /etc/haproxy/ssl/all.pem
        http_request:
          - action: set-header X-Forwarded-Proto https
        mode: http
        options:
          - httpchk GET /
          - httplog
          - httpclose
        servers:
          - host: 127.0.0.1
            name: ctl01
            params: check inter 10s fastinter 2s downinter 3s rise 3 fall 3
            port: 9292

haproxy:
  proxy:
    redis_cluster:
      listen:
        service_name: redis
        health-check:
          tcp:
            enabled: True
            options:
              - 'send PING\r\n'
              - expect string +PONG
              - 'send info\ replication\r\n'
              - expect string role:master
              - 'send QUIT\r\n'
              - expect string +OK
        binds:
```

```
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```
- **address**: ${param:cluster_address}
  - **port**: 6379

**servers**:
- **name**: ${param:cluster_node01_name}
  - **host**: ${param:cluster_node01_address}
  - **port**: 6379
  - **params**: check inter 1s
- **name**: ${param:cluster_node02_name}
  - **host**: ${param:cluster_node02_address}
  - **port**: 6379
  - **params**: check inter 1s
- **name**: ${param:cluster_node03_name}
  - **host**: ${param:cluster_node03_address}
  - **port**: 6379
  - **params**: check inter 1s

Front-end for routing between exists listeners via URL with SSL an redirects. You can use one back end for several URLs.

**haproxy**:
**proxy**:
  **listen**:
    - **service_proxy**:
      - **mode**: http
      - **balance**: source
      - **format**: end

  **binds**:
    - **address**: ${param:haproxy_bind_address}
      - **port**: 80
      - **ssl**: ${param:haproxy_frontend_ssl}
      - **ssl_port**: 443

  **redirects**:
    - **code**: 301
      - **location**: domain.com/images

  **conditions**:
    - **type**: hdr_dom(host)
      - **condition**: images.domain.com

  **acls**:
    - **name**: gerrit
      **conditions**:
        - **type**: hdr_dom(host)
          - **condition**: gerrit.domain.com
    - **name**: jenkins
      **conditions**:
        - **type**: hdr_dom(host)
          - **condition**: jenkins.domain.com
    - **name**: docker
      **conditions**:
        **backend**: artifactroy
**conditions:**
- **type:** hdr_dom(host)
- **condition:** docker.domain.com

Enable customizable forwardfor option in the defaults section:

```yaml
haproxy:
  proxy:
    enabled: true
    mode: tcp
    logging: syslog
    max_connections: 1024
    forwardfor:
      enabled: true
      except:
      header: X-Real-IP
      if-none: false
```

```yaml
haproxy:
  proxy:
    enabled: true
    mode: tcp
    logging: syslog
    max_connections: 1024
    forwardfor:
      enabled: true
      except: 127.0.0.1
      header: X-Real-IP
      if-none: false
```

Sample pillar with multiprocess multicore configuration:

```yaml
haproxy:
  proxy:
    enabled: True
    nbproc: 4
    cpu_map:
      1: 0
      2: 1
      3: 2
      4: 3
    stats_bind_process: "1 2"
    mode: http/tcp
    logging: syslog
    maxconn: 1024
    timeout:
      connect: 5000
```
client: 50000
server: 50000
listen:
  https-in:
    bind_process: "1 2 3 4"
  binds:
    - address: 0.0.0.0
      port: 443
  servers:
    - name: server1
      host: 10.0.0.1
      port: 8443
    - name: server2
      host: 10.0.0.2
      port: 8443
  params: 'maxconn 256'

Implement rate limiting, to prevent excessive requests. This feature only works if using format: end:

haproxy:
  proxy:
    ...
  listen:
    nova_metadata_api:
      ...
      format: end
      options:
        - httpchk
        - httpclose
        - httplog
      rate_limit:
        duration: 900s
        enabled: true
        requests: 125
        track: content
      servers:
        ...
      type: http

Implement HAProxy configuration without specifying certain type or with type='None'. This approach allows you to set all major HAproxy parameters manually. Sample pillar:

haproxy:
  proxy:
    listen:
      manila_api:
        type: None
mode: tcp
balance: roundrobin
timeout:
  check: 10
  client: 20
http_request:
  - action: "add-header X-Forwarded-Proto https"
  condition: "if { ssl_fc }"
options: ${_param:haproxy_https_check_options}
capture:
  - cookie ASPSESSION len 32
  - request header Host len 15
compression:
  - algo gzip
  - type text/html text/plain
declare_capture: request len 50
email_alert:
  - myhostname myserver
  - from server@localhost
  - level warning
errorfile:
  file_500:
    code: 500
    file: /tmp/error_500.log
  file_404:
    code: 400
    file: /tmp/error_400.log
max_keep_alive_queue: 100
maxconn: 10000
reqadd:
  - X-Proto: SSL if is-ssl
reqirep:
  - ^Host: www.mydomain.com Host: www
modify_headers:
  - reqallow ^Host: www.
  - reqdel ^Host:.\.*\.local
  - reqdeny ^Host:.\.*\.local
  - reqallow ^Host: www.
  - reqdel ^Host:.\.*\.local
  - reqdeny ^Host:.\.*\.local
  - reqipass ^Host:.\.*\.local
  - reqtarpit ^Host:.\.*\.local
  - reqtarpit ^Host:.\.*\.local
retries: 10
stats:
  - enable
  - auth admin1:AdMiN123
rate_limit_sessions: 1000
Implement rate limiting to prevent excessive requests using format: listen:

```
 haproxy:
  proxy:
    ...
    listen:
      nova_metadata_api:
        ...
        rate_limit:
          duration: 3s
          enabled: true
          requests: 60
          track: connection
          servers:
            ...
```

Implement rate limiting to prevent excessive requests using format: listen and acls/request/backend stick list:

```
 haproxy:
  proxy:
    listen:
      nova_metadata_api:
        options:
          - httplog
        rate_limit:
          enabled: true
          type: string
          len: 36
          size: 10m
          duration: 60s
          acls:
            101:
              enabled: true
              value: acl too_many_requests_3 sc0_gpc0_rate() gt 3
            102:
              enabled: true
              value: acl mark_seen sc0_inc_gpc0 gt 0
            110:
              enabled: true
              value: acl x_instance_id hdr(x-instance-id) -i 4777e8e0-16e8-46ce-a3fe-0a1ad9b3ebdc
            111:
              enabled: true
              value: acl x_instance_id hdr(x-instance-id) -i ca2395dd-f73f-4d43-8fe7-f7078a0920af
            201:
              enabled: true
              value: acl too_many_requests_6 sc0_gpc0_rate() gt 6
            202:
              enabled: true
              value: acl mark_seen sc0_inc_gpc0 gt 0
```
enabled: true
value: acl x_tenant_id hdr(x-tenant-id) -i 2b76cc56a437404bb8cb6cb20dbb0ea4

tcp_request:
  001:
    enabled: true
    value: tcp-request inspect-delay 5s
  101:
    enabled: true
    value: tcp-request content track-sc0 hdr(x-instance-id) if ! too_many_requests_3
  201:
    enabled: true
    value: tcp-request content track-sc0 hdr(x-tenant-id) if ! too_many_requests_6

use_backend:
  101:
    enabled: true
    value: use_backend nova_metadata_api-rate_limit if mark_seen too_many_requests_3 x_instance_id
  201:
    enabled: true
    value: use_backend nova_metadata_api-rate_limit if mark_seen too_many_requests_6 x_tenant_id

Read more

- https://gist.github.com/tomeduarte/6340205 - example on how to use a peer from within a config file (using Jinja)
- http://youtu.be/jJJ8cfDjcTc?t=8m58s - starting from the ninth minute, see an overview of a peer versus mine
- https://github.com/russki/cluster-agents
HEAT

Usage

Heat is the main project in the OpenStack Orchestration program. It implements an orchestration engine to launch multiple composite cloud applications based on templates in the form of text files that can be treated like code. A native Heat template format is evolving, but Heat also endeavors to provide compatibility with the AWS CloudFormation template format, so that many existing CloudFormation templates can be launched on OpenStack. Heat provides both an OpenStack-native ReST API and a CloudFormation-compatible Query API.

Sample pillars

Single Heat services on the controller node:

```yaml
heat:
  server:
    enabled: true
    version: icehouse
    region: RegionOne
    reauthentication_auth_method: trusts
    bind:
      metadata:
        address: 10.0.106.10
        port: 8000
        protocol: http
      waitcondition:
        address: 10.0.106.10
        port: 8000
        protocol: http
      watch:
        address: 10.0.106.10
        port: 8003
        protocol: http
    cloudwatch:
      host: 10.0.106.20
    api:
      host: 10.0.106.20
    api_cfn:
      host: 10.0.106.20
  database:
    engine: mysql
    host: 10.0.106.20
    port: 3306
    name: heat
    user: heat
    password: password
  identity:
```
**engine**: keystone  
**host**: 10.0.106.20  
**port**: 35357  
**tenant**: service  
**user**: heat  
**password**: password  
**endpoint_type_default**: internalURL  
**endpoint_type_heat**: publicURL  
**message_queue**:  
  **engine**: rabbitmq  
  **host**: 10.0.106.20  
  **port**: 5672  
  **user**: openstack  
  **password**: password  
  **virtual_host**: '/openstack'  
  **ha_queues**: True  
  **max_stacks_per_tenant**: 150  
  **max_nested_stack_depth**: 10  
  **stack_action_timeout**: 7200

Define server clients Keystone parameter:

```yaml
heat:
  server:
    clients:
      keystone:
        protocol: https
        host: 10.0.106.10
        port: 5000
        insecure: false
```

Server with auth_encryption_key defined:

```yaml
heat:
  server:
    ....
    auth_encryption_key: "KeyToEncrypt-hasToBeExact32Chars"
    ....
```

Enable CORS parameters:

```yaml
heat:
  server:
    cors:
      allowed_origin: https:localhost.local,http:localhost.local
      expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_methods: GET,PUT,POST,DELETE,PATCH
```
allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
allow_credentials: True
max_age: 86400

Heat client with specified Git templates:

```json
heat:
  client:
    enabled: true
  template:
    admin:
      domain: default
      source:
        engine: git
        address: git@repo.domain.com/admin-templates.git
        revision: master
    default:
      domain: default
      source:
        engine: git
        address: git@repo.domain.com/default-templates.git
        revision: master
```

Ceilometer notification:

```json
heat:
  server:
    enabled: true
    version: icehouse
    notification: true
```

Configuration of policy.json file:

```json
heat:
  server:
    ....
    policy:
      deny_stack_user: 'not role:heat_stack_user'
      'cloudformation:ValidateTemplate': 'rule:deny_stack_user'
      # Add key without value to remove line from policy.json
      'cloudformation:DescribeStackResource':
```

Client-side RabbitMQ HA setup:

```json
heat:
  server:
    ....
```

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message_queue:
  engine: rabbitmq
  members:
    - host: 10.0.16.1
    - host: 10.0.16.2
    - host: 10.0.16.3
  user: openstack
  password: pwd
  virtual_host: '/openstack'
  ....

Configuring TLS communications

Note
By default, system-wide installed CA certs are used, so the cacert_file and cacert parameters are optional.

- RabbitMQ TLS

  heat:
  server:
    message_queue:
      port: 5671
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/rabbitmq-ca.pem
        (optional) version: TLSv1_2

- MySQL TLS

  heat:
  server:
    database:
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/mysql-ca.pem

- Openstack HTTPS API

  heat:
  server:
    identity:
Enhanced logging with logging.conf
By default logging.conf is disabled.

You can enable per-binary logging.conf with new variables:

- **openstack_log_appender**
  Set to true to enable log_config_append for all OpenStack services
- **openstack_fluentd_handler_enabled**
  Set to true to enable FluentHandler for all Openstack services
- **openstack_ossyslog_handler_enabled**
  Set to true to enable OSSysLogHandler for all Openstack services

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.

Also, it is possible to configure this with pillar:

```yaml
heat:
  server:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
          enabled: true
        fluentd:
          enabled: true
        ossyslog:
          enabled: true
```

Enable x509 and SSL communication between Heat and Galera cluster
By default communication between Heat and Galera is unsecure.

```yaml
heat:
  server:
    database:
      x509:
        enabled: True
```

You can set custom certificates in pillar:
heat:
server:
database:
x509:
cacert: (certificate content)
cert: (certificate content)
key: (certificate content)

For more details, see: OpenStack documentation.

Heat services with Memcached caching and security strategy:

heat:
server:
  enabled: true
...
cache:
  engine: memcached
  members:
    - host: 127.0.0.1
      port: 11211
    - host: 127.0.0.1
      port: 11211
  security:
    enabled: true
    strategy: ENCRYPT
    secret_key: secret

Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>Function</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.render_config</code></td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.pre</code></td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non-destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.pre</code></td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade</code></td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.post</code></td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.post</code></td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.verify</code></td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>
HORIZON

Usage
Horizon is the canonical implementation of OpenStack Dashboard, which provides a web-based user interface to OpenStack services including Nova, Swift, Keystone, etc.

Sample pillars
Simplest Horizon setup:

```yaml
horizon:
  server:
    enabled: true
    secret_key: secret
    host:
      name: cloud.lab.cz
    cache:
      engine: 'memcached'
      host: '127.0.0.1'
      port: 11211
      prefix: 'CACHE_HORIZON'
    api_versions:
      identity: 2
    identity:
      engine: 'keystone'
      host: '127.0.0.1'
      port: 5000
    mail:
      host: '127.0.0.1'
```

Multidomain setup for Horizon:

```yaml
horizon:
  server:
    enabled: true
    default_domain: MYDOMAIN
    multidomain: True
```

Simple branded Horizon:

```yaml
horizon:
  server:
    enabled: true
    branding: 'OpenStack Company Dashboard'
    default_dashboard: 'admin'
    help_url: 'http://doc.domain.com'
```
Horizon with policy files metadata. With source mine you can obtain real time policy file state from targeted node (OpenStack control node), provided you have policy file published to specified grain key. Source file will obtain static policy definition from formula files directory.

```yaml
horizon:
  server:
    enabled: true
  policy:
    identity:
      source: mine
      host: ctl01.my-domain.local
      name: keystone_policy.json
      grain_name: keystone_policy
      enabled: true
    compute:
      source: file
      name: nova_policy.json
      enabled: true
    network:
      source: file
      name: neutron_policy.json
      enabled: true
    image:
      source: file
      name: glance_policy.json
      enabled: true
    volume:
      source: file
      name: cinder_policy.json
      enabled: true
    telemetry:
      source: file
      name: ceilometer_policy.json
      enabled: true
    orchestration:
      source: file
      name: heat_policy.json
      enabled: true

Horizon with enabled SSL security (when SSL is realised by proxy):

```yaml
horizon:
  server:
    enabled: True
    secure: True
```

Horizon package setup with SSL:
Caution!

For the sake of backwards compatibility, the ssl_no_verify attribute defaults to true when horizon:server:identity:encryption is set to 'ssl'.

```yaml
horizon:
  server:
    enabled: true
    secret_key: MEGASECRET
    version: juno
    ssl_no_verify: false
    ssl:
      enabled: true
      authority: CA_Authority
    host:
      name: cloud.lab.cz
  cache:
    engine: 'memcached'
    host: '127.0.0.1'
    port: 11211
    prefix: 'CACHE_HORIZON'
  api_versions:
    identity: 2
    identity:
      engine: 'keystone'
      host: '127.0.0.1'
      port: 5000
  mail:
    host: '127.0.0.1'
```

Horizon with custom SESSION_ENGINE (default is signed_cookies, valid options are: signed_cookies, cache, file) and SESSION_TIMEOUT:

```yaml
horizon:
  server:
    enabled: True
    secure: True
    session:
      engine: 'cache'
      timeout: 43200
```

Multi-regional Horizon setup:

```yaml
horizon:
  server:
```
enabled: true
version: juno
secret_key: MEGASECRET

cache:
  engine: 'memcached'
  host: '127.0.0.1'
  port: 11211
  prefix: 'CACHE_HORIZON'

api_versions:
  identity: 2

identity:
  engine: 'keystone'
  host: '127.0.0.1'
  port: 5000

mail:
  host: '127.0.0.1'

regions:
- name: cluster1
  address: http://cluster1.example.com:5000/v2.0
- name: cluster2
  address: http://cluster2.example.com:5000/v2.0

Configuration of LAUNCH_INSTANCE_DEFAULTS parameter:

horizon:
  server:
    launch_instance_defaults:
      config_drive: False
      enable_scheduler_hints: True
      disable_image: False
      disable_instance_snapshot: False
      disable_volume: False
      disable_volume_snapshot: False
      create_volume: False

Horizon setup with sensu plugin:

horizon:
  server:
    enabled: true
    version: juno
  sensu_api:
    host: localhost
    port: 4567
  plugin:
    monitoring:
      app: horizon_monitoring
      source:
**type:** git  
**address:** git@repo1.robotice.cz:django/horizon-monitoring.git  
**rev:** develop

**Sensu multi API:**

```yaml
horizon:
  server:
    enabled: true
    version: juno
  sensu_api:
    dc1:
      host: localhost
      port: 4567
    dc2:
      host: anotherhost
      port: 4567
```

**Horizon setup with jenkins plugin:**

```yaml
horizon:
  server:
    enabled: true
    version: juno
  jenkins_api:
    url: https://localhost:8080
    user: admin
    password: pwd
    plugin:
      jenkins:
        app: horizon_jenkins
        source:
          type: pkg
```

**Horizon setup with billometer plugin:**

```yaml
horizon:
  server:
    enabled: true
    version: juno
  billometer_api:
    host: localhost
    port: 9753
    api_version: 1
  plugin:
    billing:
      app: horizon_billing
```
Horizon setup with Contrail plugin:

```yaml
source:
  type: git
address: git@repo1.robotice.cz:django/horizon-billing.git
rev: develop

horizon:
  server:
    enabled: true
    version: icehouse
  plugin:
    contrail:
      app: contrail_openstack_dashboard
      override: true
      source:
        type: git
        address: git@repo1.robotice.cz:django/horizon-contrail.git
        rev: develop
```

Horizon setup with sentry log handler:

```yaml
source:
  type: git
address: git@repo1.robotice.cz:django/horizon-billing.git
rev: develop

horizon:
  server:
    enabled: true
    version: juno
  logging:
    engine: raven
dsn: http://pub:private@sentry1.test.cz/2
```

Multisite with Git source

Simple Horizon setup from Git repository:

```yaml
source:
  type: git
address: https://github.com/openstack/horizon.git
rev: stable/havana

horizon:
  server:
    enabled: true
    app:
      default:
        secret_key: MEGASECRET
        source:
          engine: git
          address: https://github.com/openstack/horizon.git
          rev: stable/havana
          cache:
            engine: 'memcached'
```
host: '127.0.0.1'
port: 11211
prefix: 'CACHE_DEFAULT'
api_versions:
  identity: 2
identity:
  engine: 'keystone'
host: '127.0.0.1'
port: 5000
mail:
  host: '127.0.0.1'

Themed multisite setup:

horizon:
  server:
    enabled: true
  app:
    openstack1c:
      secret_key: MEGASECRET1
      source:
        engine: git
        address: https://github.com/openstack/horizon.git
        rev: stable/havana
    contrail:
      app: contrail_openstack_dashboard
      override: true
      source:
        type: git
        address: git@repo1.robotice.cz:django/horizon-contrail.git
        rev: develop
    theme:
      app: site1_theme
      source:
        type: git
        address: git@repo1.domain.com:django/horizon-site1-theme.git
    cache:
      engine: 'memcached'
      host: '127.0.0.1'
      port: 11211
      prefix: 'CACHE_SITE1'
      api_versions:
        identity: 2
        identity:
          engine: 'keystone'
          host: '127.0.0.1'
          port: 5000

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mail:
    host: '127.0.0.1'

openstack2:
    secret_key: MEGASECRET2
    source:
        engine: git
        address: https://repo1.domain.com/openstack/horizon.git
        rev: stable/icehouse
    plugin:
        contrail:
            app: contrail_openstack_dashboard
            override: true
            source:
                type: git
                address: git@repo1.domain.com:django/horizon-contrail.git
                rev: develop
        monitoring:
            app: horizon_monitoring
            source:
                type: git
                address: git@domain.com:django/horizon-monitoring.git
                rev: develop
        theme:
            app: bootswatch_theme
            source:
                type: git
                address: git@repo1.robotice.cz:django/horizon-bootswatch-theme.git
                rev: develop
    cache:
        engine: 'memcached'
        host: '127.0.0.1'
        port: 11211
        prefix: 'CACHE_SITE2'
    api_versions:
        identity: 3
    identity:
        engine: 'keystone'
        host: '127.0.0.1'
        port: 5000
    mail:
        host: '127.0.0.1'

Set advanced theme options (for Horizon version OpenStack Mitaka and newer):

- Full example:

    horizon:
        server:
            themes:
default: default  # optional, default: "default"
directory: themes   # optional, default: "themes"
cookie_name: theme  # optional, default: "theme"
available:
default:       # slug
   name: "Default"  # display name
description: "Default style theme"
path: "themes/default"  # optional, default: "<directory>/<slug>", e.g. "themes/default"
enabled: True
material:
   name: "Material"
description: "Google's Material Design style theme"
path: "themes/material"
enabled: True

• Minimal example:

  horizon:
  server:
     theme:
       available:
          default:       # slug
             name: "Default"  # display name
description: "Default style theme"
material:
   name: "Material"
description: "Google's Material Design style theme"

API versions override:

  horizon:
  server:
     enabled: true
  app:
       openstack_api_override:
          secret_key: MEGASECRET1
          api_versions:
             identity: 3
             volume: 2
          source:
             engine: git
             address: https://github.com/openstack/horizon.git
             rev: stable/havana

Control dashboard behavior:

  horizon:
  server:
     enabled: true
  app:
openstack_dashboard_overrride:
  secret_key: password

dashboards:
  settings:
    enabled: true
  project:
    enabled: false
    order: 10
  admin:
    enabled: false
    order: 20
  source:
    engine: git
    address: https://github.com/openstack/horizon.git
  rev: stable/juno

Enable WebSSO

Define a list of choices (supported choices are: oidc, saml2), credentials choice will be automatically appended and choice description is predefined.

WebSSO with credentials and saml2:

```yaml
horizon:
  server:
    enabled: true
  websso:
    login_url: "WEBROOT + 'auth/login/'"
    logout_url: "WEBROOT + 'auth/logout/'"
    login_redirect_url: "WEBROOT + 'project/'"
    websso_choices:
      - saml2
```

Define a map of choices in the following format:
{"<choice_name>": {"description": "<choice_description>"}.

WebSSO with saml2 and credentials:

```yaml
horizon:
  server:
    enabled: true
  websso:
    login_url: "WEBROOT + 'auth/login/'"
    logout_url: "WEBROOT + 'auth/logout/'"
    login_redirect_url: "WEBROOT + 'project/'"
    websso_choices:
      saml2:
        description: "Security Assertion Markup Language"
```
credentials:
  description: "Keystone Credentials"

WebSSO with IDP mapping:

```yaml
horizon:
  server:
    enabled: true
  websso:
    login_url: "WEBROOT + 'auth/login/"
    logout_url: "WEBROOT + 'auth/logout/'"
    login_redirect_url: "WEBROOT + 'project/'"
    websso_choices:
      credentials:
        description: "Keystone Credentials"
      saml2:
        description: "Security Assertion Markup Language"
      oidc:
        description: "OpenID Connect"
      myidp_oidc:
        description: "Acme Corporation - OpenID Connect"
      myidp_saml2:
        description: "Acme Corporation - SAML2"
  idp_mapping:
    myidp_oidc:
      id: myidp
      protocol: oidc
    myidp_saml2:
      id: myidp
      protocol: saml2
```

Images upload mode

Horizon allows using different strategies when uploading images to Glance that are controlled by the `horizon:server:images_upload_mode` pillar. Possible options are direct, ligacy, off. When direct mode is used, CORS have to be enabled on Glance side, and client should use modern browser.

```yaml
horizon:
  server:
    images_upload_mode: "direct"
```

Images allow location

If set to True, this setting allows specifying an image location (URL) as the image source when creating or updating images. Depending on the Glance version, the ability to set an image location is controlled by policies and/or the Glance configuration. Therefore
IMAGES_ALLOW_LOCATION should only be set to True if Glance is configured to allow specifying a location.

```yaml
horizon:
  server:
    images_allow_location: True
```

Custom django settings

Django has a tonn of useful settings that might be tuned for particular use case. Cover them all in templated manner is not possible. This sections shows how to configure custom django setting via horizon metadata.

```yaml
horizon:
  server:
    django_settings:
      CUSTOM_DJANGO_OPTION:
        enabled: true
        value: 'value'
```

Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>State</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.pre</code></td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade</code></td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.post</code></td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.post</code></td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.verify</code></td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>

Seealso

- [https://github.com/openstack/horizon](https://github.com/openstack/horizon)
JENKINS

Usage

Jenkins CI is an open source automation server written in Java. Jenkins helps to automate the non-human part of software development process, with continuous integration and facilitating technical aspects of continuous delivery.

For more information, see https://jenkins.io/.

Setup jenkins client, works with Salt 2016.3+, supports pipeline workflow projects only for now.

Dependencies

To install on Ubuntu, you will need to add the jenkins debian repository to the target server. You can do this with the salt-formula-linux formula, with the following pillar data:

```yaml
linux:
  system:
    enabled: true
  repo:
    jenkins:
      enabled: true
      source: "deb http://pkg.jenkins.io/debian-stable binary/
      key_url: "https://pkg.jenkins.io/debian/jenkins-ci.org.key"
```

This state will need to be applied before the jenkins state.

Using this formula

To use this formula, you must install the formula to your Salt Master as documented in saltstack formula docs

This formula is driven by pillar data, and can be used to install either a Jenkins Master or Client. See pillar data below for examples.

Sample pillars

Master role

Simple master with reverse proxy:

```yaml
nginx:
  server:
    site:
      jenkins:
        enabled: true
        type: nginx_proxy
        name: jenkins
        proxy:
```

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host: 127.0.0.1
group: master
    name: jenkins.example.com
    port: 80

jenkins:
    master:
        mode: EXCLUSIVE
        java_args: -Xms256m -Xmx1g
        # Do not manage any xml config files via Salt, use UI instead
        # Including config.xml and any plugin xml's.
        no_config: true

    slaves:
        - name: slave01
          label: pbuilder
          executors: 2
        - name: slave02
          label: image_builder
          mode: EXCLUSIVE
          executors: 2

views:
    - name: "Package builds"
      regex: "debian-build-.*"
    - name: "Contrail builds"
      regex: "contrail-build-.*"
    - name: "Aptly"
      regex: "aptly-.*"

plugins:
    - name: slack
    - name: extended-choice-parameter
    - name: rebuild
    - name: test-stability

Jenkins master with experimental plugin source support:

jenkins:
    master:
        enabled: true

SMTP server settings:

jenkins:
    master:
        email:
            engine: "smtp"
        host: "smtp.domain.com"
user: "user@domain.cz"
password: "smtp-password"
port: 25

Script approvals from client:

```yaml
jenkins:
  client:
    approved_scripts:
      - method groovy.json.JsonSlurperClassic.parseText java.lang.String
```

Script approvals:

```yaml
jenkins:
  master:
    approved_scripts:
      - method groovy.json.JsonSlurperClassic.parseText java.lang.String
```

User enforcement:

```yaml
jenkins:
  master:
    user:
      admin:
        api_token: xxxxxxxxxx
        password: admin_password
        email: admin@domain.com
      user01:
        api_token: xxxxxxxxxx
        password: user_password
        email: user01@domain.com
```

Agent (slave) role

```yaml
jenkins:
  slave:
    master:
      host: jenkins.example.com
      port: 80
      protocol: http
      user:
        name: jenkins_slave
        password: dexiech6AepohthaiHook2iesh7ol5ook40v3leid3yek6daid2ooNg3Ee2oKeYo
      gpg:
        keypair_id: A76882D3
        public_key: |
        ----BEGIN PGP PUBLIC KEY BLOCK-----
```
private_key: |
-----BEGIN PGP PRIVATE KEY BLOCK-----
...

Client role

Simple client with workflow job definition:

```yaml
jenkins:
  client:
    master:
      host: jenkins.example.com
      port: 80
      protocol: http
    job:
      jobname:
        type: workflow
        param:
          bool_param:
            type: boolean
            description: true/false
            default: true
          string_param:
            type: string
            description: 1 liner
            default: default_string
          text_param:
            type: text
            description: multi-liner
            default: default_text
        jobname_scm:
          type: workflow-scm
          concurrent: false
        scm:
          type: git
          url: https://github.com/jenkinsci/docker.git
          branch: master
          script: Jenkinsfile
        github:
          name: "Jenkins Docker Image"
      trigger:
        timer:
          dependency_job_names:
          - job1
          - job2
        spec: "H H * * *"
```

---

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github:
pollscm:
  spec: "H/15 * * * *"
reverse:
  projects:
    - test1
    - test2
  state: SUCCESS
param:
  bool_param:
    type: boolean
    description: true/false
    default: true
  string_param:
    type: string
    description: 1 liner
    default: default_string
  text_param:
    type: text
    description: multi-liner
    default: default_text

Inline Groovy scripts:

jenkins:
  client:
    job:
      test_workflow_jenkins_simple:
        type: workflow
        display_name: Test jenkins simple workflow
        script:
          content: |
            node {
              stage 'Stage 1'
              echo 'Hello World 1'
              stage 'Stage 2'
              echo 'Hello World 2'
            }
      test_workflow_jenkins_input:
        type: workflow
        display_name: Test jenkins workflow inputs
        script:
          content: |
            node {
              stage 'Enter string'
              input message: 'Enter job parameters', ok: 'OK', parameters: [
                string(defaultValue: 'default', description: 'Enter a string.', name: 'string'),
              ]
            }
stage 'Enter boolean'
input message: 'Enter job parameters', ok: 'OK', parameters: [
  booleanParam(defaultValue: false, description: 'Select boolean.', name: 'Bool'),
]
stage 'Enter text'
input message: 'Enter job parameters', ok: 'OK', parameters: [
  text(defaultValue: '', description: 'Enter multiline', name: 'Multiline')
]

GIT controlled groovy scripts:

```groovy
jenkins:
  client:
    source:
      base:
        engine: git
        address: repo_url
        branch: branch
      domain:
        engine: git
        address: domain_url
        branch: branch
  job:
    test_workflow_jenkins_simple:
      type: workflow
      display_name: Test jenkins simple workflow
      param:
        bool_param:
          type: boolean
          description: true/false
          default: true
      script:
        repository: base
        file: workflows/test_workflow_jenkins_simple.groovy
    test_workflow_jenkins_input:
      type: workflow
      display_name: Test jenkins workflow inputs
      script:
        repository: domain
        file: workflows/test_workflow_jenkins_input.groovy
    test_workflow_jenkins_input_Jenkinsfile:
      type: workflow
      display_name: Test jenkins workflow inputs (jenkinsfile)
      script:
        repository: domain
        file: workflows/test_workflow_jenkins_input/Jenkinsfile
```

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GIT controlled groovy script with shared libraries:

```groovy
jenkins:
    client:
    source:
        base:
            engine: git
            address: repo_url
            branch: branch
        domain:
            engine: git
            address: domain_url
            branch: branch
    job:
        test_workflow_jenkins_simple:
            type: workflow
            display_name: Test jenkins simple workflow
            param:
                bool_param:
                    type: boolean
                    description: true/false
                    default: true
            script:
                repository: base
                file: workflows/test_workflow_jenkins_simple.groovy
            libs:
                - repository: base
                  file: macros/cookiecutter.groovy
                - repository: base
                  file: macros/git.groovy
```

Setting job max builds to keep (amount of last builds stored on Jenkins master)

```groovy
jenkins:
    client:
    job:
        my-amazing-job:
            type: workflow
            discard:
                build:
                    keep_num: 5
                    keep_days: 5
            artifact:
                keep_num: 6
                keep_days: 6
```

Using job templates in similar way as in jjb. For now just 1 defined param is supported:
jenkins:
  client:
    job_template:
      test_workflow_template:
        name: test-{{formula}}-workflow
        template:
          type: workflow
          display_name: Test jenkins {{name}} workflow
          param:
            repo_param:
              type: string
              default: repo/{{formula}}
            script:
              repository: base
              file: workflows/test_formula_workflow.groovy
            param:
              formula:
                - aodh
                - linux
                - openssh

Interpolating parameters for job templates:

```yaml
_param:
salt_formulas:
  - aodh
  - git
  - nova
  - xorg
jenkins:
  client:
    job_template:
      test_workflow_template:
        name: test-{{formula}}-workflow
        template:
          ...
        param:
          formula: ${_param:salt_formulas}
```

Or simply define multiple jobs and it's parameters to replace from template:

```yaml
jenkins:
  client:
    job_template:
      test_workflow_template:
        name: test-{{name}}-{{myparam}}
        template:
          ...
```

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**jobs**:  
- name: firstjob  
  myparam: dummy  
- name: secondjob  
  myparam: dummyaswell

Purging undefined jobs from Jenkins:

```yaml
jenkins:  
  client:  
    purge_jobs: true  
  job:  
    my-amazing-job:  
      type: workflow
```

Plugins management from client:

```yaml
jenkins:  
  client:  
    plugin_remove_unwanted: false  
    plugin_force_remove: false  
    plugin:  
      plugin1: 1.2.3  
      plugin2:  
      plugin3: {}  
      plugin4:  
        version: 3.2.1  
        enabled: false  
      plugin5: absent
```

Adding plugin params to job:

```yaml
jenkins:  
  client:  
  job:  
    my_plugin_parametrized_job:  
      plugin_properties:  
        throttleconcurrents:  
          enabled: True  
          max_concurrent_per_node: 3  
          max_concurrent_total: 1  
          throttle_option: category #one of project (default or category)  
        categories:  
          - my_throultle_category  
    plugin:  
      throttle-concurrents:
```

LDAP configuration (depends on LDAP plugin):
jenkins:
  client:
    security:
      ldap:
        server: 1.2.3.4
        root_dn: dc=foo,dc=com
        user_search_base: cn=users,cn=accounts
        manager_dn: ""
        manager_password: password
        user_search: ""
        group_search_base: ""
        inhibit_infer_root_dn: false

Matrix configuration (depends on auth-matrix plugin):

jenkins:
  client:
    security:
      matrix:
        # set true for use ProjectMatrixAuthStrategy instead of GlobalMatrixAuthStrategy
        project_based: false
        permissions:
          Jenkins:
            # administrator access
            ADMINISTER:
              - admin
            # read access (anonymous too)
            READ:
              - anonymous
              - user1
              - user2
            # agents permissions
            MasterComputer:
              BUILD:
                - user3
            # jobs permissions
            hudson:
              model:
                Item:
                  BUILD:
                    - user4

Common matrix strategies

Views enforcing from client:

jenkins:
  client:
view:
  my-list-view:
    enabled: true
    type: ListView
    include_regex: ".*"
my-view:
  # set false to disable
  enabled: true
  type: MyView

View specific params:

- include_regex for ListView and CategorizedJobsView
- categories for CategorizedJobsView

Categorized views:

jenkins:
  client:
    view:
      my-categorized-view:
        enabled: true
        type: CategorizedJobsView
        include_regex: ".*"
        categories:
          - group_regex: "aptly-.*-nightly-testing"
            naming_rule: "Nightly -> Testing"
          - group_regex: "aptly-.*-nightly-production"
            naming_rule: "Nightly -> Production"

Credentials enforcing from client:

jenkins:
  client:
    credential:
      cred_first:
        username: admin
        password: password
      cred_second:
        username: salt
        password: password
      cred_with_key:
        username: admin
        key: SOMESSHKEY
      cred_with_text_secret:
        secret: SOMETEXTSECRET
      cred_with_secret_file:
        filename: somefile.json
```json
content: |
{ "Hello": "world!" }
```

Users enforcing from client:

```json
jenkins:
  client:
    user:
      admin:
        password: admin_password
        admin: true
      user01:
        password: user_password
```

Node enforcing from client using JNLP launcher:

```json
jenkins:
  client:
    node:
      node01:
        remote_home: /remote/home/path
        desc: node-description
        num_executors: 1
        node_mode: Normal
        ret_strategy: Always
        labels:
          - example
          - label
        launcher:
          type: jnlp
```

Node enforcing from client using SSH launcher:

```json
jenkins:
  client:
    node:
      node01:
        remote_home: /remote/home/path
        desc: node-description
        num_executors: 1
        node_mode: Normal
        ret_strategy: Always
        labels:
          - example
          - label
        launcher:
          type: ssh
```
Configure Jenkins master:

```yaml
jenkins:
  client:
    node:
      master:
        num_executors: 1
        node_mode: Normal # or Exclusive
        labels:
          - example
          - label
```

Setting node labels:

```yaml
jenkins:
  client:
    label:
      node-name: node-name
      lbl_text: label-offline
      append: false # set true for label append instead of replace
```

SMTP server settings from client:

```yaml
jenkins:
  client:
    smtp:
      host: "smtp.domain.com"
      username: "user@domain.cz"
      password: "smtp-password"
      port: 25
      ssl: false
      reply_to: reply_to@address.com
```

Jenkins admin user email enforcement from client:

```yaml
jenkins:
  client:
    smtp:
      admin_email: "My Jenkins <jenkins@myserver.com>"
```

Slack plugin configuration:
jenkins:
  client:
    slack:
      team_domain: example.com
      token: slack-token
      room: slack-room
      token_credential_id: cred_id
      send_as: Some slack user

Pipeline global libraries setup:

jenkins:
  client:
    lib:
      my-pipeline-library:
        enabled: true
        url: https://path-to-my-library
        credential_id: github
        branch: master  # optional, default master
        implicit: true  # optional default true

Artifactory server enforcing:

jenkins:
  client:
    artifactory:
      my-artifactory-server:
        enabled: true
        url: https://path-to-my-library
        credential_id: github

Jenkins Global env properties enforcing:

jenkins:
  client:
    globalenvprop:
      OFFLINE_DEPLOYMENT:
        enabled: true
        name: "OFFLINE_DEPLOYMENT"  # optional, default using dict key
        value: "true"

Throttle categories management from client (requires Throttle Concurrent Builds plugin):

jenkins:
  client:
    throttle_category:
      'My First Category':
max_total: 2
max_per_node: 1
'My Second Category':
  max_total: 5
  max_per_node: 2
  max_per_label:
    'node_label_1': 1
    'node_label_2': 2
'My Category To Remove:
  enabled: false

Jira sites management from client (requires JIRA plugin):

```yaml
# Remove all sites
jenkins:
  client:
    jira:
      enabled: False

jenkins:
  client:
    jira:
      sites:
        'http://my.jira.site/':
          link_url: 'http://alternative.link/
          http_auth: false
          use_wiki_notation: false
          record_scm: false
          disable_changelog: false
          issue_pattern: ''
          any_build_result: false
          user: 'username'
          password: 'passwd'
          conn_timeout: 10
          visible_for_group: ''
          visible_for_project: ''
          timestamps: false
          timestamp_format: ''
```

Gerrit trigger plugin configuration:

```yaml
jenkins:
  client:
    gerrit:
      server1:
        host: "gerrit.domain.local"
        port: 29418
```
username: "jenkins"
email: "jenkins@domain.local"
auth_key_file: "/var/jenkins_home/.ssh/id_rsa"
frontendURL: "https://gerrit.domain.local"
build_current_patches_only: true
abort_new_patchsets: false
abort_manual_patchsets: false
abort_same_topic: false
authkey: |
  SOMESSHKEY

tenant:
  server2:
    host: "gerrit2.domain.local"
    port: 29418
    username: "jenkins"
    email: "jenkins@domain.local"
    auth_key_file: "/var/jenkins_home/.ssh/id_rsa"
    frontendURL: "https://gerrit2.domain.local"
  build_current_patches_only: true
  abort_new_patchsets: false
  abort_manual_patchsets: false
  abort_same_topic: false
  authkey: |
    SOMESSHKEY

CSRF Protection configuration:

jenkins:
client:
  security:
    csrf:
      enabled: true
      proxy_compat: false

Agent to Master Access Control:

jenkins:
client:
  security:
    agent2master:
      enabled: true
      whitelisted: "
      file_path_rules: "

Content Security Policy configuration:

jenkins:
client:
**security:**
```
csp: "sandbox; default-src 'none'; img-src 'self'; style-src 'self';"
```

**Usage**

1. Generate password hash:
   ```
echo -n "salt{plainpassword}" | openssl dgst -sha256
   ```

2. Place in the configuration `salt:hashpassword`.

**Read more**

- [https://wiki.jenkins-ci.org/display/JENKINS/Use+Jenkins](https://wiki.jenkins-ci.org/display/JENKINS/Use+Jenkins)

---

**Metadata schema specifications for Jenkins client**

**Core properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>sites</td>
<td>object</td>
<td>Jira sites to configure</td>
</tr>
<tr>
<td>node</td>
<td>object</td>
<td>Jenkins slave nodes config</td>
</tr>
<tr>
<td>trigger_gerrit_server</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>patternProperties</td>
<td>ERROR</td>
<td>description_notset</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Jenkins client</td>
</tr>
<tr>
<td>purge_jobs</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>username</td>
<td>boolean</td>
<td>description_notset</td>
</tr>
<tr>
<td>password</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>charset</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>ssl</td>
<td>string</td>
<td>description_notset</td>
</tr>
<tr>
<td>host</td>
<td>string</td>
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<td>Object</td>
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<td>Force removing plugins recursively with all dependent plugins</td>
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<td>Object</td>
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_job definition_

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### Metadata schema specifications for Jenkins job_builder

#### Core properties

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<td>Folder for jenkins_jobs.ini file</td>
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<td>Installation source for Jenkins Job Builder. Can be one of ['pkg', 'pip']</td>
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<td>Path to Jenkins Job Builder configuration file</td>
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<td>Branch of the remote repository with Jenkins Job builder configuration</td>
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### Metadata schema specifications for Jenkins master

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<td>'string']</td>
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<td>Type</td>
<td>Description</td>
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<td>object</td>
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<td>NO REF List of approved scripts</td>
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<td>NO REF List of Jenkins master packages to be installed</td>
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<td>Path to jenkins master configuration file</td>
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<td>Jenkins email user</td>
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views definition

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Metadata schema specifications for Jenkins slave

Core properties

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<td>Enables nopasswd sudo for Jenkins slave user</td>
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<td>boolean</td>
<td>Enables Jenkins slave configuration</td>
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<td>string</td>
<td>GPG keypair id for Jenkins slave</td>
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<td>Site mirror for pbuilder</td>
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<td>Use network in Pbuilder</td>
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<td>aptcache</td>
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<td>Pbuilder apt cache directory</td>
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<td>Pbuilder build result</td>
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<td>Pbuilder build place folder</td>
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<td>keyring</td>
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<td>Mirror keyring</td>
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<td>boolean</td>
<td>True if apt cache directory is hard link</td>
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<td>Number of parallel threads for Pbuilder. Set to false to use default (num of cpu)</td>
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<td>Pbuilder components</td>
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<td>OS mirror parameters for Pbuilder For details, see: _os_parameters definition</td>
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<td>Install eatmydata as extra package</td>
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_os_parameters definition_

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_othermirror definition_

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_os_distribution_parameters definition_

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**KEEPALIVED**

**Usage**

Keepalived is a routing software written in C. The main goal of this project is to provide simple and robust facilities for loadbalancing and high-availability to Linux system and Linux based infrastructures. Loadbalancing framework relies on well-known and widely used Linux Virtual Server (IPVS) kernel module providing Layer4 loadbalancing. Keepalived implements a set of checkers to dynamically and adaptively maintain and manage loadbalanced server pool according their health. On the other hand high-availability is achieved by VRRP protocol. VRRP is a fundamental brick for router failover. In addition, Keepalived implements a set of hooks to the VRRP finite state machine providing low-level and high-speed protocol interactions. Keepalived frameworks can be used independently or all together to provide resilient infrastructures.

**Sample pillar**

Simple virtual IP on an interface:

```yaml
keepalived:
  cluster:
    enabled: True
  instance:
    VIP1:
      nopreempt: True
      priority: 100 (highest priority must be on primary server, different for cluster members)
      virtual_router_id: 51
      auth_type: AH
      password: pass
      address: 192.168.10.1
      interface: eth0
    VIP2:
      nopreempt: True
      priority: 150 (highest priority must be on primary server, different for cluster members)
      virtual_router_id: 52
      auth_type: PASS
      password: pass
      address: 10.0.0.5
      interface: eth1
```

Multiple virtual IPs on single interface:

```yaml
keepalived:
  cluster:
    enabled: True
  instance:
    VIP1:
      nopreempt: True
      priority: 100 (highest priority must be on primary server, different for cluster members)
```

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virtual_router_id: 51
password: pass
addresses:
- 192.168.10.1
- 192.168.10.2
interface: eth0

Use unicast:

keepalived:
cluster:
  enabled: True
instance:
  VIP1:
    nopreempt: True
    priority: 100 (highest priority must be on primary server, different for cluster members)
  virtual_router_id: 51
  password: pass
  address: 192.168.10.1
  interface: eth0
  unicast_src_ip: 172.16.10.1
  unicast_peer:
    172.16.10.2
    172.16.10.3

Disable nopreempt mode to have Master. Highest priority is taken in all cases:

keepalived:
cluster:
  enabled: True
instance:
  VIP1:
    nopreempt: False
    priority: 100 (highest priority must be on primary server, different for cluster members)
  virtual_router_id: 51
  password: pass
  addresses:
- 192.168.10.1
- 192.168.10.2
  interface: eth0

Notify action in keepalived:

keepalived:
cluster:
  enabled: True
instance:
VIP1:
  nopreempt: True
  notify_action:
    master:
    - /usr/bin/docker start jenkins
    - /usr/bin/docker start gerrit
  backup:
    - /usr/bin/docker stop jenkins
    - /usr/bin/docker stop gerrit
  fault:
    - /usr/bin/docker stop jenkins
    - /usr/bin/docker stop gerrit
  priority: 100  # highest priority must be on primary server, different for cluster members
  virtual_router_id: 51
  password: pass
  addresses:
    - 192.168.10.1
    - 192.168.10.2
  interface: eth0

Track/vrrp scripts for keepalived instance:

keepalived:
  cluster:
    enabled: True
  instance:
    VIP2:
      priority: 100
      virtual_router_id: 10
      password: pass
      addresses:
        - 192.168.11.1
        - 192.168.11.2
      interface: eth0
      track_script: check_haproxy
    VIP3:
      priority: 100
      virtual_router_id: 11
      password: pass
      addresses:
        - 192.168.10.1
        - 192.168.10.2
      interface: eth0
      track_script:
        check_random_exit:
          interval: 10
          check_port:
            weight: 50
```
vrp_scripts:
  check_haproxy:
    name: check_pidof
    args:
      - haproxy
  check_mysql_port:
    name: check_port
    args:
      - 3306
      - TCP
      - 4
  check_ssh:
    name: check_port
    args: "22"
  check_mysql_cluster:
    args:
      # github: olafz/percona-clustercheck
      # <user> <pass> <available_when_donor=0|1> <log_file> <available_when_readonly=0|1> <defaults_extra_file>
      - clustercheck
      - clustercheck
      - available_when_donor=0
      - available_when_readonly=0
  check_random_exit:
    interval: 10
    timeout: 5
    content: |
      #!/bin/bash
      exit $((RANDOM%2))
    weight: 50
```

Read more

- [https://raymii.org/s/tutorials/Keepalived-Simple-IP-failover-on-Ubuntu.html](https://raymii.org/s/tutorials/Keepalived-Simple-IP-failover-on-Ubuntu.html)
KEYSTONE

Usage

Keystone provides authentication, authorization and service discovery mechanisms via HTTP primarily for use by projects in the OpenStack family. It is most commonly deployed as an HTTP interface to existing identity systems, such as LDAP.

From Kilo release Keystone v3 endpoint has definition without version in url

<table>
<thead>
<tr>
<th>id</th>
<th>region</th>
<th>publicurl</th>
<th>internalurl</th>
<th>adminurl</th>
<th>service_id</th>
</tr>
</thead>
<tbody>
<tr>
<td>91663a8d...494</td>
<td>RegionOne</td>
<td><a href="http://10.0.150.37:5000/">http://10.0.150.37:5000/</a></td>
<td><a href="http://10.0.150.37:5000/">http://10.0.150.37:5000/</a></td>
<td><a href="http://10.0.150.37:35357/">http://10.0.150.37:35357/</a></td>
<td>0fd2dba...9c9</td>
</tr>
</tbody>
</table>

Sample pillars

Caution!

When you use localhost as your database host (keystone:server: atabase:host), sqlalchemy will try to connect to /var/run/mysql/ mysqld.sock, may cause issues if you located your mysql socket elsewhere

Full stacked Keystone:

```python
keystone:
server:
  enabled: true
  version: juno
  service_token: 'service_token'
  service_tenant: service
  service_password: 'servicepwd'
  admin_tenant: admin
  admin_name: admin
  admin_password: 'adminpwd'
  admin_email: stackmaster@domain.com
  enable_proxy_headers_parsing: True
roles:
  - admin
  - Member
  - image_manager
bind:
  address: 0.0.0.0
  private_address: 127.0.0.1
  private_port: 35357
```
public_address: 127.0.0.1
database:
  engine: mysql
  host: '127.0.0.1'
  name: 'keystone'
  password: 'LfTno5mYdZmRfoPV'
  user: 'keystone'

Keystone public HTTPS API:

keystone:
  server:
    enabled: true
    version: juno
  ...
  services:
    - name: nova
      type: compute
      description: OpenStack Compute Service
      user:
        name: nova
        password: password
      bind:
        public_address: cloud.domain.com
        public_protocol: https
        public_port: 8774
        internal_address: 10.0.0.20
        internal_port: 8774
        admin_address: 10.0.0.20
        admin_port: 8774

Keystone with custom policies. Keys with specified rules are created or set to this value if they already exist. Keys with no value (like our existing_rule) are deleted from the policy file:

keystone:
  server:
    enabled: true
    policy:
      new_rule: "rule:admin_required"
      existing_rule:

Keystone memcached storage for tokens:
keystone:
    server:
        enabled: true
        version: juno
        ...
    token_store: cache
    cache:
        engine: memcached
        host: 127.0.0.1
        port: 11211
    services:
        ...

Keystone clustered memcached storage for tokens:

keystone:
    server:
        enabled: true
        version: juno
        ...
    token_store: cache
    cache:
        engine: memcached
        members:
        - host: 192.160.0.1
          port: 11211
        - host: 192.160.0.2
          port: 11211
    services:
        ...

Keystone client:

keystone:
    client:
        enabled: true
        server:
            host: 10.0.0.2
            public_port: 5000
            private_port: 35357
            service_token: 'token'
            admin_tenant: admin
            admin_name: admin
            admin_password: 'passwd'

Keystone cluster
keystone:
  control:
    enabled: true
  provider:
    os15_token:
      host: 10.0.0.2
      port: 35357
      token: token
    os15_tcp_core_stg:
      host: 10.0.0.5
      port: 5000
      tenant: admin
      name: admin
      password: password

Keystone fernet tokens for OpenStack Kilo release:

keystone:
  server:
    ...    
tokens:
    engine: fernet
    max_active_keys: 3
    ...

Keystone auth methods:

keystone:
  server:
    ...
    auth_methods:
    - external
    - password
    - token
    - oauth1
    ...

Keystone domain with LDAP backend, using SQL for role/project assignment:

keystone:
  server:
    domain:
      external:
        description: "Testing domain"
        backend: ldap
        assignment:
        backend: sql
ldap:
  url: "ldaps://idm.domain.com"
  suffix: "dc=cloud,dc=domain,dc=com"
  # Will bind as uid=keystone,cn=users,cn=accounts,dc=cloud,dc=domain,dc=com
  uid: keystone
  password: password

Use driver aliases for drivers instead of class path's:

keystone:
  server:
    domain:
      test:
        description: "Test domain"
        backend: ldap
        assignment:
          backend: sql
          driver: sql
        identity:
          backend: ldap
          driver: keystone.identity.backends.ldap.Identity
    ldap:
      url: "ldaps://idm.domain.com"
      ...  

Using LDAP backend for default domain:

keystone:
  server:
    backend: ldap
    assignment:
      backend: sql
    ldap:
      url: "ldaps://idm.domain.com"
      suffix: "dc=cloud,dc=domain,dc=com"
      # Will bind as uid=keystone,cn=users,cn=accounts,dc=cloud,dc=domain,dc=com
      uid: keystone
      password: password

Using LDAP backend for default domain with user_enabled field emulation:

keystone:
  server:
    backend: ldap
    assignment:
      backend: sql
    ldap:
      ...
url: "ldap://idm.domain.com"
suffix: "ou=Openstack Service Users,o=domain.com"
bind_user: keystone
password: password
# Define LDAP "group" object class and "membership" attribute
group_objectclass: groupOfUniqueNames
group_member_attribute: uniqueMember
# User will receive "enabled" attribute basing on membership in "os-user-enabled" group
user_enabled_emulation: True
user_enabled_emulation_dn: "cn=os-user-enabled,ou=Openstack,o=domain.com"
user_enabled_emulation_use_group_config: True

If the members of the group objectclass are user IDs rather than DNs, set
group_members_are_ids to true. This is the case when using posixGroup` as the group
`objectclass and OpenDirectory:

keystone:
server:
  backend: ldap
assignment:
  backend: sql
ldap:
  url: "ldaps://idm.domain.com"
  suffix: "dc=cloud,dc=domain,dc=com"
  # Will bind as uid=keystone,cn=users,cn=accounts,dc=cloud,dc=domain,dc=com
  uid: keystone
  password: password
  group_members_are_ids: True

Simple service endpoint definition (defaults to RegionOne):

keystone:
server:
  service:
    ceilometer:
      type: metering
      description: OpenStack Telemetry Service
      user:
        name: ceilometer
        password: password
        bind:
        ...

Region-aware service endpoints definition:

keystone:
server:
service:
  ceilometer_region01:
    service: ceilometer
    type: metering
    region: region01
    description: OpenStack Telemetry Service
    user:
      name: ceilometer
      password: password
    bind:
      ...  
  ceilometer_region02:
    service: ceilometer
    type: metering
    region: region02
    description: OpenStack Telemetry Service
    bind:
      ...

Enable Ceilometer notifications:

keystone:
  server:
    notification: true
  message_queue:
    engine: rabbitmq
    host: 127.0.0.1
    port: 5672
    user: openstack
    password: password
    virtual_host: '/openstack'
    ha_queues: true

Client-side RabbitMQ HA setup:

keystone:
  server:
    ....
    message_queue:
      engine: rabbitmq
      members:
        - host: 10.0.16.1
        - host: 10.0.16.2
        - host: 10.0.16.3
      user: openstack
      password: pwd
      virtual_host: '/openstack'
    ....
Client-side RabbitMQ TLS configuration:

By default system-wide CA certs are used. Nothing should be specified except ssl.enabled.

```
keystone:
  server:
    ....
    message_queue:
      ssl:
        enabled: True
```

Use cacert_file option to specify the CA-cert file path explicitly:

```
keystone:
  server:
    ....
    message_queue:
      ssl:
        enabled: True
        cacert_file: /etc/ssl/rabbitmq-ca.pem
```

To manage content of the cacert_file use the cacert option:

```
keystone:
  server:
    ....
    message_queue:
      ssl:
        enabled: True
        cacert: |
          -----BEGIN CERTIFICATE-----
          ...
          -----END CERTIFICATE------
        cacert_file: /etc/openstack/rabbitmq-ca.pem
```

**Note**

- The message_queue.port is set to 5671 (AMQPS) by default if ssl.enabled=True.
- Use message_queue.ssl.version if you need to specify protocol version. By default, is TLSv1 for python < 2.7.9 and TLSv1_2 for version above.

Enable CADF audit notification:
**keystone:**
  **server:**
    **notification:** true
    **notification_format:** cadf

Run Keystone under Apache:

**keystone:**
  **server:**
    **service_name:** apache2

**apache:**
  **server:**
    **enabled:** true
    **default_mpm:** event

**site:**
  **keystone:**
    **enabled:** true
    **type:** keystone
    **name:** wsgi
    **host:**
      **name:** ${linux:network:fqdn}

**modules:**
  - wsgi

Enable SAML2 Federated keystone:

**keystone:**
  **server:**
    **auth_methods:**
      - password
      - token
      - saml2

**federation:**
  **saml2:**
    **protocol:** saml2
    **remote_id_attribute:** Shib-Identity-Provider
    **shib_url_scheme:** https
    **shib_compat_valid_user:** 'on'

**federation_driver:** keystone.contrib.federation.backends.sql.Federation

**federated_domain_name:** Federated

**trusted_dashboard:**
  - https://${_param:cluster_public_host}/horizon/auth/websso/

**apache:**
  **server:**
    **pkgs:**
      - apache2
      - libapache2-mod-shib2

**modules:**
Enable OIDC Federated Keystone:

```
keystore:
  server:
    auth_methods:
    - password
    - token
    - oidc
  oidc:
    protocol: oidc
    remote_id_attribute: HTTP_OIDC_ISS
    remote_id_attribute_value: https://accounts.google.com
    oidc_claim_prefix: "OIDC-
    oidc_response_type: id_token
    oidc_scope: "openid email profile"
    oidc_provider_metadata_url: https://accounts.google.com/.well-known/openid-configuration
    oidc_client_id: <openid_client_id>
    oidc_client_secret: <openid_client_secret>
    oidc_crypto_passphrase: openstack
    oidc_redirect_uri: https://key.example.com:5000/v3/auth/OS-FEDERATION/websso/oidc/redirect
    oidc_oauth_introspection_endpoint: https://www.googleapis.com/oauth2/v1/tokeninfo
    oidc_oauth_introspection_token_param_name: access_token
    oidc_oauth_remote_user_claim: user_id
    oidc_ssl_validate_server: 'off'
  federated_domain_name: Federated
  federation_driver: keystone.contrib.federation.backends.sql.Federation
  trusted_dashboard:
  - https://${_param:cluster_public_host}/auth/websso/

apache:
  server:
    pkgs:
    - apache2
    - libapache2-mod-auth-openidc
    modules:
    - wsgi
    - auth_openidc
```

Note
Ubuntu Trusty repository doesn’t contain libapache2-mod-auth-openidc package. Additional repository should be added to the source list.

Use a custom identity driver with custom options:
keystone:
  server:
    backend: k2k
    k2k:
      auth_url: 'https://keystone.example.com/v2.0'
      read_user: 'example_user'
      read_pass: 'password'
      read_tenant_id: 'admin'
      identity_driver: 'sql'
      id_prefix: 'k2k:'
      domain: 'default'
    caching: true
    cache_time: 600

Enable CORS parameters:

keystone:
  server:
    cors:
      allowed_origin: https:localhost.local,http:localhost.local
      expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_methods: GET,PUT,POST,DELETE,PATCH
      allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_credentials: True
      max_age: 86400

Keystone client

Service endpoints enforcement with service token:

keystone:
  client:
    enabled: true
  server:
    keystone01:
      admin:
        host: 10.0.0.2
        port: 35357
        token: 'service_token'
      service:
        nova:
          type: compute
          description: OpenStack Compute Service
          endpoints:
            - region: region01
              public_address: 172.16.10.1
              public_port: 8773
              public_path: '/v2'
**internal_address**: 172.16.10.1
**internal_port**: 8773
**internal_path**: '/v2'

**admin_address**: 172.16.10.1
**admin_port**: 8773
**admin_path**: '/v2'

---

Project, users, roles enforcement with admin user:

```yaml
keystone:
  client:
    enabled: true
  server:
    keystone01:
      admin:
        host: 10.0.0.2
        port: 5000
        project: admin
        user: admin
        password: 'passwd'
        region_name: RegionOne
        protocol: https
      roles:
        - admin
        - member
    project:
      tenant01:
        description: "test env"
      quota:
        instances: 100
        cores: 24
        ram: 151200
        floating_ips: 50
        fixed_ips: -1
        metadata_items: 128
        injected_files: 5
        injected_file_content_bytes: 10240
        injected_file_path_bytes: 255
        key_pairs: 100
        security_groups: 20
        security_group_rules: 40
        server_groups: 20
        server_group_members: 20
      user:
        user01:
          email: jdoe@domain.com
          is_admin: true
          password: some
```
user02:
  email: jdoe2@domain.com
  password: some
  roles:
    - custom-roles

Multiple servers example:

keystone:
  client:
    enabled: true
  server:
    keystone01:
      admin:
        host: 10.0.0.2
        port: 5000
        project: 'admin'
        user: admin
        password: 'workshop'
        region_name: RegionOne
        protocol: https
    keystone02:
      admin:
        host: 10.0.0.3
        port: 5000
        project: 'admin'
        user: admin
        password: 'workshop'
        region_name: RegionOne

Tenant quotas:

keystone:
  client:
    enabled: true
  server:
    keystone01:
      admin:
        host: 10.0.0.2
        port: 5000
        project: admin
        user: admin
        password: 'passwd'
        region_name: RegionOne
        protocol: https
        roles:
          - admin
          - member
```yaml
project:
tenant01:
description: "test env"
quota:
  instances: 100
  cores: 24
  ram: 151200
  floating_ips: 50
  fixed_ips: -1
  metadata_items: 128
  injected_files: 5
  injected_file_content_bytes: 10240
  injected_file_path_bytes: 255
  key_pairs: 100
  security_groups: 20
  security_group_rules: 40
  server_groups: 20
  server_group_members: 20

Extra config params in keystone.conf (since Mitaka release):

```yaml
keystone:
  server:
    ......
    extra_config:
      ini_section1:
        param1: value
        param2: value
      ini_section2:
        param1: value
        param2: value
    ......

Configuration of policy.json file:

```json
keystone:
  server:
    ......
    policy:
      admin_or_token_subject: 'rule:admin_required or rule:token_subject'

Manage os-cloud-config yml with keystone.client:

```yaml
keystone:
  client:
    os_client_config:
      enabled: true
```
cfgs:
  root:
    file: /root/.config/openstack/clouds.yml
    content:
      clouds:
        admin_id identity:
          region_name: RegioneOne
        auth:
          username: admin
          password: secretpassword
          user_domain_name: Default
          project_name: admin
          project_domain_name: Default
          auth_url: "http://1.2.3.4:5000"

Setting up default admin project name and domain:

keystone:
  server:
    ....
    admin_project:
      name: "admin"
      domain: "default"

Enhanced logging with logging.conf
By default logging.conf is disabled.
That is possible to enable per-binary logging.conf with new variables:

- openstack_log_appender
  Set to true to enable log_config_append for all OpenStack services
- openstack_fluentd_handler_enabled
  Set to true to enable FluentHandler for all Openstack services
- openstack_ossyslog_handler_enabled
  Set to true to enable OSSysLogHandler for all Openstack services

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.
Also, it is possible to configure this with pillar:

keystone:
  server:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
          enabled: true
Usage

1. Apply the keystone.client.service state.
2. Apply the keystone.client state.

Fernet-keys rotation without gluster

In the future fernet keys supposed to be rotated with rsync+ssh instead of using glusterfs. By default it is assumed that the script will run on primary control node (ctl01) and will rotate and transfer fernet keys to secondary controller nodes (ctl02, ctl03). Following parameter should be set on cluster level:

keystone_node_role

and fernet_rotation_driver should be set to ‘rsync’

By default this parameter is set to “secondary” on system level along with other parameters:

keystone:
server:
  role: ${_param:keystone_node_role}
tokens:
  fernet_sync_nodes_list:
    control02:
      name: ctl02
      enabled: True
    control03:
      name: ctl03
      enabled: True
  fernet_rotation_driver: rsync

Prior to running keystone salt states ssh key should be generated and its public part should be placed on secondary controllers. It can be accomplished by running following orchestration state before keystone states:

```
salt-run state.orchestrate keystone.orchestrate.deploy
```

Currently the default fernet rotation driver is a shared filesystem

Enable x509 and SSL communication between Keystone and Galera cluster

By default communication between Keystone and Galera is unsecure.
keystone:
  server:
  database:
    x509:
      enabled: True

You able to set custom certificates in pillar:

keystone:
  server:
  database:
    x509:
      cacert: (certificate content)
      cert: (certificate content)
      key: (certificate content)

You can read more about it here:

https://docs.openstack.org/security-guide/databases/database-access-control.html

Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.pre</code></td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade</code></td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.upgrade.post</code></td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.post</code></td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td><code>&lt;app&gt;.upgrade.verify</code></td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>
LINUX

Linux Formula

Linux Operating Systems:

- Ubuntu
- CentOS
- RedHat
- Fedora
- Arch

Sample pillars

Linux System

Basic Linux box

```yaml
linux:
  system:
    enabled: true
    name: 'node1'
    domain: 'domain.com'
    cluster: 'system'
    environment: prod
    timezone: 'Europe/Prague'
    utc: true
```

Linux with system users, some with password set:

```
Warning
If no password variable is passed, any predefined password will be removed.
```

```yaml
linux:
  system:
    ...
  user:
    jdoe:
      name: 'jdoe'
      enabled: true
      sudo: true
      shell: /bin/bash
      full_name: 'Jonh Doe'
```
Configure password expiration parameters

The following login.defs parameters can be overridden per-user:

- PASS_MAX_DAYS
- PASS_MIN_DAYS
- PASS_WARN_DAYS
- INACTIVE

```
linux:
  system:
    ...
  user:
    jdoe:
      name: 'jdoe'
      enabled: true
    ...
    maxdays: <PASS_MAX_DAYS>
    mindays: <PASS_MIN_DAYS>
    warndays: <PASS_WARN_DAYS>
    inactdays: <INACTIVE>
```

Configure sudo for users and groups under /etc/sudoers.d/. This way `linux.system.sudo` pillar map to actual sudo attributes:

```
# simplified template:
Cmds_Alias {{ alias }}={{ commands }}
```
{{ user }} {{ hosts }}=({{ runas }}) NOPASSWD: {{ commands }}

%{{ group }} {{ hosts }}=({{ runas }}) NOPASSWD: {{ commands }}

# when rendered:
saltuser1 ALL=(ALL) NOPASSWD: ALL

---

linux:
system:
sudo:
enabled: true
alias:
host:
  LOCAL:
  - localhost
  PRODUCTION:
  - db1
  - db2
runas:
  DBA:
  - postgres
  - mysql
  SALT:
  - root
command:
  # Note: This is not 100% safe when ALL keyword is used, user still may modify configs and hide his actions.
  # Best practice is to specify full list of commands user is allowed to run.
  SUPPORT_RESTRICTED:
  - /bin/vi /etc/sudoers*
  - /bin/vim /etc/sudoers*
  - /bin/nano /etc/sudoers*
  - /bin/emacs /etc/sudoers*
  - /bin/su - root
  - /bin/su -
  - /bin/su
  - /usr/sbin/visudo
  SUPPORT_SHELLS:
  - /bin/sh
  - /bin/ksh
  - /bin/bash
  - /bin/rbash
  - /bin/bash
  - /bin/zsh
  - /bin/csh
  - /bin/fish
  - /bin/tcsh
  - /usr/bin/login
  - /usr/bin/su
  - /usr/su

ALL_SALT_SAFE:
  - /usr/bin/salt state*
  - /usr/bin/salt service*
  - /usr/bin/salt pillar*
  - /usr/bin/salt grains*
- /usr/bin/salt saltutil*
- /usr/bin/salt-call state*
- /usr/bin/salt-call service*
- /usr/bin/salt-call pillar*
- /usr/bin/salt-call grains*
- /usr/bin/salt-call saltutil*

SALT_TRUSTED:
- /usr/bin/salt*

users:
# saltuser1 with default values: saltuser1 ALL=(ALL) NOPASSWD: ALL
saltuser1: {}  
saltuser2:
  hosts:
    - LOCAL  
# User Alias DBA
DBA:
  hosts:
    - ALL  
  commands:
    - ALL_SALT_SAFE  
groups:
  db-ops:
    hosts:
      - ALL  
      - '!PRODUCTION'
    runas:
      - DBA  
    commands:
      - /bin/cat *  
      - /bin/less *  
      - /bin/ls *  
  salt-ops:
    hosts:
      - 'ALL'  
    runas:
      - SALT  
    commands:
      - SUPPORT_SHELLS  
salt-ops-2nd:
  name: salt-ops  
nopasswd: false  
setenv: true # Enable sudo -E option  
runas:
  - DBA  
commands:
  - ALL  
  - '!SUPPORT_SHELLS'  
  - '!SUPPORT.Restricted'
Linux with package, latest version:

```yaml
linux:
  system:
    ...  
    package:
      package-name:
        version: latest
```

Linux with package from certain repo, version with no upgrades:

```yaml
linux:
  system:
    ...  
    package:
      package-name:
        version: 2132.323
        repo: 'custom-repo'
        hold: true
```

Linux with package from certain repo, version with no GPG verification:

```yaml
linux:
  system:
    ...  
    package:
      package-name:
        version: 2132.323
        repo: 'custom-repo'
        verify: false
```

Linux with autoupdates (automatically install security package updates):

```yaml
linux:
  system:
    ...  
    autoupdates:
      enabled: true
      mail: root@localhost
      mail_only_on_error: true
      remove_unused_dependencies: false
      automatic_reboot: true
      automatic_reboot_time: "02:00"
```

Managing cron tasks

There are two data structures that are related to managing cron itself and cron tasks:
linux:
  system:
    cron:

and

linux:
  system:
    job:

to add user to `/etc/cron.allow' use 'enabled' key as shown above.

'/etc/cron.deny' is not managed as CIS 5.1.8 requires it was removed.

A user would be ignored if any of the following is true: * user is disabled in linux:system:user:<username> * user is disabled in linux:system:cron:user:<username>

By default, it will use name as an identifier, unless identifier key is explicitly set or False (then it will use Salt’s default behavior which is identifier same as command resulting in not being able to change it):

linux:
  system:
    ... 
    job:
      cmd1: 
        command: '/cmd/to/run'
        identifier: cmd1
        enabled: true
        user: 'root'
Managing ‘at’ tasks

Pillar for managing at tasks is similar to one for cron tasks:

```yaml
linux:
  system:
    at:
      enabled: true
      pkgs: [ <at packages> ]
      services: [ <at services> ]
    user:
      <username>:
        enabled: true
```

To add a user to ‘/etc/at.allow’ use ‘enabled’ key as shown above.

‘/etc/at.deny’ is not managed as CIS 5.1.8 requires it was removed.

A user will be ignored if any of the following is true: * user is disabled in linux:system:user:<username> * user is disabled in linux:system:at:user:<username>

Linux security limits (limit sensu user memory usage to max 1GB):

```yaml
linux:
  system:
    ...
    limit:
      sensu:
        enabled: true
        domain: sensu
        limits:
          - type: hard
            item: as
            value: 1000000
```

Enable autologin on tty1 (may work only for Ubuntu 14.04):

```yaml
linux:
  system:
    console:
      tty1:
        autologin: root
      # Enable serial console
    ttyS0:
      autologin: root
```
To disable set autologin to false.

Set policy-rc.d on Debian-based systems. Action can be any available command in while true loop and case context. Following will disallow dpkg to stop/start services for the Cassandra package automatically:

```yaml
linux:
  system:
    policyrcd:
      - package: cassandra
        action: exit 101
      - package: '*'
        action: switch
```

Set system locales:

```yaml
linux:
  system:
    locale:
      en_US.UTF-8:
        default: true
      "cs_CZ.UTF-8 UTF-8":
        enabled: true
```

Systemd settings:

```yaml
linux:
  system:
    systemd:
      system:
        systemd:
          Manager:
            DefaultLimitNOFILE: 307200
            DefaultLimitNPROC: 307200
          user:
            Manager:
              DefaultLimitCPU: 2
              DefaultLimitNPROC: 4
```

Ensure presence of directory:

```yaml
linux:
  system:
    directory:
```
Ensure presence of file by specifying its source:

```
linux:
  system:
  file:
    /tmp/test.txt:
      source: http://example.com/test.txt
      user: root #optional
      group: root #optional
      mode: 700 #optional
      dir_mode: 700 #optional
      encoding: utf-8 #optional
      hash: <<hash>> or <<URI to hash>> #optional
      makedirs: true #optional
```

Ensure presence of file by specifying its contents:

```
linux:
  system:
  file:
    /tmp/test.txt:
      contents: |
      line1
      line2
```
Ensure presence of file to be serialized through one of the serializer modules (see: https://docs.saltstack.com/en/latest/ref/serializers/all/index.html):

```yaml
linux:
system:
  file:
    /tmp/test.txt:
      contents_pillar: linux:network:hostname

linux:
system:
  file:
    /tmp/test.txt:
      contents_grains: motd
```

Kernel

Install always up to date LTS kernel and headers from Ubuntu Trusty:

```yaml
linux:
system:
  kernel:
    type: generic
    lts: trusty
    headers: true
```

Load kernel modules and add them to /etc/modules:

```yaml
linux:
system:
  kernel:
    modules:
      - nf_conntrack
      - tp_smapi
      - 8021q
```

Configure or blacklist kernel modules with additional options to /etc/modprobe.d following example will add /etc/modprobe.d/nf_conntrack.conf file with line options nf_conntrack hashsize=262144:

‘option’ can be a mapping (with ‘enabled’ and ‘value’ keys) or a scalar.
Example for ‘scalar’ option value:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          option:
            hashsize: 262144
```

Example for ‘mapping’ option value:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          option:
            hashsize: 262144
            enabled: true
            value: 262144
```

Note
The enabled key is optional and is true by default.

Blacklist a module:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          blacklist: true
```

A module can have a number of aliases, wildcards are allowed. Define an alias for a module:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          alias:
            nfct:
```
enabled: true
"nf_conn*":
  enabled: true

Note
The enabled key is mandatory as no other keys exist.

Execute custom command instead of ‘insmod’ when inserting a module:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          install:
            enabled: true
            command: /bin/true
```

Note
The enabled key is optional and is true by default.

Execute custom command instead of ‘rmmod’ when removing a module:

```yaml
linux:
  system:
    kernel:
      module:
        nf_conntrack:
          remove:
            enabled: true
            command: /bin/true
```

Note
The enabled key is optional and is true by default.

Define module dependencies:
Linux:

System:
Kernel:
Module:
Nf_contrack:
Softdep:
Pre:
  1:
    Enabled: true
    Value: a
  2:
    Enabled: true
    Value: b
  3:
    Enabled: true
    Value: c
Post:
  1:
    Enabled: true
    Value: x
  2:
    Enabled: true
    Value: y
  3:
    Enabled: true
    Value: z

Note
The enabled key is optional and is true by default.

Install specific kernel version and ensure all other kernel packages are not present. Also install extra modules and headers for this kernel:

Linux:
System:
Kernel:
  Type: generic
  Extra: true
  Headers: true
  Version: 4.2.0-22

Sysctl kernel parameters:
Configure kernel boot options:

```yaml
linux:
  system:
    kernel:
      boot_options:
        - elevator=deadline
        - spectre_v2=off
        - nopti
```

CPU

Enable cpufreq governor for every cpu:

```yaml
linux:
  system:
    cpu:
      governor: performance
```

CGROUPS

Setup linux cgroups:

```yaml
linux:
  system:
    cgroup:
      enabled: true
      group:
        ceph_group_1:
          controller:
            cpu:
              shares:
                value: 250
              usage:
                value: 0
              cpuacct:
                value: 1,2,3
              memory:
```
limit_in_bytes:
  value: 2G
memsw.limit_in_bytes:
  value: 3G
mapping:
  subjects:
    - '@ceph'
generic_group_1:
  controller:
    cpu:
      shares:
        value: 250
    cpuacct:
      usage:
        value: 0
mapping:
  subjects:
    - '*:firefox'
    - 'student:cp'

Shared libraries

Set additional shared library to Linux system library path:

```
linux:
  system:
    ld:
      library:
        java:
          - /usr/lib/jvm/jre-openjdk/lib/amd64/server
          - /opt/java/jre/lib/amd64/server
```

Certificates

Add certificate authority into system trusted CA bundle:

```
linux:
  system:
    ca_certificates:
      mycert: |
        -----BEGIN CERTIFICATE-----
        MIICPDCCAaUChEHC65B0Q2Sk0tjKewPMur8wDQYJKoZIhvcNAQECBQAwZzELMAkG
        A1UEBhMCVVMxFzAVBgNVBAMtTDIZImIWFuY29mdGltZSBJbmMuMTc2NQYDVQQE
        LEy5DbGFzcyAzIFB1YmxpYyBQcm9tYXRpb24gQXV0aG9yaXR5MB4XDTk2MDEyOTAw
        MDAwMFoXDTI4MDgwMTIzNTk5OVowXzELMAkGA1UEBhMCVVMxFzAVBgNVBAMtTDIZ
        ImIWFuY29mdGltZSBJbmMuMTc2NQYDVQQELEy5DbGFzcyAzIFB1YmxpYyBQcm9t
        YXRpb24gQXV0aG9yaXR5MB4XDTk2MDEyOTAwMDAwMFoXDTI4MDgwMTIzNTk5OVow
        XzELMAkGa1UEBhMCVVMxFzAVBgNVBAMtTDIZImIWFuY29mdGltZSBJbmMuMTc2NQY
        DVQQELEy5DbGFzcyAzIFB1YmxpYyBQcm9tYXRpb24gQXV0aG9yaXR5MB4XDTk2MDEy
        OTAwMDAwMFoXDTI4MDgwMTIzNTk5OVowXzELMAkGa1UEBhMCVVMxFzAVBgNVBAMtTD
        IZImIWFuY29mdGltZSBJbmMuMTc2NQYDVQQELEy5DbGFzcyAzIFB1YmxpYyBQcm9t
        YXRpb24gQXV0aG9yaXR5MB4XDTk2MDEyOTAwMDAwMFoXDTI4MDgwMTIzNTk5OVow
        XzELMAkGa1UEBhMCVVMxFzAVBgNVBAMtTDIZImIWFuY29mdGltZSBJbmMuMTc2NQY
        DVQQELEy5DbGFzcyAzIFB1YmxpYyBQcm9tYXRpb24gQXV0aG9yaXR5MB4XDTk2MDEy
        OTAwMDAwMFoXDTI4MDgwMTIzNTk5OVowXzELMAkGa1UEBhMCVVMxFzAVBgNVBAMtTD
        IZImIWFuY29mdGltZSBJbmMuMTc2NQYDVQQELEy5DbGFzcyAzIFB1YmxpYyBQcm9t
        YXRpb24gQXV0aG9yaXR5MB4XDTk2MDEyOTAwMDAwMFoXDTI4MDgwMTIzNTk5OVow
        XzELMAkGa1UEBhMCVVMxFzAVBgNVBAMtTDIZImIWFuY29mdGltZSBJbmMuMTc2NQY
```
Sysfs

Install sysfsutils and set sysfs attributes:

```yaml
linux:
  system:
    sysfs:
      scheduler:
        block/sda/queue/scheduler: deadline
      power:
        mode:
          power/state: 0660
      owner:
        power/state: "root:power"
      devices/system/cpu/cpu0/cpufreq/scaling_governor: powersave
```

Optional: You can also use list that will ensure order of items.

```yaml
linux:
  system:
    sysfs:
      scheduler:
        block/sda/queue/scheduler: deadline
      power:
        - mode:
          power/state: 0660
        - owner:
          power/state: "root:power"
      devices/system/cpu/cpu0/cpufreq/scaling_governor: powersave
```

Sysfs definition with disabled automatic write. Attributes are saved to configuration, but are not applied during the run. They will be applied automatically after the reboot.

```yaml
linux:
  system:
    sysfs:
      enable_apply: false
      scheduler:
        block/sda/queue/scheduler: deadline
```
Huge Pages

Huge Pages give a performance boost to applications that intensively deal with memory allocation/deallocation by decreasing memory fragmentation:

```yaml
linux:
system:
  kernel:
    hugepages:
      small:
        size: 2M
        count: 107520
        mount_point: /mnt/hugepages_2MB
        mount: false/true # default is true (mount immediately) / false (just save in the fstab)
      large:
        default: true # default automatically mounted
        size: 1G
        count: 210
        mount_point: /mnt/hugepages_1GB
```

Note

Not recommended to use both pagesizes concurrently.

Intel SR-IOV

PCI-SIG Single Root I/O Virtualization and Sharing (SR-IOV) specification defines a standardized mechanism to virtualize PCIe devices. The mechanism can virtualize a single PCIe Ethernet controller to appear as multiple PCIe devices:

```bash
#!/bin/sh -e
# Enable 7 VF on eth1
echo 7 > /sys/class/net/eth1/device/sriov_numvfs; sleep 2; ifup -a
```

Note

The enable_apply parameter defaults to True if not defined.
Isolate CPU options

Remove the specified CPUs, as defined by the cpu_number values, from the general kernel SMP balancing and scheduler algoirthms. The only way to move a process onto or off an isolated CPU is via the CPU affinity syscalls. cpu_number begins at 0, so the maximum value is 1 less than the number of CPUs on the system:

```yaml
linux:
  system:
    kernel:
      isolcpu: 1,2,3,4,5,6,7 # isolate first cpu 0
```

Repositories

RedHat-based Linux with additional OpenStack repo:

```yaml
linux:
  system:
    ...
  repo:
    rdo-icehouse:
      enabled: true
      pgpcheck: 0
```

Ensure system repository to use czech Debian mirror (default: true) Also pin it’s packages with priority 900:

```yaml
linux:
  system:
    repo:
      debian:
        default: true
        # Import signing key from URL if needed
        key_url: "http://dummy.com/public.gpg"
        pin:
          - pin: 'origin "ftp.cz.debian.org"'
            priority: 900
            package: '*'
```

Sometimes better to use one pining rule file, to decrease mistaken ordering. You can use those option system:apt:preferences, which would add opts into /etc/apt/preferences file:

```yaml
parameters:
  linux:
    system:
      apt:
```

©2020, Mirantis Inc.
preferences:
  enabled: true
  rules:
    100:
      enabled: true
      name: 'some origin pin'
      pin: 'release o=Debian'
      priority: 1100
      package: '*'

If you need to add multiple pin rules for one repo, please use new, ordered definition format ('pinning' definition will be in priority to use):

linux:
  system:
    repo:
      mcp_saltstack:
        architectures: amd64
        clean_file: true
        pinning:
          10:
            enabled: true
            pin: 'release o=SaltStack'
            priority: 50
            package: 'libsodium18'
          20:
            enabled: true
            pin: 'release o=SaltStack'
            priority: 1100
            package: '*'

Note
For old Ubuntu releases (<xenial) extra packages for apt transport, like apt-transport-https may be required to be installed manually. (Chicken-eggs issue: we need to install packages to reach repo from where they should be installed) Otherwise, you still can try ‘fortune’ and install prereq.packages before any repo configuration, using list of requires in map.jinja.

Disabling any prerequisite packages installation:
You can simply drop any package pre-installation (before system.linux.repo will be processed) via cluster lvl:
Package manager proxy global setup:

```yaml
linux:
  system:
    ...
    repo:
      apt-mk:
        source: "deb http://apt-mk.mirantis.com/ stable main salt"
    ...
    proxy:
      pkg:
        enabled: true
        ftp: ftp://ftp-proxy-for-apt.host.local:2121
    ...
    # NOTE: Global defaults for any other component that configure proxy on the system.
    # If your environment has just one simple proxy, set it on linux:system:proxy.
    # # fall back system defaults if linux:system:proxy:pkg has no protocol specific entries
    # as for https and http
    ftp: ftp://proxy.host.local:2121
    http: http://proxy.host.local:3142
    https: https://proxy.host.local:3143
```

Package manager proxy setup per repository:

```yaml
linux:
  system:
    ...
    repo:
      debian:
        source: "deb http://apt-mk.mirantis.com/ stable main salt"
    ...
      apt-mk:
        source: "deb http://apt-mk.mirantis.com/ stable main salt"
        # per repository proxy
        proxy:
          enabled: true
          http: http://maas-01:8080
          https: http://maas-01:8080
    ...
    proxy:
      # package manager fallback defaults
      # used if linux:system:repo:apt-mk:proxy has no protocol specific entries
      pkg:
```
enabled: true
ftp: ftp://proxy.host.local:2121
#http: http://proxy.host.local:3142
#https: https://proxy.host.local:3143
...
# global system fallback system defaults
ftp: ftp://proxy.host.local:2121
http: http://proxy.host.local:3142
https: https://proxy.host.local:3143

Remove all repositories:

```yaml
linux:
  system:
    purge_repos: true
```

Refresh repositories metada, after configuration:

```yaml
linux:
  system:
    refresh_repos_meta: true
```

Setup custom apt config options:

```yaml
linux:
  system:
    apt:
      config:
        compression-workaround:
          "Acquire::CompressionTypes::Order": "gz"
        docker-clean:
          "DPkg::Post-Invoke":
            "rm -f /var/cache/apt/archives/*.deb /var/cache/apt/archives/partial/*.deb /var/cache/apt/*.bin || true"
          "APT::Update::Post-Invoke":
            "rm -f /var/cache/apt/archives/*.deb /var/cache/apt/archives/partial/*.deb /var/cache/apt/*.bin || true"
```

RC

rc.local example

```bash
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
```
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.
exit 0

Prompt

Setting prompt is implemented by creating /etc/profile.d/promp**t**.sh. Every user can have
different prompt:

```
linux:
  system:
    prompt:
      root: \n\n\D{%y/%m/%d %H:%M:%S} $(hostname -f)\n\n\[\e[1;31m\]\[\u@\h:\w\]\[\e[0m\]
      default: \n\D{%y/%m/%d %H:%M:%S} $(hostname -f)\n\n\[\u@\h:\w\]
```

On Debian systems, to set prompt system-wide, it’s necessary to remove setting PS1 in
/etc/bash.bashrc and ~/.bashrc, which comes from /etc/skel/.bashrc. This formula will do this
automatically, but will not touch existing user’s ~/.bashrc files except root.

Bash

Fix bash configuration to preserve history across sessions like ZSH does by default:

```
linux:
  system:
    bash:
      preserve_history: true
```

Login banner message

/etc/issue is a text file which contains a message or system identification to be printed before
the login prompt. It may contain various @char and char sequences, if supported by the
getty-type program employed on the system.

Setting logon banner message is easy:

```
linux:
  system:
    banner:
      enabled: true
      contents: |
      UNAUTHORIZED ACCESS TO THIS SYSTEM IS PROHIBITED
      You must have explicit, authorized permission to access or configure this
device. Unauthorized attempts and actions to access or use this system may
result in civil and/or criminal penalties.
All activities performed on this system are logged and monitored.

Message of the day

pam_motd from package libpam-modules is used for dynamic messages of the day. Setting custom motd will clean up existing ones.

Setting static motd will replace existing /etc/motd and remove scripts from /etc/update-motd.d.

Setting static motd:

```
linux:
  system:
    motd: |
    UNAUTHORIZED ACCESS TO THIS SYSTEM IS PROHIBITED

    You must have explicit, authorized permission to access or configure this device. Unauthorized attempts and actions to access or use this system may result in civil and/or criminal penalties.
    All activities performed on this system are logged and monitored.
```

Setting dynamic motd:

```
linux:
  system:
    motd:
      - release: |
        #!/bin/sh
        [ -r /etc/lsb-release ] && . /etc/lsb-release

        if [ -z "$DISTRIB_DESCRIPTION" ] && [ -x /usr/bin/lsb_release ]; then
          # Fall back to using the very slow lsb_release utility
          DISTRIB_DESCRIPTION=$(lsb_release -s -d)
        fi

        printf "Welcome to %s (%s %s %s)"
        "$DISTRIB_DESCRIPTION" "$(uname -o)" "$(uname -r)" "$(uname -m)"

      - warning: |
        #!/bin/sh
        printf "This is [company name] network.
        Unauthorized access strictly prohibited."
```

Services

Stop and disable the linux service:

```
linux:
  system:
    service:
      apt-daily.timer:
        status: dead
```
Override systemd service unit:

```yaml
parameters:
  linux:
    system:
      service:
        tgt:
          name: tgt
          status: running
          enabled: True
          override:
            50:
              target: tgt.service.d
              name: bind
              content: |
                [Service]
                ExecStart= /usr/sbin/tgtd -f --iscsi portal=${_param:single_address}:3260
```

Possible statuses are dead (disable service by default), running (enable service by default), enabled, disabled:

Linux with the atop service:

```yaml
  linux:
    system:
      atop:
        enabled: true
        interval: 20
        logpath: "/var/log/atop"
        outfile: "/var/log/atop/daily.log"
```

Linux with the mcelog service:

```yaml
  linux:
    system:
      mcelog:
        enabled: true
        logging:
          syslog: true
```

RHEL / CentOS

Currently, update-motd is not available for RHEL. So there is no native support for dynamic motd. You can still set a static one, with a different pillar structure:
Haveged

If you are running headless server and are low on entropy, you may set up Haveged:

```
linux:
  system:
    motd: |
      This is [company name] network.
      Unauthorized access strictly prohibited.
```

Let's have a look at the way we set up Linux network:

### Linux network

**Linux with network manager:**

```
linux:
  network:
    enabled: true
    network_manager: true
```

**Execute Linux.network.interface state without ifupdown activity:**

```
salt-call linux.network.interface pillar='{"linux":{"network":{"noifupdown":true}}}'
```

**Linux with default static network interfaces, default gateway interface and DNS servers:**

```
linux:
  network:
    enabled: true
    interface: eth0
      enabled: true
      type: eth
      address: 192.168.0.102
      netmask: 255.255.255.0
      gateway: 192.168.0.1
      name_servers:
        - 8.8.8.8
        - 8.8.4.4
      mtu: 1500
```

**Linux with bonded interfaces and disabled NetworkManager:**
```yaml
linux:
  network:
    enabled: true
    interface:
      eth0:
        type: eth
        ...
      eth1:
        type: eth
        ...
      bond0:
        enabled: true
        type: bond
        address: 192.168.0.102
        netmask: 255.255.255.0
        mtu: 1500
        use_in:
          - interface: ${linux:interface:eth0}
          - interface: ${linux:interface:eth0}
        network_manager:
          disable: true

Linux with VLAN interface_params:

```yaml
linux:
  network:
    enabled: true
    interface:
      vlan69:
        type: vlan
        use_interfaces:
          - interface: ${linux:interface:bond0}

Linux with wireless interface parameters:

```yaml
linux:
  network:
    enabled: true
    gateway: 10.0.0.1
    default_interface: eth0
    interface:
      wlan0:
        type: eth
        wireless:
          essid: example
          key: example_key
          security: wpa
          priority: 1
```
Linux networks with routes defined:

```yaml
linux:
  network:
    enabled: true
    gateway: 10.0.0.1
    default_interface: eth0
  interface:
    eth0:
      type: eth
      route:
        default:
          address: 192.168.0.123
          netmask: 255.255.255.0
          gateway: 192.168.0.1
```

Native Linux Bridges:

```yaml
linux:
  network:
  interface:
    eth1:
      enabled: true
      type: eth
      proto: manual
    up_cmds:
      - ip address add 0/0 dev $IFACE
      - ip link set $IFACE up
    down_cmds:
      - ip link set $IFACE down
  br-ex:
    enabled: true
    type: bridge
    address: ${linux:network:host:public_local:address}
    netmask: 255.255.255.0
    use_interfaces:
      - eth1
```

Open vSwitch Bridges:

```yaml
linux:
  network:
  bridge: openvswitch
  interface:
    eth1:
      enabled: true
      type: eth
      proto: manual
```
up_cmds:
- ip address add 0/0 dev $IFACE
- ip link set $IFACE up
down_cmds:
- ip link set $IFACE down
br-ex:
  enabled: true
type: bridge
  address: ${linux:network:host:public_local:address}
  netmask: 255.255.255.0
  use_interfaces:
    - eth1
br-prv:
  enabled: true
type: ovs_bridge
  mtu: 65000
br-ens7:
  enabled: true
  name: br-ens7
type: ovs_bridge
  proto: manual
  mtu: 9000
  use_interfaces:
    - ens7
patch-br-ens7-br-prv:
  enabled: true
  name: ens7-prv
type: ovs_port
  bridge: br-ens7
  port_type: patch
  peer: prv-ens7
tag: 109 # [] to unset a tag
  mtu: 65000
patch-br-prv-br-ens7:
  enabled: true
  name: prv-ens7
  bridge: br-prv
  ovs_type: ovs_port
  type: ovs_port
  port_type: patch
  peer: ens7-prv
tag: 109
  mtu: 65000
ens7:
  enabled: true
  name: ens7
  proto: manual
  ovs_port_type: OVSPort
Debian manual proto interfaces

When you are changing interface proto from static in up state to manual, you may need to flush ip addresses. For example, if you want to use the interface and the ip on the bridge. This can be done by setting the ipflush_onchange to true.

```
linux:
  network:
    interface:
      eth1:
        enabled: true
        type: eth
        proto: manual
        mtu: 9100
        ipflush_onchange: true
```

Debian static proto interfaces

When you are changing interface proto from dhcp in up state to static, you may need to flush ip addresses and restart interface to assign ip address from a managed file. For example, if you want to use the interface and the ip on the bridge. This can be done by setting the ipflush_onchange with combination restart_on_ipflush param set to true.

```
linux:
  network:
    interface:
      eth1:
        enabled: true
        type: eth
        proto: static
        address: 10.1.0.22
        netmask: 255.255.255.0
        ipflush_onchange: true
        restart_on_ipflush: true
```

Concatinating and removing interface files

Debian based distributions have /etc/network/interfaces.d/ directory, where you can store configuration of network interfaces in separate files. You can concatenate the files to the defined destination when needed, this operation removes the file from the /etc/network/interfaces.d/. If you just need to remove iface files, you can use the remove_iface_files key.

```
linux:
  network:
    concat_iface_files:
```

```
Configure DHCP client

None of the keys is mandatory, include only those you really need. For full list of available options under send, supersede, prepend, append refer to dhcp-options(5).

```yaml
linux:
  network:
    dhclient:
      enabled: true
      backoff_cutoff: 15
      initial_interval: 10
      reboot: 10
      retry: 60
      select_timeout: 0
      timeout: 120
    send:
      - option: host-name
        declaration: "= gethostname()"
    supersede:
      - option: host-name
        declaration: "spaceship"
      - option: domain-name
        declaration: "domain.home"
    prepend:
      - option: domain-name-servers
        declaration:
        - 8.8.8.8
        - 8.8.4.4
      - option: domain-search
        declaration:
        - example.com
        - eng.example.com
    #append:
      # - option: domain-name-servers
      #  declaration: 127.0.0.1
      # ip or subnet to reject dhcp offer from
    reject:
      - 192.33.137.209
      - 10.0.2.0/24
    request:
      - subnet-mask
      - broadcast-address
```
- time-offset
- routers
- domain-name
- domain-name-servers
- domain-search
- host-name
- dhcp6.name-servers
- dhcp6.domain-search
- dhcp6.fqdn
- dhcp6.sntp-servers
- netbios-name-servers
- netbios-scope
- interface-mtu
- rfc3442-classless-static-routes
- ntp-servers

**require:**
- subnet-mask
- domain-name-servers

# if per interface configuration required add below

**interface:**

ens2:
  initial_interval: 11
  reject:
    - 192.33.137.210

ens3:
  initial_interval: 12
  reject:
    - 192.33.137.211

Linux network systemd settings:

```
linux:
  network:
    ...
    systemd:
      link:
        10-iface-dmz:
          Match:
            MACAddress: c8:5b:67:fa:1a:af
            OriginalName: eth0
            Link:
              Name: dmz0
      netdev:
        20-bridge-dmz:
          match:
            name: dmz0
            network:
              mescription: bridge
```
Configure global environment variables

Use /etc/environment for static system wide variable assignment after boot. Variable expansion is frequently not supported.

```yaml
linux:
  system:
    env:
      BOB_VARIABLE: Alice
      BOB_PATH:
        - /srv/alice/bin
        - /srv/bob/bin
      ftp_proxy: none
      https_proxy: ${linux:system:proxy:https}
      no_proxy:
        - 192.168.0.80
        - 192.168.1.80
        - .domain.com
        - .local

# NOTE: global defaults proxy configuration.
proxy:
  ftp: ftp://proxy.host.local:2121
  http: http://proxy.host.local:3142
  https: https://proxy.host.local:3143
  noproxy:
    - .domain.com
    - .local
```

Configure the profile.d scripts

The profile.d scripts are being sourced during .sh execution and support variable expansion in opposite to /etc/environment global settings in /etc/environment.
locales: |
    export LANG=C
    export LC_ALL=C
...

vi_flavors.sh: |
    export PAGER=view
    export EDITOR=vim
    alias vi=vim

shell_locales.sh: |
    export LANG=en_US
    export LC_ALL=en_US.UTF-8

shell_proxies.sh: |
    export FTP_PROXY=ftp://127.0.3.3:2121
    export NO_PROXY='.local'

Configure login.defs parameters

```
linux:
    system:
        login_defs:
            <opt_name>:
                enabled: true
                value: <opt_value>
```

<opt_name> is a configurational option defined in ‘man login.defs’. <opt_name> is case sensitive, should be UPPERCASE only!

Linux with hosts

Parameter purge_hosts will enforce whole /etc/hosts file, removing entries that are not defined in model except defaults for both IPv4 and IPv6 localhost and hostname as well as FQDN.

We recommend using this option to verify that /etc/hosts is always in a clean state. However it is not enabled by default for security reasons.

```
linux:
    network:
        purge_hosts: true
        host:
            # No need to define this one if purge_hosts is true
            hostname:
                address: 127.0.1.1
                names:
                    - ${linux:network:fqdn}
                    - ${linux:network:hostname}
            node1:
                address: 192.168.10.200
                names:
                    - node2.domain.com
```
Linux with hosts collected from mine

All DNS records defined within infrastructure are passed to the local hosts records or any DNS server. Only hosts with the grain parameter set to true will be propagated to the mine.

```yaml
linux:
  network:
    purge_hosts: true
    mine_dns_records: true
    host:
      node1:
        address: 192.168.10.200
        grain: true
        names:
          - node2.domain.com
          - service2.domain.com
```

Set up resolvconf's basic resolver info, e.g. nameservers, search/domain and options:

```yaml
linux:
  network:
    resolv:
      dns:
        - 8.8.4.4
        - 8.8.8.8
      domain: my.example.com
      search:
        - my.example.com
        - example.com
      options:
        - ndots:5
        - timeout:2
        - attempts:2
```

Set up custom TX queue length for tap interfaces:

```yaml
linux:
  network:
    tap_custom_txqueuelen: 10000
```

DPDK OVS interfaces
DPDK OVS NIC

```yaml
linux:
  network:
    bridge: openvswitch
    dpdk:
      enabled: true
      driver: uio/vfio
    openvswitch:
      pmd_cpu_mask: "0x6"
      dpdk_socket_mem: "1024,1024"
      dpdk_lcore_mask: "0x400"
      memory_channels: 2
    interface:
      dpkd0:
        name: ${_param:dpdk_nic}
        pci: 0000:06:00.0
        driver: igb_uio/vfio-pci
        enabled: true
        type: dpdk_ovs_port
        n_rxq: 2
        pmd_rxq_affinity: "0:1,1:2"
        bridge: br-prv
        mtu: 9000
        br-prv:
          enabled: true
          type: dpdk_ovs_bridge
```

DPDK OVS Bond

```yaml
linux:
  network:
    bridge: openvswitch
    dpdk:
      enabled: true
      driver: uio/vfio
    openvswitch:
      pmd_cpu_mask: "0x6"
      dpdk_socket_mem: "1024,1024"
      dpdk_lcore_mask: "0x400"
      memory_channels: 2
    interface:
      dpdk_second_nic:
        name: ${_param:primary_second_nic}
        pci: 0000:06:00.0
        driver: igb_uio/vfio-pci
        bond: dpdkbond0
        enabled: true
```
```yaml
type: dpdk_ovs_port
n_rxq: 2
pmd_rxq_affinity: "0:1,1:2"
mtu: 9000
dpdk_first_nic:
  name: ${_param:primary_first_nic}
  pci: 0000:05:00.0
  driver: igb_uio/vfio-pci
  bond: dpdkbond0
  enabled: true
  type: dpdk_ovs_port
  n_rxq: 2
  pmd_rxq_affinity: "0:1,1:2"
  mtu: 9000
dpdkbond0:
  enabled: true
  bridge: br-prv
  type: dpdk_ovs_bond
  mode: active-backup
  br-prv:
    enabled: true
  type: dpdk_ovs_bridge

dpdk bond dpdkbond0:

DPDK OVS LACP Bond with vlan tag

linux:
  network:
    bridge: openvswitch
dpdk:
  enabled: true
driver: uio
openvswitch:
  pmd_cpu_mask: "0x6"
dpdk_socket_mem: "1024,1024"
dpdk_lcore_mask: "0x400"
memory_channels: "2"
interface:
  eth3:
    enabled: true
type: eth
  proto: manual
  name: ${_param:tenant_first_nic}
  eth4:
    enabled: true
type: eth
  proto: manual
  name: ${_param:tenant_second_nic}
dpdk0:
```

DPDK OVS LACP Bond with vlan tag
DPDK OVS bridge for VXLAN

If VXLAN is used as tenant segmentation, IP address must be set on br-prv.

```yaml
name: ${_param:tenant_first_nic}
pci: "0000:81:00.0"
driver: igb_uio
bond: bond1
enabled: true
type: dpdk_ovs_port
n_rxq: 2
dpdk1:
  name: ${_param:tenant_second_nic}
pci: "0000:81:00.1"
driver: igb_uio
bond: bond1
enabled: true
type: dpdk_ovs_port
n_rxq: 2
bond1:
  enabled: true
  bridge: br-prv
  type: dpdk_ovs_bond
  mode: balance-slb
br-prv:
  enabled: true
  type: dpdk_ovs_bridge
  tag: ${_param:tenant_vlan}
  address: ${_param:tenant_address}
  netmask: ${_param:tenant_network_netmask}
```

DPDK OVS bridge with Linux network interface

```yaml
linux:
  network:
    ...
    interface:
      br-prv:
        enabled: true
        type: dpdk_ovs_bridge
        address: 192.168.50.0
        netmask: 255.255.255.0
        tag: 101
        mtu: 9000
```
interface:
  eth0:
    type: eth
    ovs_bridge: br-prv
  ... 
  br-prv:
    enabled: true
    type: dpdk_ovs_bridge
  ...

Linux storage

Linux with mounted Samba:

```yaml
linux:
  storage:
    enabled: true
  mount:
    samba1:
      - enabled: true
      - path: /media/myuser/public/
      - device: //192.168.0.1/storage
      - file_system: cifs
      - options: guest,uid=myuser,iocharset=utf8,file_mode=0777,dir_mode=0777,noperm
```

NFS mount:

```yaml
linux:
  storage:
    enabled: true
  mount:
    nfs_glance:
      enabled: true
      path: /var/lib/glance/images
      device: 172.16.10.110:/var/nfs/glance
      file_system: nfs
      opts: rw,sync
```

File swap configuration:

```yaml
linux:
  storage:
    enabled: true
  swap:
    file:
      enabled: true
      engine: file
```
Partition swap configuration:

```yaml
device: /swapfile
size: 1024

Partition swap configuration:

linux:
  storage:
    enabled: true
  swap:
    partition:
      enabled: true
      engine: partition
      device: /dev/vg0/swap

LVM group vg1 with one device and data volume mounted into /mnt/data.

parameters:
  linux:
    storage:
      mount:
        data:
          enabled: true
          device: /dev/vg1/data
          file_system: ext4
          path: /mnt/data
  lvm:
    vg1:
      enabled: true
      devices: - /dev/sdb
      volume:
        data:
          size: 40G
          mount: ${linux:storage:mount:data}

# When set they will take precedence over filters aget from volume groups.

lvm_filters:
  10:
    enabled: True
    value: "a|loop|"
  20:
    enabled: True
    value: "r|/dev/hdc|"
  30:
    enabled: True
    value: "a|/dev/ide|"
  40:
    enabled: True
    value: "r|.*|"
```
Create partitions on disk. Specify size in MB. It expects empty disk without any existing partitions. Set startsector=1 if you want to start partitions from 2048.

```yaml
linux:
  storage:
    disk:
      first_drive:
        startsector: 1
        name: /dev/loop1
        type: gpt
        partitions:
          - size: 200  #size in MB
            type: fat32
          - size: 300  #size in MB
            mkfs: True
            type: xfs
        /dev/vda1:
          partitions:
            - size: 5
              type: ext2
            - size: 10
              type: ext4
```

Multipath with Fujitsu Eternus DXL:

```yaml
parameters:
  linux:
    storage:
      multipath:
        enabled: true
        blacklist_devices:
          - /dev/sda
          - /dev/sdb
        backends:
          - fujitsu_eternus_dxl
```

Multipath with Hitachi VSP 1000:

```yaml
parameters:
  linux:
    storage:
      multipath:
        enabled: true
        blacklist_devices:
          - /dev/sda
          - /dev/sdb
        backends:
          - hitachi_vsp1000
```
Multipath with IBM Storwize:

```yaml
parameters:
  linux:
    storage:
      multipath:
        enabled: true
        blacklist_devices:
          - /dev/sda
          - /dev/sdb
        backends:
          - ibm_storwize
```

Multipath with multiple backends:

```yaml
parameters:
  linux:
    storage:
      multipath:
        enabled: true
        blacklist_devices:
          - /dev/sda
          - /dev/sdb
          - /dev/sdc
          - /dev/sdd
        backends:
          - ibm_storwize
          - fujitsu_ eternus_dxl
          - hitachi_vsp1000
```

PAM LDAP integration:

```yaml
parameters:
  linux:
    system:
      auth:
        enabled: true
        mkhomedir:
          enabled: true
        umask: 0027
      ldap:
        enabled: true
        binddn: cn=bind,ou=service_users,dc=example,dc=com
        bindpw: secret
        uri: ldap://127.0.0.1
        base: ou=users,dc=example,dc=com
        ldap_version: 3
        pagesize: 65536
```
referrals: off
filter:
  passwd: (&(&(objectClass=person)(uidNumber=*)))(unixHomeDirectory=*)
  shadow: (&(&(objectClass=person)(uidNumber=*)))(unixHomeDirectory=*)
  group: (&(objectClass=group)(gidNumber=*))

PAM duo 2FA integration

parameters:
  linux:
    system:
      auth:
        enabled: true
      duo:
        enabled: true
        duo_host: localhost
        duo_ikey: DUO-INTEGRATION-KEY
        duo_skey: DUO-SECRET-KEY

duo package version may be specified (optional)

linux:
  system:
    package:
      duo-unix:
        version: 1.10.1-0

Disabled multipath (the default setup):

parameters:
  linux:
    storage:
      multipath:
        enabled: false

Linux with local loopback device:

linux:
  storage:
    loopback:
      disk1:
        file: /srv/disk1
        size: 50G

External config generation
You are able to use config support metadata between formulas and only generate configuration files for external use, for example, Docker, and so on.

```yaml
parameters:
  linux:
    system:
      config:
        pillar:
          jenkins:
            master:
              home: /srv/volumes/jenkins
            approved_scripts:
              - method java.net.URL openConnection
            credentials:
              - type: username_password
                scope: global
                id: test
                desc: Testing credentials
              username: test
              password: test
```

Netconsole Remote Kernel Logging

Netconsole logger can be configured for the configfs-enabled kernels (CONFIG_NETCONSOLE_DYNAMIC must be enabled). The configuration applies both in runtime (if network is already configured), and on-boot after an interface initialization.

```yaml
parameters:
  linux:
    system:
      netconsole:
        enabled: true
        port: 514 (optional)
        loglevel: debug (optional)
        target: 192.168.0.1:
          interface: bond0
          mac: "ff:ff:ff:ff:ff:ff" (optional)
```

Note

- Receiver can be located only on the same L3 domain (or you need to configure gateway MAC manually).
- The Receiver MAC is detected only on configuration time.
- Using broadcast MAC is not recommended.
Check network params on the environment
Grab nics and nics states

```shell
salt osd001\* net_checks.get_nics
```

Example of system output:

```
osd001.domain.com:
  - bond0
    - None
    - 1e:c8:64:42:23:b9
    - 0
    - 1500
  - bond1
    - None
    - 3c:fd:fe:27:3b:00
    - 1
    - 9100
  - fourty1
    - None
    - 3c:fd:fe:27:3b:00
    - 1
    - 9100
  - fourty2
    - None
    - 3c:fd:fe:27:3b:02
    - 1
    - 9100
```

Grab 10G nics PCI addresses for hugepages setup

```shell
salt cmp001\* net_checks.get_ten_pci
```

Example of system output:

```
cmp001.domain.com:
  - ten1
    - 0000:19:00.0
  - ten2
    - 0000:19:00.1
```

Grab ip address for an interface

```
salt cmp001\* net_checks.get_ip iface=one4
```

Example of system output:

```
cmp001.domain.com:
   10.200.177.101
```

Grab ip addresses map

```
salt-call net_checks.nodes_addresses
```

Example of system output:

```
local:
 _
  - cid01.domain.com
    _
    _
    - pxe
     - 10.200.177.91
    _
    - control
     - 10.200.178.91
 _
  - cmn02.domain.com
    _
    _
    - storage_access
     - 10.200.181.67
    _
    - pxe
     - 10.200.177.67
    _
    - control
     - 10.200.178.67
 _
  - cmp010.domain.com
    _
    _
- pxe
  - 10.200.177.110
- storage_access
  - 10.200.181.110
- control
  - 10.200.178.110
- vxlan
  - 10.200.179.110

Verify full mesh connectivity

salt-call net_checks.ping_check

Example of positive system output:

['PASSED']
[INFO    ] ['PASSED']
local:
  True

Example of system output in case of failure:

FAILED
[ERROR    ] FAILED
['control: 10.0.1.92 -> 10.0.1.224: Failed']
['control: 10.0.1.93 -> 10.0.1.224: Failed']
['control: 10.0.1.51 -> 10.0.1.224: Failed']
['control: 10.0.1.102 -> 10.0.1.224: Failed']
['control: 10.0.1.13 -> 10.0.1.224: Failed']
['control: 10.0.1.81 -> 10.0.1.224: Failed']
local:
  False

For this feature to work, please mark addresses with some role. Otherwise ‘default’ role is assumed and mesh would consist of all addresses on the environment.

Mesh mark is needed only for interfaces which are enabled and have ip address assigned.

Checking dhcp pxe network meaningless, as it is used for salt master vs minion communications, therefore treated as checked.

 parameters:
linux:
  network:
    interface:
ens3:
  enabled: true
  type: eth
  proto: static
  address: ${_param:deploy_address}
  netmask: ${_param:deploy_network_netmask}
  gateway: ${_param:deploy_network_gateway}
  mesh: pxe

Check pillars for ip address duplicates

salt-call net_checks.verify_addresses

Example of positive system output:

```
['PASSED']
[INFO ] ['PASSED']
local:
  True
```

Example of system output in case of failure:

```
FAILED. Duplicates found
[ERROR ] FAILED. Duplicates found
['gtw01.domain.com', 'gtw02.domain.com', '10.0.1.224']
[ERROR ] ['gtw01.domain.com', 'gtw02.domain.com', '10.0.1.224']
local:
  False
```

Generate csv report for the env

```
salt -C 'kvm* or cmp* or osd*' net_checks.get_nics_csv
  | grep '^' | sed 's/\t/ */g' | grep -Ev ^server
  | sed '1 i|server,nic_name,ip_addr,mac_addr,link,mtu,chassis_id,chassis_name,port_mac,port_descr'
```

Example of system output:

```
server,nic_name,ip_addr,mac_addr,link,mtu,chassis_id,chassis_name,port_mac,port_descr
cmp010.domain.com,bond0,None,b4:96:91:10:5b:3a,1,1500,,,
cmp010.domain.com,bond0.21,10.200.178.110,b4:96:91:10:5b:3a,1,1500,,,
cmp010.domain.com,bond0.22,10.200.179.110,b4:96:91:10:5b:3a,1,1500,,,
cmp010.domain.com,bond1,None,3c:fd:fe:34:ad:22,0,1500,,,
cmp010.domain.com,bond1.24,10.200.181.110,3c:fd:fe:34:ad:22,0,1500,,,
cmp010.domain.com,fourty5,None,3c:fd:fe:34:ad:20,0,9000,,,
cmp010.domain.com,fourty6,None,3c:fd:fe:34:ad:22,0,9000,,,
cmp010.domain.com,one1,None,b4:96:91:10:5b:38,0,1500,,,
cmp010.domain.com,one2,None,b4:96:91:10:5b:39,1,1500,f0:4b:3a:8f:75:40,exnfvaa18-20,548,ge-0/0/22
```
Usage
Set MTU of the eth0 network interface to 1400:

```
ip link set dev eth0 mtu 1400
```

Read more

- https://www.archlinux.org/
MAAS

Usage
Metal as a Service

Sample pillars
Single MAAS service:

```yaml
maas:
  server:
    enabled: true
```

Single MAAS region service [single UI/API]:

```yaml
maas:
  salt_master_ip: 192.168.0.10
  region:
    upstream_proxy:
      address: 10.0.0.1
      port: 8080
      user: username      #OPTIONAL
      password: password  #OPTIONAL
    theme: mirantis
  bind:
    host: 192.168.0.10:5240
    port: 5240
  admin:
    username: exampleuser
    password: examplepassword
    email: email@example.com
  database:
    engine: null
    host: localhost
    name: maasdb
    password: qwqwqw
    username: maas
  enabled: true
  user: mirantis
  token: "89EgtWkX45ddjMYpuL:SvgVjxFG87Dr6kVf4Wp:5WLFbUgmm9XQtjxm3V2LUUy7bpCmqmnk"
  fabrics:
    fabric1:
      name: 'tf2'
      description: "Test fabric"
    fabric2:
      name: 'tf2'
      description: "Test fabric2"

deploy_network:
  name: 'deploy_network'
  description: Fabric for deploy_network
  vlans:
    0:
      name: 'vlan 0'
      description: Deploy VLAN
mtu: 1500
dhcp: true
# FIXME: after refactoring domain module, it should be
# fixed exactly for FQDN, not only 'hostname'
primary_rack: "$(linux:network:hostname)"

dhcp_snippets:
test-snippet:
  value: option bootfile-name "tftp://192.168.0.10/snippet";
  description: Test snippet
  enabled: true

subnets:
  subnet1:
    fabric: ${maas:region:fabrics:deploy_network:name}
    cidr: 2.2.3.0/24
    gateway_ip: 2.2.3.2
    vlan: 150
    ipranges:
      1:
        end: "2.2.3.40"
        start: "2.2.3.20"
        type: dynamic
      2:
        end: "2.2.3.250"
        start: "2.2.3.45"
        type: reserved

package_repositories:
Saltstack:
  distributions:
    - trusty
    - main
  arches: amd64
  key: "-----BEGIN PGP PUBLIC KEY BLOCK-----
mQENBFOpvpgBCADkP656H41i8fpplEEB8leLhugyC2rTEwwScIb8tQNYtUigdna9
......
fuBmScum8uQTrEF5+Um5zkwC7EXTdH1co/+V/fpOtxIG4XO4kcugZefVm5ERfVS
MA==
=dtMN
-----END PGP PUBLIC KEY BLOCK-----"
  enabled: true
machines:
machine1_new_schema:
pxe_interface_mac: "11:22:33:44:55:66" # Node will be identified by those mac
interfaces:
nic01: # could be any, used for iterate only
type: eth # Not implemented
name: eth0 # Override default nic name. Interface to rename will be identified by mac
mode: "static"
ip: "2.2.3.19" # ip should be out of reserved subnet range, but still in subnet range
subnet: "subnet1"
gateway: "2.2.3.2" # override default gateway from subnet
nic02:
type: eth # Not-implemented
subnet: "subnet2"
mode: "dhcp"
power_parameters:
power_type: ipmi
power_address: '192.168.10.10'
power_user: bmc_user
# power_password: bmc_password # Old format, please use new one
power_pass: bmc_password
# Optional (for legacy HW)
power_driver: LAN
distro_series: xenial
hwe_kernel: hwe-16.04
machine1_old_schema:
interface:
  mac: "11:22:33:44:55:88" # Node will be identified by those mac
  mode: "static"
ip: "2.2.3.15"
  subnet: "subnet1"
  gateway: "2.2.3.2"
power_parameters:
power_type: ipmi
power_address: '192.168.10.10'
power_user: bmc_user
# power_password: bmc_password # Old format, please use new one
power_pass: bmc_password
# Optional (for legacy HW)
power_driver: LAN
distro_series: xenial
hwe_kernel: hwe-16.04
virsh_example:
pxe_interface_mac: "52:54:00:00:01:01"
interfaces:
nic01:
type: eth
name: eth0
mac: "52:54:00:00:01:01"

subnet: "${maas:region:subnets:deploy_network:name}"
mode: "dhcp"
power_parameters:
power_type: virsh
power_address: "qemu+tcp://my-kvm-node-hostname/system"
power_id: "kvm01-pxe01"
devices:
machine1-ipmi:
interface:
ip_address: 192.168.10.10
subnet: cidr:192.168.10.0/24
Update VLAN:

Note
Vid 0 has default name untagged in the MAAS UI.

```yaml
maas:
  region:
    fabrics:
      test-fabric:
        description: "Test fabric"
        vlan:
          0:
            description: "Your VLAN 0"
            dhcp: True
          13:
            description: "Your VLAN 13"
            dhcp: False
```

Create disk schema per machine via maas/client.sls with default lvm schema + default values.

Note
This should be used mostly for custom root partitioning and RAID configuration. For not-root partitions, use salt-formula-linux.
maas:
region:
machines:
server1:
  disk_layout:
    type: lvm
    root_size: 20G
    root_device: vda
    volume_group: vg1
    volume_name: root
    volume_size: 8
    bootable_device: vda

FLAT layout with custom root size:

maas:
region:
machines:
server2:
  disk_layout:
    type: flat
    root_size: 20
    physical_device: vda
    bootable_device: vda

Size specification with % char used is not yet supported.

maas:
region:
machines:
server3:
  disk_layout:
    type: flat
    bootable_device: sda
  disk:
    sda:
      type: physical
      partition_schema:
        part1:
          size: 100%
          type: ext4
          mount: '/'

Define more complex layout:
machines:
  server3:
    disk_layout:
      type: custom
      bootable_device: vda
disk:
  vda:
    type: physical
    partition_schema:
      part1:
        size: 10G
        type: ext4
        mount: '/'
      part2:
        size: 2G
      part3:
        size: 3G
  vdc:
    type: physical
    partition_schema:
      part1:
        size: 100G
  vdd:
    type: physical
    partition_schema:
      part1:
        size: 100G
  raid0:
    type: raid
    level: 10
    devices:
    - vde
    - vdf
    partition_schema:
      part1:
        size: 10G
      part2:
        size: 2G
      part3:
        size: 3G
  raid1:
    type: raid
    level: 1
    partitions:
    - vdc-part1
    - vdd-part1
volume_group2:
  type: lvm
  devices:
- raid1

  **volume:**
  
  **tmp:**
  
  **size:** 5G
  
  **type:** ext4
  
  **mount:** '/tmp'

  **log:**
  
  **size:** 7G
  
  **type:** ext4
  
  **mount:** '/var/log'

Raid setup, 4x HDD:

```yaml
maas:
  region:
    machines:
      serverWithRaidExample:
        disk_layout:
          type: custom
          bootable_device: sda
          disk:
            md0:
              type: raid
              level: 1
              devices:
                - sda
                - sdb
              partition_schema:
                part1:
                  size: 230G
                  type: ext4
                  mount: /
            md1:
              type: raid
              level: 1
              devices:
                - sdc
                - sdd
              partition_schema:
                part1:
                  size: 1890G
                  type: ext4
                  mount: /var/lib/libvirt
```

Raid + LVM setup, 2xSSD + 2xHDD:
Note
This setup lacks the ability run state twice, as of now when `disk_partition_present` is called, it tries blindly to delete the partition and then recreated. That fails as MAAS rejects remove partition used in RAID/LVM.

```yaml
maas:
  region:
    machines:
      serverWithRaidExample2:
        disk_layout:
          type: custom
          #bootable_device: vgssd-root
        disk:
          sda: &maas_disk_physical_ssd
type: physical
          partition_schema:
            part1:
              size: 239G
          sdb: *maas_disk_physical_ssd
          sdc: &maas_disk_physical_hdd
type: physical
          partition_schema:
            part1:
              size: 1990G
          sdd: *maas_disk_physical_hdd
        md0:
          type: raid
          level: 1
          partitions:
            - sda-part1
            - sdb-part1
        md1:
          type: raid
          level: 1
          partitions:
            - sdc-part1
            - sdd-part1
        vgssd:
          type: lvm
          devices:
            - md0
          volume:
            root:
              size: 230G
              type: ext4
```
mount: '/'

vghdd:
  type: lvm
devices:
  - md1
volume:
  libvirt:
    size: 1800G
    type: ext4
    mount: '/var/lib/libvirt'

LVM setup using partition

maas:
  region:
    machines:
      serverWithLvmExample3:
        disk_layout:
          type: custom
          bootable_device: sda
disk:
  sda:
    type: physical
    partition_schema:
      part1:
        size: 50G
      part2:
        mount: '/var/lib/libvirt/images/
        size: 10G
        type: ext4
  vg0:
    partitions:
      - sda-part1
type: lvm
volume:
  root:
    mount: /
    size: 40G
    type: ext4

Setup image mirror (MAAS boot resources):

maas:
  mirror:
    enabled: true
  image:
    sections:
      bootloaders:
Usage of local deb repos and curtin-based variables.

Dict of variables curtin_vars:amd64:xenial: format, which will be passed only to /etc/maas/preseeds/curtin_userdata_amd64_generic_xenial accordingly.

```
maas:
  cluster: |
    enabled: true
  region: |
    port: 80
    host: localhost
  saltstack_repo_key: |
    -----BEGIN PGP PUBLIC KEY BLOCK-----
    Version: GnuPG v2
    mQENBFOpvpgBCADkP656H41I8fppIEEB8leLhugyC2rTEwwSclb8tQNYtUiGdna9
    .....
    fuBmScum8uQTrEF5+Um5zkW7c6Tdhf1co/+V/fpOtxlG4XO4kcugZefVm5ERfVS
    MA==
    =dtMN
    -----END PGP PUBLIC KEY BLOCK-----
  saltstack_repo_xenial: "deb [arch=amd64] http://{_param:local_repo_url}/ubuntu-xenial stable salt"
  saltstack_repo_trusty: "deb [arch=amd64] http://{_param:local_repo_url}/ubuntu-trusty stable salt"
  curtin_vars: |
    amd64: |
      xenial: |
        # List of packages, to be installed directly in curtin stage.
        extra_pkgs: |
          enabled: true
          # exact kernel pkgs name, to be passed into curtin stage.
          kernel_package: |
            enabled: true
            value 'linux-image-virtual-hwe-16.04'
```
maas:
  cluster:
    enabled: true
    role: master/slave

MAAS region service with backup data:

maas:
  region:
    database:
      initial_data:
        source: cfg01.local
        host: 192.168.0.11

MAAS service power_parameters definition with OpenStack Nova power_type:

maas:
  region:
    machines:
      cmp1:
        power_type: nova
        power_parameters: # old style, deprecated
        power_nova_id: hostuuid
        power_os_tenantname: tenant
        power_os_username: user
        power_os_password: password
        power_os_authurl: http://url

maas:
  region:
    machines:
      cmp1:
        power_type: nova
        power_parameters: # new style
        nova_id: hostuuid
        os_tenantname: tenant
        os_username: user
        os_password: password
        os_authurl: http://url

Ext pillar from MAAS address pool
Set up the Salt Master node:

```
salt:
master:
ext_pillars:
1:
module: cmd_json
params: /usr/share/salt-formulas/env/_modules/maas-IPAM.py --address_pool ${salt:master:pillar:data_dir}/classes/cluster/${_param:cluster_name}/infra/address_pool.yml
```

```
salt-call state.apply salt.master
salt '*' saltutil.refresh_pillar
```

Update infra/address_pool.yml:

```
parameters:
address_pool:
  external:
    dns_server01: 8.8.8.8
    dns_server02: 8.8.4.4
    upstream_ntp_server: 193.27.208.100
    remote_rsyslog_host: 127.0.0.3
  deploy_network:
    address: 192.168.0.0
    netmask: 255.255.255.0
    gateway: 192.168.0.1
    prefix: 24
    vlan: 0
  # Static reservation which interfere with maas reserve pool
  reserved:
    cmp001_deploy_address: 192.168.0.101
    cmp002_deploy_address: 192.168.0.102
    infra_config_deploy_address: 192.168.0.253
    infra_kvm_node01_deploy_address: 192.168.0.241
    infra_kvm_node02_deploy_address: 192.168.0.242
    infra_kvm_node03_deploy_address: 192.168.0.243
    infra_kvm_node04_deploy_address: 192.168.0.244
    infra_kvm_node05_deploy_address: 192.168.0.245
    infra_kvm_node06_deploy_address: 192.168.0.246
    ldap_ip_address: 192.168.0.249
  pool:
    # Static reservation out of maas reserved pool
    aptly_server_deploy_address: 192.168.0.252
    # Dynamic serialization
    cicd_control_node01_deploy_address: dummy
    cicd_control_node02_deploy_address: dummy
    cicd_control_node03_deploy_address: dummy
    # Release IP address
    openstack_share_node02_proxy_address: ""
  cluster_networks:
  deploy_network:
    name: 'deploy_network'
```
Update maas.yml:

```yaml
maas:
data:
  region:
data:
  fabrics:
data:
    deploy_fabric:
data:
      name: '${cluster_networks:deploy_network:fabric}'
data:
      description: 'Fabric for deploy_network'
data:
      vlans:
data:
        0:
data:
          name: 'lan 0'
data:
          description: Deploy VLAN
          dhcp: true
          primary_rack: '${linux:network:hostname}'
data:
    control_fabric:
data:
      name: 'control_fabric'
data:
      description: 'Fabric for control_network'
data:
      vlans:
data:
        0:
data:
          name: '${cluster_networks:control_network:fabric}'
data:
          description: Control VLAN
          dhcp: false
          primary_rack: '${linux:network:hostname}'
data:
    mesh_fabric:
data:
      name: '${cluster_networks:mesh_network:fabric}'
data:
      description: 'Fabric for mesh_network'
data:
```

```yaml
control_network:
data:
  name: 'control_network'
data:
  cidr: '${address_pool:control_network:address}/${address_pool:control_network:prefix}'
data:
  fabric: control_fabric
  vlan: '${address_pool:control_network:vlan}'
data:
  gateway_ip: '${address_pool:control_network:gateway}'
data:
  ipranges:
data:
    1:
data:
      start: 192.168.0.30
      end: 192.168.0.80
      type: dynamic
      comment: 'dynamic range'
data:
    2:
data:
      start: 192.168.0.1
      end: 192.168.0.29
      type: reserved
      comment: 'infra reserve'
data:
```

```yaml
control_network:
data:
  name: 'control_network'
data:
  cidr: '${address_pool:control_network:address}/${address_pool:control_network:prefix}'
data:
  fabric: control_fabric
  vlan: '${address_pool:control_network:vlan}'
data:
  gateway_ip: '${address_pool:control_network:address}'
data:
```
vlans:
  0:
    name: 'mesh_network'
    description: Mesh VLAN
    dhcp: false
    primary_rack: "${linux:network:hostname}"

subnets:
  deploy_network: ${cluster_networks:deploy_network}
  control_network: ${cluster_networks:control_network}
  mesh_network: ${cluster_networks:mesh_network}
  proxy_network: ${cluster_networks:proxy_network}

Populate MAAS with networks:

salt-call state.apply maas.region

Serialize IP addresses using MAAS network pools:

salt-call maasng.sync_address_pool

Verify pillar override works:

salt-call pillar.get address_pool:deploy_network:pool:openstack_share_node02_deploy_address

# Sample output:
# local:
#   192.168.0.81

Test pillars
Mind the PostgreSQL and rsyslog .sls. Database and syslog service are required for MAAS to properly install and work.

• https://github.com/salt-formulas/salt-formula-rsyslog/tree/master/tests/pillar

Module function example
Wait for status of selected machine's:

> cat maas/machines/wait_for_machines_ready.sls

...

wait_for_machines_ready:
  module.run:
    - name: maas.wait_for_machine_status
    - kwargs:
      machines:
wait_for_machines_ready:
  module.run:
    - name: maas.wait_for_machine_status
    - kwargs:
      - timeout: 1200 # in seconds
      - req_status: "Deployed"
      - ignore_machines:
        - kvm01 # in case it's broken or whatever
    - require:
      - cmd: maas_login_admin

List of available req_status defined in global variable:

```
STATUS_NAME_DICT = dict(
    (0, 'New'), (1, 'Commissioning'), (2, 'Failed commissioning'),
    (3, 'Missing'), (4, 'Ready'), (5, 'Reserved'), (10, 'Allocated'),
    (9, 'Deploying'), (6, 'Deployed'), (7, 'Retired'), (8, 'Broken'),
    (11, 'Failed deployment'), (12, 'Releasing'),
    (13, 'Releasing failed'), (14, 'Disk erasing'),
    (15, 'Failed disk erasing'))
```

Read more

- [https://maas.io/](https://maas.io/)
MEMCACHED

Usage

Memcached is an in-memory key-value store for small chunks of arbitrary data (strings, objects) from results of database calls, API calls, or page rendering.

Sample metadata

```yaml
memcached:
  server:
    enabled: true
    cache_size: 64
    slabsize: 1m
    bind:
      address: 0.0.0.0
      port: 11211
      protocol: tcp
```

Enable/Disable tcp/udp listener

```yaml
memcached:
  server:
    enabled: true
    cache_size: 64
    slabsize: 2m
    threads: 1
    bind:
      address: 0.0.0.0
      port: 11211
      protocol:
        tcp:
          enabled: True
        udp:
          enabled: True
```

Note

The following pillar option is deprecated and does not affect any functionality:

```yaml
bind:
  protocol: tcp
```
Read more

- [http://memcached.org/](http://memcached.org/)

**Metadata schema specifications for Memcached server**

**Core properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cache_size</td>
<td>integer</td>
<td>Size for cache, tells Memcached how much RAM to use for item storage (in megabytes).</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables Memcached server service.</td>
</tr>
<tr>
<td>slabsize</td>
<td>string</td>
<td>Set size of each slab page.</td>
</tr>
<tr>
<td>threads</td>
<td>integer</td>
<td>Number of threads to use to process incoming requests.</td>
</tr>
<tr>
<td>address</td>
<td>string</td>
<td>IP address to listen on.</td>
</tr>
<tr>
<td>port</td>
<td>integer</td>
<td>Connection port to use.</td>
</tr>
<tr>
<td>proto</td>
<td>object</td>
<td>Listen on TCP/UDP port.</td>
</tr>
</tbody>
</table>
NGINX

Usage

Nginx is an open source reverse proxy server for HTTP, HTTPS, SMTP, POP3, and IMAP protocols, as well as a load balancer, HTTP cache, and a web server (origin server). The nginx project started with a strong focus on high concurrency, high performance and low memory usage.

Sample pillars

Gitlab server setup:

```
nginx:
  server:
    enabled: true
    bind:
      address: '0.0.0.0'
      ports: - 80
    site:
      gitlab_domain:
        enabled: true
        type: gitlab
        name: domain
        ssl:
          enabled: true
          key: |
            -----BEGIN RSA PRIVATE KEY-----
            ...
            cert: |
            xyz
            chain: |
              my_chain..
        host:
          name: gitlab.domain.com
          port: 80
```

Simple static HTTP site:

```
nginx:
  server:
    site:
      nginx_static_site01:
        enabled: true
        type: nginx_static
        name: site01
        host:
```


name: gitlab.domain.com
port: 80

Simple load balancer:

nginx:
  server:
    upstream:
      horizon-upstream:
        backend1:
          address: 10.10.10.113
          port: 8078
          opts: weight=3
        backend2:
          address: 10.10.10.114
    site:
      nginx_proxy_openstack_web:
        enabled: true
        type: nginx_proxy
        name: openstack_web
        proxy:
          upstream_proxy_pass: http://horizon-upstream
        host:
          name: 192.168.0.1
          port: 31337

Static site with access policy:

nginx:
  server:
    site:
      nginx_static_site01:
        enabled: true
        type: nginx_static
        name: site01
        access_policy:
          allow:
            - 192.168.1.1/24
            - 127.0.0.1
          deny:
            - 192.168.1.2
            - all
        host:
          name: gitlab.domain.com
          port: 80

Simple TCP/UDP proxy:
**nginx:**

**server:**

**stream:**

**rabbitmq:**

**host:**

**backend:**

**server1:**

- **address:** 10.10.10.113
- **port:** 5672
- **least_conn:** true
- **hash:** "$remote_addr consistent"

**unbound:**

**host:**

- **bind:** 127.0.0.1
- **port:** 53
- **protocol:** udp

**backend:**

**server1:**

- **address:** 10.10.10.113
- **port:** 5353

---

**Simple HTTP proxy:**

**nginx:**

**server:**

**site:**

**nginx_proxy_site01:**

- **enabled:** true
- **type:** nginx_proxy
- **name:** site01

**proxy:**

- **host:** local.domain.com
- **port:** 80
- **protocol:** http

**host:**

- **name:** gitlab.domain.com
- **port:** 80

---

**Simple HTTP proxy with multiple locations:**

**Note**

If proxy part is defined and location is missing /, the proxy part is used. If the / location is defined, it overrides the proxy part.
nginx:
server:
  site:
    nginx_proxy_site01:
      enabled: true
      type: nginx_proxy
      name: site01
      proxy:
        host: local.domain.com
        port: 80
        protocol: http
      location:
        /internal/:
          host: 172.120.10.200
          port: 80
          protocol: http
        /doc/:
          host: 172.10.10.200
          port: 80
          protocol: http
      host:
        name: gitlab.domain.com
        port: 80

nginx:
server:
  site:
    nginx_proxy_site01:
      enabled: true
      type: nginx_proxy
      name: site01
      location:
        /:
          host: 172.120.10.200
          port: 80
          protocol: http
        /doc/:
          host: 172.10.10.200
          port: 80
          protocol: http
      host:
        name: gitlab.domain.com
        port: 80

Simple Websocket proxy:
nginx:
  server:
    site:
      nginx_proxy_site02:
        enabled: true
        type: nginx_proxy
        name: site02
        proxy:
          websocket: true
          host: local.domain.com
          port: 80
          protocol: http
          host:
            name: gitlab.domain.com
            port: 80

Content filtering proxy:

nginx:
  server:
    enabled: true
    site:
      nginx_proxy_site03:
        enabled: true
        type: nginx_proxy
        name: site03
        proxy:
          host: local.domain.com
          port: 80
          protocol: http
          filter:
            search: https://www.domain.com
            replace: http://10.10.10.10
          host:
            name: gitlab.domain.com
            port: 80

Proxy with access policy:

nginx:
  server:
    site:
      nginx_proxy_site01:
        enabled: true
        type: nginx_proxy
        name: site01
        access_policy:
          allow:
Use `nginx ngx_http_map_module` that creates variables whose values depend on values of other variables.

```yaml
nginx:
  server:
    enabled: true
  map:
    enabled: true
  items:
    mymap:
      enabled: true
      string: input_string
      variable: output_map_variable
      body:
        default:
          value: ""
    example.com:
      value: '1'
    example.org:
      value: '2'
```

Use `nginx ngx_http_geo_module` module that creates variables with values depending on the client IP address.

```yaml
nginx:
  server:
    enabled: true
  geo:
    enabled: true
  items:
    my_geo_map:
      enabled: true
      variable: output_get_variable
      body:
        default:
```

```yaml
- 192.168.1.1/24
- 127.0.0.1
deny:
- 192.168.1.2
- all
proxy:
  host: local.domain.com
  port: 80
  protocol: http
  host:
    name: gitlab.domain.com
  port: 80
```
Use ngx_http_limit_req_module module that is used to limit the request processing rate per a
defined key, in particular, the processing rate of requests coming from a single IP address. The
limitation is done using the leaky bucket method. The limit_req_module might be configured
globally or applied to specific nginx site.

```nginx
server:
  limit_req_module:
    limit_req_zone:
      global_limit_ip_zone:
        key: global_limit_ip_var
        size: 10m
        rate: '1r/s'
        limit_req_status: 503
        limit_req:
          global_limit_zone:
            burst: 5
            enabled: true
```

There is an example to to limit requests to all sites based on IP. In the following example all
clients are limited except of 10.12.100.1 with 1 req per second.

1. Create geo instance that will match IP and set limit_action var. “0” - is unlimited, 1 - limited
2. Create a global_geo_limiting_map that will map ip_limit_key to ip_limit_action
3. Create global limit_req_zone called global_limit_zone that limits number of requests to 1r/s
4. Apply global_limit_zone globally to all requests with 5 req burst.

```nginx
server:
  enabled: true
  geo:
    enabled: true
    items:
      global_geo_limiting:
        enabled: true
        variable: ip_limit_key
        body:
          default:
            value: '1'
```
unlimited_client1:
  name: '10.12.100.1/32'
  value: '0'
map:
  enabled: true
items:
  global_geo_limiting_map:
    enabled: true
    string: ip_limit_key
    variable: ip_limit_action
    body:
      limited:
        name: 1
        value: '$binary_remote_addr'
      unlimited:
        name: 0
        value: '0'
limit_req_module:
limit_req_zone:
  global_limit_zone:
    key: ip_limit_action
    size: 10m
    rate: '1r/s'
    limit_req_status: 503
    limit_req:
      global_limit_zone:
        burst: 5
        enabled: true

To apply request limiting to particular site only limit_req should be applied on site level, for example:

nginx:
  server:
    site:
      nginx_proxy_openstack_api_keystone:
        limit_req_module:
          limit_req:
            global_limit_zone:
              burst: 5
              enabled: true

Use ngx_http_limit_conn_module module that is used to set the shared memory zone and the maximum allowed number of connections for a given key value. The limit_conn_module might be configured globally or applied to specific nginx site.

nginx:
  server:
To apply connection limiting to particular site only limit_conn should be applied on site level, for example:

```yaml
nginx:
  server:
    site:
      nginx_proxy_openstack_web:
        limit_conn_module:
          limit_conn:
            global_limit_conn_zone:
              connection: 25
              enabled: true
```

Gitlab server with user for basic auth:

```yaml
nginx:
  server:
    enabled: true
    user:
      username1:
        enabled: true
        password: magicunicorn
        htpasswd: htpasswd-site1
      username2:
        enabled: true
        password: magicunicorn
```

Proxy buffering:

```yaml
nginx:
  server:
    enabled: true
    bind:
      address: '0.0.0.0'
      ports: - 80
```
site:
  gitlab_proxy:
    enabled: true
    type: nginx_proxy
    proxy:
      request_buffer: false
      buffer:
        number: 8
        size: 16
      host:
        name: gitlab.domain.com
        port: 80

Let’s Encrypt:

nginx:
  server:
    enabled: true
  bind:
    address: '0.0.0.0'
    ports:
      - 443
  site:
    gitlab_domain:
      enabled: true
      type: gitlab
      name: domain
    ssl:
      enabled: true
      engine: letsencrypt
    host:
      name: gitlab.domain.com
      port: 443

SSL using already deployed key and cert file.

Note
The cert file should already contain CA cert and complete chain.
ssl:
   enabled: true
   key_file: /etc/ssl/private/mykey.key
   cert_file: /etc/ssl/cert/mycert.crt

Advanced SSL configuration, more information about SSL option may be found at

Note
Prior to nginx 1.11.0, only one type of ecdh curve can be applied in
ssl_ecdh_curve directive.

if mode = secure or mode = normal and ciphers or protocols are set, they should have
type string. If mode = manual, their type should be dict as shown below.

nginx:
   server: true
   site:
      mysite:
         ssl:
            enabled: true
            mode: 'manual'
            key_file: /srv/salt/pki/{_param:cluster_name}/{salt:minion:cert:proxy:common_name}.key
            cert_file: /srv/salt/pki/{_param:cluster_name}/{salt:minion:cert:proxy:common_name}.crt
            protocols:
               TLS1:
                  name: 'TLSv1'
                  enabled: True
               TLS1_1:
                  name: 'TLSv1.1'
                  enabled: True
               TLS1_2:
                  name: 'TLSv1.2'
                  enabled: False
            ciphers:
               ECDHE_RSA_AES256_GCM_SHA384:
                  name: 'ECDHE-RSA-AES256-GCM-SHA384'
                  enabled: True
               ECDHE_ECDSA_AES256_GCM_SHA384:
                  name: 'ECDHE-ECDSA-AES256-GCM-SHA384'
                  enabled: True
                  buffer_size: '16k'
            crl:
               file: '/etc/ssl/crl.pem'
               enabled: False
            dhparam:
### SSL Configuration

```yaml
enabled: True
numbits: 2048
use_dsaparam: True
ecdh_curve:
  secp384r1:
    name: 'secp384r1'
    enabled: False
  secp521r1:
    name: 'secp521r1'
    enabled: True
password_file:
  content: 'testcontent22'
  enabled: True
  file: '/etc/ssl/password.key'
prefer_server_ciphers: 'on'
ticket_key:
  enabled: True
  numbytes: 48
resolver:
  address: '127.0.0.1'
  valid_seconds: '500'
  timeout_seconds: '60'
session_tickets: 'on'
stapling: 'off'
stapling_file: '/path/to/stapling/file'
stapling_responder: 'http://ocsp.example.com/
stapling_verify: 'on'
verify_client: 'on'
client_certificate:
  file: '/etc/ssl/client_cert.pem'
  enabled: False
verify_depth: 1
session_cache: 'shared:SSL:15m'
session_timeout: '15m'
strict_transport_security:
  max_age: 16000000
  include_subdomains: False
  always: True
  enabled: True
```

### Setting custom proxy headers:

```yaml
nginx:
  server:
    enabled: true
  site:
    custom_headers:
      type: nginx_proxy
```
proxy_set_header:
  Host:
    enabled: true
    value: "$host:8774"
X-Real-IP:
  enabled: true
  value: '$remote_addr'
X-Forwarded-For:
  enabled: true
  value: '$proxy_add_x_forwarded_for'
X-Forwarded-Proto:
  enabled: true
  value: '$scheme'
X-Forwarded-Port:
  enabled: true
  value: '$server_port'

Define site catalog indexes:

nginx:
  server:
    enabled: true
  site:
    nginx_catalog:
      enabled: true
      type: nginx_static
      name: server
      indexes:
        - index.htm
        - index.html
      host:
        name: 127.0.0.1
        port: 80

Define site catalog autoindex:

nginx:
  server:
    enabled: true
  site:
    nginx_catalog:
      enabled: true
      type: nginx_static
      name: server
      autoindex: True
    host:
      name: 127.0.0.1
      port: 80
Nginx stats server (required by collectd nginx plugin) (DEPRECATED):

```
nginx:
  server:
    enabled: true
  site:
    nginx_stats_server:
      enabled: true
      type: nginx_stats
      name: server
      host:
        name: 127.0.0.1
        port: 8888

or:

nginx:
  server:
    enabled: true
  site:
    nginx_stats_server:
      enabled: true
      root: disabled
      indexes: []
      stats: True
      type: nginx_static
      name: stat_server
      host:
        name: 127.0.0.1
        address: 127.0.0.1
        port: 8888
```

Nginx configured to wait for another service/s before starting (currently only with systemd):

```
nginx:
  server:
    wait_for_service: 
      - foo-bar.mount
    enabled: true
  site: ...
```

Read more

- [http://wiki.nginx.org/Main](http://wiki.nginx.org/Main)
• https://mozilla.github.io/server-side-tls/ssl-config-generator/
NEUTRON

Usage

Neutron is an OpenStack project to provide networking as a service between interface devices (e.g., vNICs) managed by other Openstack services (e.g., nova).

Starting with the Folsom release, Neutron is a core and supported part of the OpenStack platform (for Essex, we were an incubated project, which means use is suggested only for those who really know what they’re doing with Neutron).

Sample pillars

Neutron Server on the controller node

```yaml
neutron:
  server:
    enabled: true
    version: mitaka
    allow_pagination: true
    pagination_max_limit: 100
    api_workers: 2
    rpc_workers: 2
    rpc_state_report_workers: 2
    root_helper_daemon: false
dhcp_lease_duration: 600
  firewall_driver: iptables_hybrid
  agent_boot_time: 180
  agent_down_time: 30
dhcp_agents_per_network: 2
  allow_automatic_dhcp_failover: true
  bind:
    address: 172.20.0.1
    port: 9696
database:
  engine: mysql
  host: 127.0.0.1
  port: 3306
  name: neutron
  user: neutron
  password: pwd
identity:
  engine: keystone
  host: 127.0.0.1
  port: 35357
  user: neutron
  password: pwd
  tenant: service
  endpoint_type: internal
```
message_queue:
  engine: rabbitmq
  host: 127.0.0.1
  port: 5672
  user: openstack
  password: pwd
  virtual_host: '/openstack'
  rpc_conn_pool_size: 30
  rpc_thread_pool_size: 100
  rpc_response_timeout: 120

metadata:
  host: 127.0.0.1
  port: 8775
  insecure: true
  proto: https
  password: pass
  workers: 2
  audit:
    enabled: false

Note
The pagination is useful to retrieve a large bunch of resources, because a single request may fail (timeout). This is enabled with both parameters allow_pagination and pagination_max_limit as shown above.

Configuration of policy.json file:

neutron:
  server:
    ...
  policy:
    create_subnet: 'rule:admin_or_network_owner'
    get_network:queue_id': 'rule:admin_only'
    # Add key without value to remove line from policy.json
    'create_network:shared':

Neutron LBaaSv2 enablement

neutron:
  server:
    lbaas:
      enabled: true
      providers:
octavia:
  
  
  engine: octavia
  
  driver_path: 'neutron_lbaas.drivers.octavia.driver.OctaviaDriver'
  
  base_url: 'http://127.0.0.1:9876'

avi_adc:
  
  engine: avinetworks
  
  driver_path: 'avi_lbaasv2.avi_driver.AviDriver'
  
  controller_address: 10.182.129.239
  
  controller_user: admin
  
  controller_password: Cloudlab2016
  
  controller_cloud_name: Default-Cloud

avi_adc2:
  
  engine: avinetworks
  
  ...  

Note

If the Contrail backend is set, Opencontrail loadbalancer would be enabled automatically. In this case lbaas should disabled in pillar:

```yaml
neutron:
  
  server:
  
  lbaas:
    
    enabled: false
```

Neutron FWaaS v1 enablement

```yaml
neutron:
  
  fwaas:
  
    enabled: true
  
    version: ocata
  
    api_version: v1
```

Enable CORS parameters

```yaml
neutron:
  
  server:
  
  cors:
    
    allowed_origin: https:localhost.local,http:localhost.local
    
    expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
    
    allow_methods: GET,PUT,POST,DELETE,PATCH
    
    allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
```
**allow_credentials**: True
**max_age**: 86400

Neutron VXLAN tenant networks with Network nodes

With DVR for East-West and Network node for North-South.

This use case describes a model utilising VxLAN overlay with DVR. The DVR routers will only be utilized for traffic that is router within the cloud infrastructure and that remains encapsulated. External traffic will be routed to via the network nodes.

The intention is that each tenant will require at least two (2) vrouter one to be utilised

**Neutron Server:**

```yaml
neutron:
  server:
    version: mitaka
    path_mtu: 1500
    bind:
      address: 172.20.0.1
      port: 9696
    database:
      engine: mysql
      host: 127.0.0.1
      port: 3306
      name: neutron
      user: neutron
      password: pwd
    identity:
      engine: keystone
      host: 127.0.0.1
      port: 35357
      user: neutron
      password: pwd
      tenant: service
    endpoint_type: internal
    message_queue:
      engine: rabbitmq
      host: 127.0.0.1
      port: 5672
      user: openstack
      password: pwd
      virtual_host: '/openstack'
    global_physnet_mtu: 9000
    l3_ha: False # Which type of router will be created by default
    dvr: True # disabled for non DVR use case
    backend:
      engine: ml2
    tenant_network_types: "flat,vxlan"
```
Network Node:

```
external_mtu: 9000
mechanism:
  ovs:
    driver: openvswitch
```

```
neutron:
gateway:
  enabled: True
  version: mitaka
  report_interval: 10
  dhcp_lease_duration: 600
  firewall_driver: iptables_hybrid
message_queue:
  engine: rabbitmq
  host: 127.0.0.1
  port: 5672
  user: openstack
  password: pwd
  virtual_host: '/openstack'
rpc_conn_pool_size: 300
rpc_thread_pool_size: 2048
rpc_response_timeout: 3600
local_ip: 192.168.20.20 # br-mesh ip address
dvr: True # disabled for non DVR use case
agent_mode: dvr_snat
metadata:
  host: 127.0.0.1
  password: pass
backend:
  engine: ml2
tenant_network_types: "flat,vxlan"
mechanism:
  ovs:
    driver: openvswitch
agents:
  dhcp:
    ovs_use_veth: False
```

Compute Node:

```
neutron:
compute:
  enabled: True
  version: mitaka
message_queue:
  engine: rabbitmq
```
Setting mac base address

By default neutron uses fa:16:3f:00:00:00 basement for mac generator. One can set its own mac base both for dvr and nondvr cases.

NOTE: dvr_base_mac and base_mac SHOULD differ.

```
neutron:
  server:
    base_mac: fa:16:3f:00:00:00
    dvr_base_mac: fa:16:3f:a0:00:00

gateways:

neutron:
  gateway:
    base_mac: fa:16:3f:00:00:00
    dvr_base_mac: fa:16:3f:a0:00:00

compute nodes:

neutron:
  compute:
    base_mac: fa:16:3f:00:00:00
    dvr_base_mac: fa:16:3f:a0:00:00
```
Disable physnet1 bridge

By default we have external access turned on, so among any physnets in your reclass there would be additional one: physnet1, which is mapped to br-floating

If you need internal nets only without this bridge, remove br-floating and configurations mappings. Disable mappings for this bridge on neutron-servers:

```
server:
  external_access: false
```

gateways:

```
neutron:
  gateway:
    external_access: false
```

compute nodes:

```
neutron:
  compute:
    external_access: false
```

Add additional bridge mappings for OVS bridges

By default we have external access turned on, so among any physnets in your reclass there would be additional one: physnet1, which is mapped to br-floating

If you need to add extra non-default bridge mappings they can be defined separately for both gateways and compute nodes:

gateways:

```
neutron:
  gateway:
    bridge_mappings:
      physnet4: br-floating-internet
```

compute nodes:

```
neutron:
  compute:
    bridge_mappings:
      physnet4: br-floating-internet
```

Specify different mtu values for different physnets

Neutron Server:
Neutron VXLAN tenant networks with Network Nodes (non DVR)

This section describes a network solution that utilises VxLAN overlay networks without DVR with all routers being managed on the network nodes.

Neutron Server:

```yaml
neutron:
  server:
    version: mitaka
    backend:
      external_mtu: 1500
      tenant_net_mtu: 9000
      ironic_net_mtu: 9000
```

```yaml
neutron:
  server:
    version: mitaka
    bind:
      address: 172.20.0.1
      port: 9696
    database:
      engine: mysql
      host: 127.0.0.1
      port: 3306
      name: neutron
      user: neutron
      password: pwd
    identity:
      engine: keystone
      host: 127.0.0.1
      port: 35357
      user: neutron
      password: pwd
      tenant: service
      endpoint_type: internal
    message_queue:
      engine: rabbitmq
      host: 127.0.0.1
      port: 5672
      user: openstack
      password: pwd
      virtual_host: '/openstack'
    l3_ha: True
    dvr: False
    backend:
      engine: ml2
      tenant_network_types= "flat,vxlan"
```
**external_mtu**: 9000
**mechanism**: ovs
  **driver**: openvswitch

**Network Node:**

**neutron**:
**gateway**:
  **enabled**: True
  **version**: mitaka
**message_queue**:
  **engine**: rabbitmq
  **host**: 127.0.0.1
  **port**: 5672
  **user**: openstack
  **password**: pwd
  **virtual_host**: '/openstack'
**local_ip**: 192.168.20.20 # br-mesh ip address
**dvr**: False
**agent_mode**: legacy
**availability_zone**: az1
**metadata**:
  **host**: 127.0.0.1
  **password**: pass
**backend**:
  **engine**: ml2
**tenant_network_types**: "flat,vxlan"
**mechanism**:
  **ovs**:
    **driver**: openvswitch

**Compute Node:**

**neutron**:
**compute**:
  **enabled**: True
  **version**: mitaka
**message_queue**:
  **engine**: rabbitmq
  **host**: 127.0.0.1
  **port**: 5672
  **user**: openstack
  **password**: pwd
  **virtual_host**: '/openstack'
**local_ip**: 192.168.20.20 # br-mesh ip address
**external_access**: False
**dvr**: False
**backend:**
- **engine:** ml2
- **tenant_network_types:** "flat,vxlan"
- **mechanism:**
  - **ovs:**
    - **driver:** openvswitch

**Neutron VXLAN tenant networks with Network Nodes with DVR**

With DVR for East-West and North-South, DVR everywhere, Network node for SNAT.

This section describes a network solution that utilises VxLAN overlay networks with DVR with North-South and East-West. Network Node is used only for SNAT.

**Neutron Server:**

```
**neutron:**
  **server:**
    **version:** mitaka
    **bind:**
      **address:** 172.20.0.1
      **port:** 9696
    **database:**
      **engine:** mysql
      **host:** 127.0.0.1
      **port:** 3306
      **name:** neutron
      **user:** neutron
      **password:** pwd
    **identity:**
      **engine:** keystone
      **host:** 127.0.0.1
      **port:** 35357
      **user:** neutron
      **password:** pwd
      **tenant:** service
    **endpoint_type:** internal
  **message_queue:**
    **engine:** rabbitmq
    **host:** 127.0.0.1
    **port:** 5672
    **user:** openstack
    **password:** pwd
    **virtual_host:** '/openstack'
  **global_physnet_mtu:** 9000
  **l3_ha:** False
  **dvr:** True
  **backend:**
    **engine:** ml2
```
tenant_network_types= "flat,vxlan"

external_mtu: 9000
mechanism:
  ovs:
    driver: openvswitch

Configuring networking-generic-switch ml2 plugin used for bare-metal integration:

neutron:
  server:
    backend:
      mechanism:
        ngs:
          driver: genericswitch
        n_g_s:
          enabled: true
        coordination:
          enabled: true
        backend_url: "etcd3+http://1.2.3.4:2379"
    devices:
      s1brbm:
        options:
          device_type:
            value: netmiko_ovs_linux
          ip:
            value: 1.2.3.4
          username:
            value: ngs_ovs_manager
          password:
            value: password

Network Node:

neutron:
  gateway:
    enabled: True
  version: mitaka
  message_queue:
    engine: rabbitmq
    host: 127.0.0.1
    port: 5672
    user: openstack
    password: pwd
    virtual_host: '/openstack'
  local_ip: 192.168.20.20 # br-mesh ip address
  dvr: True
  agent_mode: dvr_snat
  availability_zone: az1
metadata:
  host: 127.0.0.1
  password: pass
backend:
  engine: ml2
tenant_network_types: "flat,vxlan"
mechanism:
  ovs:
    driver: openvswitch

Compute Node:

neutron:
  compute:
    enabled: True
    version: mitaka
message_queue:
  engine: rabbitmq
  host: 127.0.0.1
  port: 5672
  user: openstack
  password: pwd
  virtual_host: `/openstack`
local_ip: 192.168.20.20 # br-mesh ip address
dvr: True
external_access: True
agent_mode: dvr
availability_zone: az1
metadata:
  host: 127.0.0.1
  password: pass
backend:
  engine: ml2
tenant_network_types: "flat,vxlan"
mechanism:
  ovs:
    driver: openvswitch

Sample Linux network configuration for DVR:

linux:
  network:
    bridge: openvswitch
    interface:
      eth1:
        enabled: true
        type: eth
        mtu: 9000
proto: manual
eth2:
  enabled: true
type: eth
mtu: 9000
proto: manual
eth3:
  enabled: true
type: eth
mtu: 9000
proto: manual
br-int:
  enabled: true
mtu: 9000
type: ovs_bridge
br-floating:
  enabled: true
mtu: 9000
type: ovs_bridge
float-to-ex:
  enabled: true
type: ovs_port
mtu: 65000
bridge: br-floating
br-mgmt:
  enabled: true
type: bridge
mtu: 9000
address: ${_param:single_address}
netmask: 255.255.255.0
use_interfaces:
  - eth1
br-mesh:
  enabled: true
type: bridge
mtu: 9000
address: ${_param:tenant_address}
netmask: 255.255.255.0
use_interfaces:
  - eth2
br-ex:
  enabled: true
type: bridge
mtu: 9000
address: ${_param:external_address}
netmask: 255.255.255.0
use_interfaces:
  - eth3
use_ovs_ports:
- float-to-ex

Additional VXLAN tenant network settings

The default multicast group of 224.0.0.1 only multicasts to a single subnet. Allow overriding it to allow larger underlay network topologies.

Neutron Server:

```yaml
neutron:
  server:
    vxlan:
      group: 239.0.0.0/8
      vni_ranges: "2:65535"
```

Neutron VLAN tenant networks with Network Nodes

VLAN tenant provider

Neutron Server only:

```yaml
neutron:
  server:
    version: mitaka
    ...
    global_physnet_mtu: 9000
    l3_ha: False
    dvr: True
    backend:
      engine: ml2
      tenant_network_types: "flat,vlan" # Can be mixed flat,vlan,vxlan
      tenant_vlan_range: "1000:2000"
      external_vlan_range: "100:200" # Does not have to be defined.
      external_mtu: 9000
      mechanism:
        ovs:
          driver: openvswitch
```

Compute node:

```yaml
neutron:
  compute:
    version: mitaka
    ...
    dvr: True
    agent_mode: dvr
    external_access: False
    backend:
```
**Neutron with explicit physical networks**

Neutron Server only:

```yaml
neutron:
  server:
    version: ocata
...
backend:
  engine: ml2
  tenant_network_types: "flat,vlan" # Can be mixed flat,vlan,vxlan
...
# also need to configure corresponding bridge_mappings on compute and gateway nodes
flat_networks_default: '*' # '*' to allow arbitrary names or '' to disable
physnets: # only listed physnets will be configured (overrides physnet1/2/3)
  external:
    mtu: 1500
    types:
      - flat # possible values - 'flat' or 'vlan'
sriov_net:
    mtu: 9000 # Optional, defaults to 1500
    vlan_range: '100:200,300:400' # Optional
types:
  - vlan
ext_net2:
  mtu: 1500
  types:
    - flat
    - vlan
mechanism:
  ovs:
    driver: openvswitch
```

**Advanced Neutron Features (DPDK, SR-IOV)**

Neutron OVS DPDK

Enable datapath netdev for neutron openvswitch agent:

```yaml
neutron:
  server:
    version: mitaka
```
...  
    dpdk: True  
...

neutron:  
  compute:  
    version: mitaka  
    dpdk: True  
    vhost_mode: client  # options: client|server (default)  
    vhost_socket_dir: /var/run/openvswitch  
    backend:  
      engine: ml2  
...  
  mechanism:  
    ovs:  
      driver: openvswitch

Neutron OVS SR-IOV:

neutron:  
  server:  
    version: mitaka  
    backend:  
      engine: ml2  
...  
  mechanism:  
    ovs:  
      driver: openvswitch  
    sriov:  
      driver: sriovnicsswitch  
      # Driver w/ highest number will be placed ahead in the list (default is 0).  
      # It’s recommended for SR-IOV driver to set an order >0 to get it  
      # before (for example) the opendaylight one.  
      order: 9

neutron:  
  compute:  
    version: mitaka  
...

  backend:  
    engine: ml2  
    tenant_network_types: "flat,vlan"  # Can be mixed flat,vlan,vxlan  
    sriov:  
      nic_one:  
        devname: eth1  
        physical_network: physnet3  
      mechanism:
ovs:
  driver: openvswitch

Neutron with LinuxBridge Agents

neutron:
  server:
    firewall_driver: iptables
    backend:
      mechanism:
        lb:
          driver: linuxbridge
    ...
  compute:
    backend:
      mechanism:
        lb:
          driver: linuxbridge
    ...
  gateway:
    backend:
      mechanism:
        lb:
          driver: linuxbridge
    agents:
      dhcp:
        interface_driver: linuxbridge
      l3:
        interface_driver: linuxbridge

Neutron with VLAN-aware-VMs

neutron:
  server:
    vlan_aware_vms: true
...

  compute:
    vlan_aware_vms: true
...

  gateway:
    vlan_aware_vms: true

Neutron with BGP VPN (BaGPipe driver)

neutron:
  server:
Neutron with DHCP agent on compute node

```yaml
neutron:
  ...  
  compute:
    dhcp_agent_enabled: true
    ...  
```

Neutron with DHCP agent disabled on gateway node

```yaml
neutron:
  ...  
  gateway:
    dhcp_agent_enabled: false
    ...  
```

Neutron with metadata agent on compute node

```yaml
neutron:
  ...  
  compute:
    metadata_agent_enabled: true
    ...  
```

Neutron with OVN

Control node:
neutron:
  server:
    backend:
      engine: ovn
      mechanism:
        ovn:
          driver: ovn
      tenant_network_types: "geneve,flat"
  ovn:
    ovn_l3_scheduler: leastloaded # valid options: chance, leastloaded
    neutron_sync_mode: repair # valid options: log, off, repair
    metadata_enabled: True
    ovn_ctl_opts:
      db-nb-create-insecure-remote: 'yes'
      db-sb-create-insecure-remote: 'yes'

Compute node:

neutron:
  compute:
    local_ip: 10.2.0.105
    controller_vip: 10.1.0.101
    external_access: false
    backend:
      engine: ovn
      ovsdb_connection: tcp:127.0.0.1:6640
    metadata:
      enabled: true
      ovsdb_server_iface: ptcp:6640:127.0.0.1
    host: 10.1.0.101
    password: unsegreto

Neutron L2 Gateway

Control node:

neutron:
  server:
    version: pike
  l2gw:
    enabled: true
    periodic_monitoring_interval: 5
    quota_l2_gateway: 20
    quota_l3_gateway: 20
    # service_provider=<service_type>:<name>:<driver>[default]
  service_provider:
    L2GW:OpenDaylight:networking_odl.l2gateway.driver.OpenDaylightL2gwDriver:default
    backend:
      engine: ml2

Network/Gateway node:
neutron:
gateway:
  version: pike
l2gw:
  enabled: true
debug: true
socket_timeout: 20
ovsdb_hosts:
# <ovsdb_name>: <ip address>:<port>
# - ovsdb_name: a user defined symbolic identifier of physical switch
# - ip address: the address or dns name for the OVSDB server (i.e. pointer to the switch)
  ovsdb1: 10.164.5.33:6632
  ovsdb2: 10.164.4.33:6632

OpenDaylight integration
Control node:

neutron:
server:
  backend: 
    opendaylight: true
    router: odl-router_v2
    host: 10.20.0.77
    rest_api_port: 8282
    user: admin
    password: admin
    ovsdb_connection: tcp:127.0.0.1:6639
    ovsdb_interface: native
    enable_websocket: true
    enable_dhcp_service: false
    mechanism:
      ovs:
        driver: opendaylight_v2
        order: 1

Network/Gateway node:

neutron:
gateway:
  backend:
    router: odl-router_v2
    ovsdb_connection: tcp:127.0.0.1:6639
    ovsdb_interface: native
    opendaylight:
      ovsdb_server_iface: ptcp:6639:127.0.0.1
      ovsdb_odl_iface: tcp:10.20.0.77:6640
**tunnel_ip**: 10.1.0.110  
**provider_mappings**: physnet1:br-floating

**Compute node:**

```yaml
neutron:
  compute:
    opendaylight:
      ovsdb_server_iface: ptcp:6639:127.0.0.1
      ovsdb_odl_iface: tcp:10.20.0.77:6640
      tunnel_ip: 10.1.0.105
      provider_mappings: physnet1:br-floating
```

**Service Function Chaining Extension (SFC)**

```yaml
neutron:
  server:
    sfc:
      enabled: true
      sfc_drivers:
        - ovs # valid options: ovs, odl, ovn (not implemented yet)
      flow_classifier_drivers:
        - ovs # valid options: see above

compute:
  backend:
    ovs_extension:
      sfc:
        enabled: True
```

**Neutron Server**

**Neutron Server with OpenContrail:**

```yaml
neutron:
  server:
    backend:
      engine: contrail
      host: contrail_discovery_host
      port: 8082
      user: admin
      password: password
      tenant: admin
      token: token
```

**Neutron Server with Midonet:**
neutron:
    server:
        backend:
            engine: midonet
            host: midonet_api_host
            port: 8181
            user: admin
            password: password

Neutron Server with NSX:

neutron:
    server:
        backend:
            engine: vmware
            core_plugin: vmware_nsxv3
            vmware:
                nsx:
                    extension_drivers:
                        - vmware_nsxv3_dns
                    v3:
                        api_password: nsx_password
                        api_user: nsx_username
                        api_managers:
                            01:
                                scheme: https
                                host: 192.168.10.120
                                port: '443'
                                insecure: true

Neutron Keystone region:

neutron:
    server:
        enabled: true
        version: kilo
        ...
        identity:
            region: RegionTwo
            ...
        compute:
            region: RegionTwo
            ...

Client-side RabbitMQ HA setup:
neutron:
  server:
    ....
    message_queue:
      engine: rabbitmq
      members:
        - host: 10.0.16.1
        - host: 10.0.16.2
        - host: 10.0.16.3
      user: openstack
      password: pwd
      virtual_host: '/openstack'
    ....

Configuring TLS communications

Note
By default, system-wide installed CA certs are used, so cacert_file param is optional, as well as cacert.

• RabbitMQ TLS

neutron:
  server, gateway, compute:
    message_queue:
      port: 5671
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/rabbitmq-ca.pem
        (optional) version: TLSv1_2

• MySQL TLS

neutron:
  server:
    database:
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/mysql-ca.pem

• Openstack HTTPS API
neutron:
  server:
    identity:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem

Enable auditing filter, ie: CADF:

neutron:
  server:
    audit:
      enabled: true
      ...
      filter_factory: 'keystonemiddleware.audit:filter_factory'
      map_file: '/etc/pycadf/neutron_api_audit_map.conf'

  ...
compute:
  audit:
    enabled: true
      ...
      filter_factory: 'keystonemiddleware.audit:filter_factory'
      map_file: '/etc/pycadf/neutron_api_audit_map.conf'

Neutron with security groups disabled:

neutron:
  server:
    security_groups_enabled: False
    ...
compute:
  security_groups_enabled: False
    ...
gateway:
  security_groups_enabled: False

Neutron Client

Neutron networks:

neutron:
  client:
    enabled: true
  server:
    identity:
      endpoint_type: internalURL
      network:
        inet1:
tenant: demo
shared: False
admin_state_up: True
router_external: True
provider_physical_network: inet
provider_network_type: flat
provider_segmentation_id: 2
subnet:
  inet1-subnet1:  
    cidr: 192.168.90.0/24
    enable_dhcp: False
inet2:
  tenant: admin
  shared: False
  router_external: True
  provider_network_type: "vlan"
subnet:
  inet2-subnet1:  
    cidr: 192.168.92.0/24
    enable_dhcp: False
  inet2-subnet2:  
    cidr: 192.168.94.0/24
    enable_dhcp: True
identity1:
  network:
  ...

Neutron routers:

neutron:
  client:
    enabled: true
  server:
    identity:
      endpoint_type: internalURL
  router:
    inet1-router:
      tenant: demo
      admin_state_up: True
      gateway_network: inet
      interfaces:
        - inet1-subnet1
        - inet1-subnet2
    identity1:
      router:
      ...

Neutron security groups:
neutron:
  client:
    enabled: true
  server:
    identity:
      endpoint_type: internalURL
      security_group:
        security_group1:
          tenant: demo
          description: security group 1
          rules:
            - direction: ingress
              ethertype: IPv4
              protocol: TCP
              port_range_min: 1
              port_range_max: 65535
              remote_ip_prefix: 0.0.0.0/0
            - direction: ingress
              ethertype: IPv4
              protocol: UDP
              port_range_min: 1
              port_range_max: 65535
              remote_ip_prefix: 0.0.0.0/0
            - direction: ingress
              ethertype: ICMP
              remote_ip_prefix: 0.0.0.0/0
        identity1:
          security_group:
            ...

Floating IP addresses:

neutron:
  client:
    enabled: true
  server:
    identity:
      endpoint_type: internalURL
      floating_ip:
        prx01-instance:
          server: prx01.mk22-lab-basic.local
          subnet: private-subnet1
          network: public-net1
          tenant: demo
        gtw01-instance:
          ...

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Note
The network must have flag router:external set to True. Instance port in the stated subnet will be associated with the dynamically generated floating IP.

Enable Neutron extensions (QoS, DNS, etc.)

```yaml
neutron:
  server:
    backend:
      extension:
        dns:
          enabled: True
          host: 127.0.0.1
          port: 9001
          protocol: http
          ...
        qos
          enabled: True
```

Different Neutron extensions for different agents

```yaml
neutron:
  server:
    backend:
      extension: # common extensions for OVS and SRIOV agents
dns:
  enabled: True
...
quos
  enabled: True
ovs_extension: # OVS specific extensions
  bagpipe_bgpvpn:
    enabled: True
sriov_extension: # SRIOV specific extensions
dummy:
  enabled: True
```

Neutron with Designate

```yaml
neutron:
  server:
    backend:
      extension:
        dns:
```

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enabled: True
host: 127.0.0.1
port: 9001
protocol: http

Enable RBAC for OpenContrail engine

neutron:
  server:
    backend:
      engine: contrail
      rbac:
        enabled: True

Enhanced logging with logging.conf

By default logging.conf is disabled.
That is possible to enable per-binary logging.conf with new variables:

- openstack_log_appender
  Set to true to enable log_config_append for all OpenStack services

- openstack_fluentd_handler_enabled
  Set to true to enable FluentHandler for all Openstack services

- openstack_ossyslog_handler_enabled
  Set to true to enable OSSysLogHandler for all Openstack services.

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.

Also it is possible to configure this with pillar:

neutron:
  server:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
          enabled: true
        fluentd:
          enabled: true
        ossyslog:
          enabled: true
    ....
  compute:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
enabled: true
fluentd:
  enabled: true
ossyslog:
  enabled: true

....
gateway:
  logging:
    log_appender: true
    log_handlers:
      watchedfile:
        enabled: true
fluentd:
  enabled: true
ossyslog:
  enabled: true

Logging levels pillar example:

neutron:
  server:
    logging:
      log_appender: true
      loggers:
        root:
          level: 'DEBUG'
        neutron:
          level: 'DEBUG'
        amqplib:
          level: 'DEBUG'
        sqlalchemy:
          level: 'DEBUG'
        boto:
          level: 'DEBUG'
        suds:
          level: 'DEBUG'
        eventletwsgi:
          level: 'DEBUG'

Neutron server with Memcached caching and security strategy:

neutron:
  server:
    enabled: true
  ...
    cache:
      engine: memcached
members:
- host: 127.0.0.1
  port: 11211
- host: 127.0.0.1
  port: 11211
security:
  enabled: true
  strategy: ENCRYPT
  secret_key: secret

Upgrades
Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.upgrade.pre</td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
</tbody>
</table>
This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.

Add services back to scheduling.

This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.

Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)

Enable x509 and SSL communication between Neutron and Galera cluster

By default communication between Neutron and Galera is unsecure.

```
neutron:
  server:
    database:
      x509:
        enabled: True
```

You able to set custom certificates in pillar:

```
neutron:
  server:
    database:
      x509:
        cacert: (certificate content)
        cert: (certificate content)
        key: (certificate content)
```

You can read more about it here:

https://docs.openstack.org/security-guide/databases/database-access-control.html
NOVA

Usage

OpenStack Nova provides a cloud computing fabric controller, supporting a wide variety of virtualization technologies, including KVM, Xen, LXC, VMware, and more. In addition to its native API, it includes compatibility with the commonly encountered Amazon EC2 and S3 APIs.

Sample pillars

Controller nodes

Nova services on the controller node:

```yaml
nova:
  controller:
    version: juno
    enabled: true
    security_group: true
    cpu_allocation_ratio: 8.0
    ram_allocation_ratio: 1.0
    disk_allocation_ratio: 1.0
    cross_az_attach: false
    workers: 8
    report_interval: 60
    dhcp_domain: novalocal
    vif_plugging_timeout: 300
    vif_plugging_is_fatal: false
    consoleauth:
      token_ttl: 600
    bind:
      public_address: 10.0.0.122
      public_name: openstack.domain.com
      novncproxy_port: 6080
    database:
      engine: mysql
      host: 127.0.0.1
      port: 3306
      name: nova
      user: nova
      password: pwd
    identity:
      engine: keystone
      host: 127.0.0.1
      port: 35357
      user: nova
      password: pwd
      tenant: service
```
message_queue:
  engine: rabbitmq
  host: 127.0.0.1
  port: 5672
  user: openstack
  password: pwd
  virtual_host: '/openstack'
  pci:
    alias:
      alias1:
        device_type: "type-PF"
        name: "a1"
        product_id: "154d"
        vendor_id: "8086"
  network:
    engine: neutron
    host: 127.0.0.1
    port: 9696
    extension_sync_interval: 600
  identity:
    engine: keystone
    host: 127.0.0.1
    port: 35357
    user: neutron
    password: pwd
    tenant: service
  metadata:
    password: password
  audit:
    enabled: false
  osapi_max_limit: 500
  barbican:
    enabled: true

Nova services from custom package repository:

    nova:
      controller:
        version: juno
        source:
          engine: pkg
          address: http://...

Client-side RabbitMQ HA setup:

    nova:
      controller:
Enable auditing filter, i.e: CADF:

```yaml
message_queue:
  engine: rabbitmq
  members:
    - host: 10.0.16.1
    - host: 10.0.16.2
    - host: 10.0.16.3
  user: openstack
  password: pwd
  virtual_host: '/openstack'

nova:
  controller:
    audit:
      enabled: true
      filter_factory: 'keystonemiddleware.audit:filter_factory'
      map_file: '/etc/pycadf/nova_api_audit_map.conf'

Enable CORS parameters:

```yaml
nova:
  controller:
    cors:
      expose_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_methods: GET,PUT,POST,DELETE,PATCH
      allow_headers: X-Auth-Token,X-Openstack-Request-Id,X-Subject-Token
      allow_credentials: True
      max_age: 86400

Configuration of the policy.json file:

```yaml
nova:
  controller:
    ....
    policy:
      context_is_admin: 'role:admin or role:administrator'
      'compute:create': 'rule:admin_or_owner'
      # Add key without value to remove line from policy.json
      'compute:create:attach_network':

Enable Barbican integration:

```
Define aliases for PCI devices:

```yaml
nova:
  controller:
    ....
  barbican:
    enabled: true
```

Enable cells update:

```yaml
nova:
  controller:
    ....
  update_cells: true
```

Configuring TLS communications

```yaml
nova:
  compute:
    message_queue:
```

Note
Useful when upgrading Openstack. To update cells to test sync db against the production database.

Note
By default system wide installed CA certs are used, so cacert_file param is optional, as well as cacert.

• RabbitMQ TLS
port: 5671
ssl:
  enabled: True
  (optional) cacert: cert body if the cacert_file does not exists
  (optional) cacert_file: /etc/openstack/rabbitmq-ca.pem
  (optional) version: TLSv1_2

• MySQL TLS

  nova:
  controller:
    database:
      ssl:
        enabled: True
        (optional) cacert: cert body if the cacert_file does not exists
        (optional) cacert_file: /etc/openstack/mysql-ca.pem

• Openstack HTTPS API

  Set the https as protocol at nova:compute and nova:controller sections:

  nova:
  controller:
    identity:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
    network:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
  glance:
    protocol: https
    (optional) cacert_file: /etc/openstack/proxy.pem

  nova:
  compute:
    identity:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
    network:
      protocol: https
      (optional) cacert_file: /etc/openstack/proxy.pem
  image:
    protocol: https
    (optional) cacert_file: /etc/openstack/proxy.pem
  ironic:
    protocol: https
    (optional) cacert_file: /etc/openstack/proxy.pem
Note
Barbican, Cinder, and placement url endpoints are discovering using service catalog.

Compute nodes
Nova controller services on compute node:

```yaml
nova:
  compute:
    version: juno
    enabled: true
    cross_az_attach: false
    disk_cachemodes: network=writeback,block=none
    availability_zone: availability_zone_01
    aggregates:
      - hosts_with_fc
      - hosts_with_ssd
    security_group: true
    resume_guests_state_on_host_boot: False
    preallocate_images: space # Default is 'none'
    my_ip: 10.1.0.16
    vif_plugging_timeout: 300
    vif_plugging_is_fatal: false
    bind:
      vnc_address: 172.20.0.100
      vnc_port: 6080
      vnc_name: openstack.domain.com
      vnc_protocol: http
    database:
      engine: mysql
      host: 127.0.0.1
      port: 3306
      name: nova
      user: nova
      password: pwd
    identity:
      engine: keystone
      host: 127.0.0.1
      port: 35357
      user: nova
      password: pwd
      tenant: service
    message_queue:
      engine: rabbitmq
      host: 127.0.0.1
      port: 5672
```
Compute with VMware driver. Each VMware cluster requires a separate process of nova-compute. Each process should have uniq host identifier. However, multiple computes might be running on single host. It is not recommended to have multiple computes running on different hosts that manage the same VMware cluster. To achieve this, Pacemaker/Corosync or Keepalived might be used.

```
user: openstack
password: pwd
virtual_host: '/openstack'
image:
    engine: glance
    host: 127.0.0.1
    port: 9292
pci:
    alias:
        alias1:
            device_type: "type-PF"
            name: "a1"
            product_id: "154d"
            vendor_id: "8086"
network:
    engine: neutron
    host: 127.0.0.1
    port: 9696
identity:
    engine: keystone
    host: 127.0.0.1
    port: 35357
    user: neutron
    password: pwd
    tenant: service
qemu:
    max_files: 4096
    max_processes: 4096
    host: node-12.domain.tld
```

Group and user to be used for QEMU processes run by the system instance:

```
nova:
    compute:
        compute_driver: vmwareapi.VMwareVCDriver
        vmware:
            host_username: vmware
            host_password: vmware
            cluster_name: vmware_cluster01
            host_ip: 1.2.3.4
```
nova:
  compute:
    enabled: true
    ...
  qemu:
    user: nova
    group: cinder
    dynamic_ownership: 1

Group membership for user nova (upgrade related):

nova:
  compute:
    enabled: true
    ...
  user:
    groups:
    - libvirt

Nova services on compute node with OpenContrail:

nova:
  compute:
    enabled: true
    ...
    networking: contrail

Nova services on compute node with memcached caching and security strategy:

nova:
  compute:
    enabled: true
    ...
    cache:
      engine: memcached
      members:
        - host: 127.0.0.1
          port: 11211
        - host: 127.0.0.1
          port: 11211
      security:
        enabled: true
        strategy: ENCRYPT
        secret_key: secret

Client-side RabbitMQ HA setup:
Nova with ephemeral configured with Ceph:

```yaml
nova:
  compute:
    enabled: true
    ...
  ceph:
    ephemeral: yes
    rbd_pool: nova
    rbd_user: nova
    secret_uuid: 03006edd-d957-40a3-ac4c-26cd254b3731
    ...
```

Nova with ephemeral configured with LVM:

```yaml
nova:
  compute:
    enabled: true
    ...
  lvm:
    ephemeral: yes
    images_volume_group: nova_vg

linux:
  storage:
    lvm:
      nova_vg:
        name: nova_vg
        devices:
          - /dev/sdf
          - /dev/sdd
          - /dev/sdg
          - /dev/sde
          - /dev/sdc
```

```
- /dev/sdj
- /dev/sdh

Enable Barbican integration:

```
nova:
  compute:
    ....
  barbican:
    enabled: true
```

Define aliases for PCI devices:

```
nova:
  compute:
    ...
  pci:
    alias:
      alias1:
        device_type: "type-PF"
        name: "a1"
        product_id: "154d"
        vendor_id: "8086"
```

Nova metadata custom bindings:

```
nova:
  controller:
    enabled: true
    ...
  metadata:
    bind:
      address: 1.2.3.4
      port: 8776
```

Define multipath for nova compute:

```
nova:
  compute:
    ....
  libvirt:
    volume_use_multipath: True
```

Client role

Nova configured with NFS:
**Nova**:  
```yaml
compute:
  instances_path: /mnt/nova/instances
```

**Linux**:  
```yaml
storage:
  enabled: true
  mount:
    nfs_nova:
      enabled: true
      path: ${nova:compute:instances_path}
      device: 172.31.35.145:/data
      file_system: nfs
      opts: rw,vers=3
```

**Nova flavors**:  
```yaml
client:
  enabled: true
server:
  identity:
    flavor:
      flavor1:
        flavor_id: 10
        ram: 4096
        disk: 10
        vcpus: 1
      flavor2:
        flavor_id: auto
        ram: 4096
        disk: 20
        vcpus: 2
    identity1:
      flavor:
        ...
```

**Availability zones**:  
```yaml
client:
  enabled: true
server:
  identity:
    availability_zones:
    - availability_zone_01
    - availability_zone_02
```
Aggregates:

```
nova:
  client:
    enabled: true
  server:
    identity:
      aggregates:
        - aggregate1
        - aggregate2
```

Upgrade levels:

```
nova:
  controller:
    upgrade_levels:
      compute: juno

nova:
  compute:
    upgrade_levels:
      compute: juno
```

SR-IOV

Add PciPassthroughFilter into scheduler filters and NICs on specific compute nodes:

```
nova:
  controller:
nova:
  compute:
    sriov:
      nic_one:
        devname: eth1
        physical_network: physnet1
```

Note

Parameters located under nova:compute:sriov:<nic_name> are copied to passthrough_whitelist parameter into nova.conf file in appropriate format.

CPU pinning & Hugepages

CPU pinning of virtual machine instances to dedicated physical CPU cores. Hugepages mount point for libvirt.
Custom Scheduler filters

If you have a custom filter, that needs to be included in the scheduler, then you can include it like so:

```
nova:
  controller:
    scheduler_custom_filters: my_custom_filter.MyCustomFilter

# Then add your custom filter on the end (make sure to include all other ones that you need as well)
 scheduler_default_filters: ...sFilter,ImagePropertiesFilter,ServerGroupAntiAffinityFilter,ServerGroupAffinityFilter,MyCustomFilter
```

Hardware Trip/Unmap Support

To enable TRIM support for ephemeral images (thru nova managed images), libvirt has this option:

```
nova:
  compute:
    libvirt:
      hw_disk_discard: unmap
```

To actually utilize this feature, the following metadata must be set on the image as well, so the SCSI unmap is supported:

```
  glance image-update --property hw_scsi_model=virtio-scsi <image>
  glance image-update --property hw_disk_bus=scsi <image>
```

Scheduler Host Manager

Specify a custom host manager.

libvirt CPU mode

Allow setting the model of CPU that is exposed to a VM. This allows for better support live migration between hypervisors with different hardware, among other things. Defaults to host-passthrough.

```
nova:
  controller:
    scheduler_host_manager: ironic_host_manager

  compute:
    cpu_mode: host-model
```

Nova compute cpu model

```
nova:
  compute:
    cpu_mode: custom
```
libvirt:
  cpu_model: IvyBridge

RNG (Random Number Generator) device path
The path to an RNG (Random Number Generator) device that will be used as the source of entropy on the host.
The recommended source of entropy is /dev/urandom.
Permitted options include /dev/random, /dev/urandom, and /dev/hwrng.
Default value is /dev/urandom.

nova:
  controller:
    libvirt:
      rng_dev_path: /dev/urandom
  compute:
    libvirt:
      rng_dev_path: /dev/urandom

Nova compute workarounds
Live snapshotting is disabled by default in nova. To enable this, it needs a manual switch.
From manual:

When using libvirt 1.2.2 live snapshots fail intermittently under load (likely related to concurrent libvirt/qemu operations). This config option provides a mechanism to disable live snapshot, in favor of cold snapshot, while this is resolved. Cold snapshot causes an instance outage while the guest is going through the snapshotting process.

For more information, refer to the bug report:
https://bugs.launchpad.net/nova/+bug/1334398

Configurable pillar data:

nova:
  compute:
    workaround:
      disable_libvirt_livesnapshot: False

Config drive options
See example below on how to configure the options for the config drive:
```yaml
nova:
  compute:
    config_drive:
      forced: True  # Default: True
      cdrom: True  # Default: False
      format: iso9660  # Default: vfat
      inject_password: False  # Default: False
```

Number of concurrent live migrates

Default is to have no concurrent live migrations (so 1 live-migration at a time).

Excerpt from config options page [https://docs.openstack.org/ocata/config-reference/compute/config-options.html](https://docs.openstack.org/ocata/config-reference/compute/config-options.html):

Maximum number of live migrations to run concurrently. This limit is enforced to avoid outbound live migrations overwhelming the host/network and causing failures. It is not recommended that you change this unless you are very sure that doing so is safe and stable in your environment.

Possible values:

- 0 : treated as unlimited.
- Negative value defaults to 0.
- Any positive integer representing maximum number of live migrations to run concurrently.

To configure this option:

```yaml
nova:
  compute:
    max_concurrent_live_migrations: 1  # (1 is the default)
```

Live migration with auto converge

Auto converge throttles down CPU if a progress of on-going live migration is slow [https://docs.openstack.org/ocata/config-reference/compute/config-options.html](https://docs.openstack.org/ocata/config-reference/compute/config-options.html):

```yaml
nova:
  compute:
    libvirt:
      live_migration_permit_auto_converge: False  # (False is the default)

nova:
  controller:
    libvirt:
      live_migration_permit_auto_converge: False  # (False is the default)
```

Enhanced logging with logging.conf

By default logging.conf is disabled.
That is possible to enable per-binary logging.conf with new variables:

- **openstack_log_appender**
  Set to true to enable log_config_append for all OpenStack services
- **openstack_fluentd_handler_enabled**
  Set to true to enable FluentHandler for all Openstack services
- **openstack_ossyslog_handler_enabled**
  Set to true to enable OSSysLogHandler for all Openstack services

Only WatchedFileHandler, OSSysLogHandler, and FluentHandler are available.

Also it is possible to configure this with pillar:

```yaml
nova:
  controller:
    logging:
      log_appender: true
      log_handlers:
        watchedfile:
          enabled: true
        fluentd:
          enabled: true
        ossyslog:
          enabled: true

compute:
  logging:
    log_appender: true
    log_handlers:
      watchedfile:
        enabled: true
      fluentd:
        enabled: true
      ossyslog:
        enabled: true
```

The log level might be configured per logger by using the following pillar structure:

```yaml
nova:
  compute:
    logging:
      loggers:
        <logger_name>:
          level: WARNING

nova:
  compute:
    logging:
```
loggers:
<logger_name>:
  level: WARNING

Configure syslog parameters for libvirtd

To configure syslog parameters for libvirtd the below pillar structure should be used with values which are supported by libvirtd. These values might be known from the documentation.

nova:
  compute:
    libvirt:
      logging:
        level: 3
        filters: '3:remote 4:event'
        outputs: '3:syslog:libvirtd'
        buffer_size: 64

Logging controls:

Logging level: 4 errors, 3 warnings, 2 information, 1 debug basically 1 will log everything possible log_level = 3

Logging filters:

A filter allows to select a different logging level for a given category of logs.

The format for a filter is one of:

- x:name
- x:+name
  where name is a string which is matched against source file name, e.g., remote, qemu, or util/json, the optional + prefix tells libvirt to log stack trace for each message matching name, and x is the minimal level where matching messages should be logged:

- 1: DEBUG
- 2: INFO
- 3: WARNING
- 4: ERROR

Multiple filter can be defined in a single @filters, they just need to be separated by spaces.

For example, to only get warning or errors from the remote layer and only errors from the event layer: log_filters="3:remote 4:event"

Logging outputs:

An output is one of the places to save logging information The format for an output can be:

- x:stderr
  Output goes to stderr
• x:syslog:name
  Use syslog for the output and use the given name as the ident
• x:file:file_path
  output to a file, with the given filepath
  In all case the x prefix is the minimal level, acting as a filter

  • 1: DEBUG
  • 2: INFO
  • 3: WARNING
  • 4: ERROR

Multiple output can be defined, they just need to be separated by spaces. For example, to log all
warnings and errors to syslog under the libvirt dident: log_outputs="3:syslog:libvirtd"

Log debug buffer size: default 64
The daemon keeps an internal debug log buffer which will be
dumped in case of crash or upon receiving a SIGUSR2 signal. This setting allows to override the
default buffer size in kilobytes. If value is 0 or less the debug log buffer is deactivated
log_buffer_size = 64

To configure the logging parameters for QEMU, the below pillar structure and logging
parameters should be used:

```yaml
nova:
  compute:
    qemu:
      logging:
        handler: logd
      virtlog:
        enabled: true
        level: 4
        filters: '3:remote 3:event'
        outputs: '4:syslog:virtlogd'
        max_clients: 512
        max_size: 2097100
        max_backups: 2
```

Inject password to VM

By default nova blocks up any inject to VM because inject_partition param is equal to -2. If you
want to inject password to VM, you will need to define inject_partition greater or equal to -1 and
define inject_password to True

For example:

```yaml
nova:
  compute:
    inject_partition: '-1'
    inject_password: True
```
Allow the injection of an admin password for instance only at create and rebuild process. There is no agent needed within the image to do this. If libguestfs is available on the host, it will be used. Otherwise nbd is used. The file system of the image will be mounted and the admin password, which is provided in the REST API call will be injected as password for the root user. If no root user is available, the instance won’t be launched and an error is thrown. Be aware that the injection is not possible when the instance gets launched from a volume.

Possible values:

- **True**
  - Allows the injection

- **False (default)**
  - Disallows the injection. Any via the REST API provided admin password will be silently ignored.

Related options:

- **inject_partition**
  - Decides about the discovery and usage of the file system. It also can disable the injection at all. (boolean value)

You can read more about injecting the administrator password here: https://docs.openstack.org/nova/queens/admin/admin-password-injection.html

Enable libvirt control channel over TLS

By default TLS is disabled.

Enable TLS transport:

```yaml
compute:
  libvirt:
    tls:
      enabled: True
```

You able to set custom certificates in pillar:

```yaml
nova:
  compute:
    libvirt:
      tls:
        key: (certificate content)
        cert: (certificate content)
        cacert: (certificate content)
        client:
          key: (certificate content)
          cert: (certificate content)
```

Controlling access by tls_allowed_dn_list. Enable an access control list of client certificate Distinguished Names (DNs) which can connect to the TLS port on this server. The default is that DNs are not checked. This list may contain wildcards such as
“C=GB,ST=London,L=London,O=Libvirt Project,CN=*” See the POSIX fnmatch function for the format of the wildcards. Note that if this is an empty list, no client can connect. Note also that GnuTLS returns DNs without spaces after commas between the fields (and this is what we check against), but the openssl x509 tool shows spaces.

```yaml
nova:
  compute:
    libvirt:
      tls:
        tls_allowed_dn_list:
          host1:
            enabled: true
            value: 'C=foo,CN=cmp1'
          host2:
            enabled: true
            value: 'C=foo,CN=cmp2'
```

You can read more about live migration over TLS here: https://wiki.libvirt.org/page/TLSCreateServerCerts

Enable transport + authentication for VNC over TLS

# Only for Queens. Communication between noVNC proxy service and QEMU

By default communication between nova-novncproxy and qemu service is unsecure.

```yaml
compute:
  qemu:
    vnc:
      tls:
        enabled: True
```

```yaml
controller:
  novncproxy:
    # This section responsible for communication between noVNC proxy and client machine
    tls:
      enabled: True
    # This section responsible for communication between nova-novncproxy and qemu service
    vencrypt:
      tls:
        enabled: True
```

You can set custom certificates in pillar:

```yaml
nova:
  compute:
    qemu:
      vnc:
```

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```
tls:
cacert (certificate content)
cert (certificate content)
key (certificate content)
nova:
controller:
novncproxy:
tls:
    server:
        cert (certificate content)
        key (certificate content)
vencrypt:
tls:
    cacert (certificate content)
cert (certificate content)
key (certificate content)
```

You can read more about it here: https://docs.openstack.org/nova/queens/admin/remote-console-access.html

Enable communication between noVNC proxy and client machine over TLS
By default communication between noVNC proxy and client machine is unsecure.

```
controller:
novncproxy:
tls:
    enabled: True
```

```
nova:
controller:
novncproxy:
tls:
    server:
        cert (certificate content)
        key (certificate content)
```

You can read more about it here: https://docs.openstack.org/mitaka/config-reference/dashboard/configure.html

Enable x509 and ssl communication between Nova and Galera cluster
By default communication between Nova and Galera is unsecure.

```
nova:
controller:
```
You can set custom certificates in pillar:

```
nova:
  controller:
    database:
      x509:
        cacert: (certificate content)
        cert: (certificate content)
        key: (certificate content)
```

You can read more about it here: https://docs.openstack.org/security-guide/databases/database-access-control.html

### Upgrades

Each OpenStack formula provides a set of phases (logical blocks) that help to build a flexible upgrade orchestration logic for particular components. The table below lists the phases and their descriptions:

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;app&gt;.upgrade.service_running</td>
<td>Ensure that all services for particular application are enabled for autostart and running</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.service_stopped</td>
<td>Ensure that all services for particular application disabled for autostart and dead</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pkgs_latest</td>
<td>Ensure that packages used by particular application are installed to latest available version. This will not upgrade data plane packages like qemu and openvswitch as usually minimal required version in openstack services is really old. The data plane packages should be upgraded separately by apt-get upgrade or apt-get dist-upgrade. Applying this state will not autostart service.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.render_config</td>
<td>Ensure configuration is rendered actual version.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.pre</td>
<td>We assume this state is applied on all nodes in the cloud before running upgrade. Only non destructive actions will be applied during this phase. Perform service built in service check like (keystone-manage doctor and nova-status upgrade)</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.upgrade.pre</td>
<td>Mostly applicable for data plane nodes. During this phase resources will be gracefully removed from current node if it is allowed. Services for upgraded application will be set to admin disabled state to make sure node will not participate in resources scheduling. For example on gtw nodes this will set all agents to admin disable state and will move all routers to other agents.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.upgrade</td>
<td>This state will basically upgrade application on particular target. Stop services, render configuration, install new packages, run offline dbsync (for ctl), start services. Data plane should not be affected, only OpenStack Python services.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.upgrade.post</td>
<td>Add services back to scheduling.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.post</td>
<td>This phase should be launched only when upgrade of the cloud is completed. Cleanup temporary files, perform other post upgrade tasks.</td>
</tr>
<tr>
<td>&lt;app&gt;.upgrade.verify</td>
<td>Here we will do basic health checks (API CRUD operations, verify do not have dead network agents/compute services)</td>
</tr>
</tbody>
</table>
OPENLDAP

Usage

Sample pillars

Client

```yaml
openldap:
  client:
    server:
      basedn: dc=example,dc=local
      host: ldap.example.local
      tls: true
      port: 389
    auth:
      user: cn=admin,dc=example,dc=local
      password: dummypass
    entry:
      people:
        type: ou
        classes:
        - top
        - organizationalUnit
        entry:
          jdoe:
            type: cn
            action: replace
            purge: true
            attr:
              uid: jdoe
              uidNumber: 20001
              gidNumber: 20001
              gecos: John Doe
              givenName: John
              sn: Doe
              homeDirectory: /home/jdoe
              loginShell: /bin/bash
            classes:
            - posixAccount
            -/inetOrgPerson
            - top
            - ldapPublicKey
            - shadowAccount
            karel:
```

©2020, Mirantis Inc.
# Simply remove cn=karel

type: cn

enabled: false

Read more

Python is a widely used general-purpose, high-level programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale.

Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library.

Available metadata

- `service.environment.environment`
  Basic Python environment
- `service.environment.development`
  Python development environment
- `python.environment.django`
  Python Django environment

Sample pillars

Simple Python environment:

```yaml
python:
  environment: enabled: true
```

Development Python environment:

```yaml
python:
  environment:
    enabled: true
  module:
    development: true
```

Python django environment:

```yaml
python:
  environment:
    enabled: true
  module:
    django: true
```
Using offline mirrors:

```yaml
python:
  environment:
    enabled: true
  user:
    root:
      pypi_user: user
      pypi_password: password
    pypi_mirror:
      protocol: http
      host: pypi.local
      port: 8084
      upstream_fallback: true
    user: user
    password: password
```

Read more

- [https://www.python.org/](https://www.python.org/)
RABBITMQ

Usage
RabbitMQ is a complete and highly reliable enterprise messaging system based on the emerging AMQP standard.

Sample pillars

Standalone broker

RabbitMQ as AMQP broker with admin user and vhosts:

```yaml
rabbitmq:
  server:
    enabled: true
    memory:
      vm_high_watermark: 0.4
    bind:
      address: 0.0.0.0
      port: 5672
    secret_key: rabbit_master_cookie
  admin:
    name: adminuser
    password: pwd
  plugins:
    - amqp_client
    - rabbitmq_management
  host:
    '/monitor':
      enabled: true
      user: 'monitor'
      password: 'password'
```

RabbitMQ as a STOMP broker:

```yaml
rabbitmq:
  server:
    enabled: true
    secret_key: rabbit_master_cookie
  bind:
    address: 0.0.0.0
    port: 5672
  host:
    '/monitor':
      enabled: true
      user: 'monitor'
      password: 'password'
```
plugins_runas_user: rabbitmq
plugins:
- rabbitmq_stomp

RabbitMQ cluster
RabbitMQ as base cluster node:

rabbitmq:
  server:
    enabled: true
    bind:
      address: 0.0.0.0
      port: 5672
    secret_key: rabbit_master_cookie
  admin:
    name: adminuser
    password: pwd
  cluster:
    enabled: true
    role: master
    mode: disc
    members:
    - name: openstack1
      host: 10.10.10.212
    - name: openstack2
      host: 10.10.10.213

HA Queues definition:

rabbitmq:
  server:
    enabled: true
    ...
    host:
      '/monitor':
        enabled: true
        user: 'monitor'
        password: 'password'
        policies:
        - name: HA
          pattern: '^(!amq\.|\.)*$'
          definition: '{"ha-mode": "all"}'

Enable TLS support
To enable support of TLS for rabbitmq-server you need to provide a path to cacert, server cert and private key:
rabbitmq:
  server:
    enabled: true
  ...
  ssl:
    enabled: True
    key_file: /etc/rabbitmq/ssl/key.pem
    cert_file: /etc/rabbitmq/ssl/cert.pem
    ca_file: /etc/rabbitmq/ssl/ca.pem

To manage content of these files you can either use the following options:

rabbitmq:
  server:
    enabled: true
  ...
  ssl:
    enabled: True
    key_file: /etc/rabbitmq/ssl/key.pem
    key:
      -----BEGIN RSA PRIVATE KEY-----
      ...
      -----END RSA PRIVATE KEY-----
    ca_file: /etc/rabbitmq/ssl/ca.pem
    cacert_chain:
      -----BEGIN CERTIFICATE-----
      ...
      -----END CERTIFICATE-----
    cert_file: /etc/rabbitmq/ssl/cert.pem
    cert:
      -----BEGIN CERTIFICATE-----
      ...
      -----END CERTIFICATE-----

Or you can use the salt.minion.cert salt state which creates all required files according to defined reclass model. See https://github.com/Mirantis/reclass-system-salt-model/tree/master/salt/minion/cert/rabbitmq for details. In this case you need just to enable ssl and nothing more:

rabbitmq:
  server:
    enabled: true
  ...
  ssl:
    enabled: True
Default port for TLS is 5671:

```
rabbitmq:  
  server:  
    bind:  
      ssl:  
        port: 5671
```

Usage

Check cluster status, example shows running cluster with 3 nodes: ctl-1, ctl-2, ctl-3

```
> rabbitmqctl cluster_status

Cluster status of node 'rabbit@ctl-1' ...
[{nodes,[[disc,['rabbit@ctl-1','rabbit@ctl-2','rabbit@ctl-3']]]},
 {running_nodes,['rabbit@ctl-3','rabbit@ctl-2','rabbit@ctl-1']},
 {partitions,[]}]
...done.
```

Setup management user:

```
> rabbitmqctl add_vhost vhost
> rabbitmqctl add_user user alive
> rabbitmqctl set_permissions -p vhost user ".*" ".*" ".*"
> rabbitmqctl set_user_tags user management
```

EPD process is Erlang Port Mapper Daemon. It’s a feature of the Erlang runtime that helps Erlang nodes to find each other. It’s a pretty tiny thing and doesn’t contain much state (other than “what Erlang nodes are running on this system?”) so it’s not a huge deal for it to still be running.

Although it’s running as user rabbitmq, it was started automatically by the Erlang VM when we started. We’ve considered adding “epmd -kill” to our shutdown script - but that would break any other Erlang apps running on the system; it’s more “global” than RabbitMQ.

Read more

- [http://docs.saltstack.com/ref/states/all/salt.states.rabbitmq_user.html](http://docs.saltstack.com/ref/states/all/salt.states.rabbitmq_user.html)

Clustering

- [http://www.rabbitmq.com/clustering.html#auto-config](http://www.rabbitmq.com/clustering.html#auto-config)
• https://github.com/jesusaurus/hpcs-salt-state/tree/master/rabbitmq
RECLASS

Usage
Reclass is an external node classifier (ENC) as can be used with automation tools, such as Puppet, Salt, and Ansible. It is also a stand-alone tool for merging data sources recursively.

Sample metadata
Install sources from [repository, git, pip]:

```yaml
salt:
  source:
    engine: pkg
...
  source:
    engine: git
    repo: git+https://github.com/salt-formulas/reclass
    branch: master
...
source:
  engine: pip
...
```

If reclass is pre-installed, set the engine to None to avoid updates:

```yaml
salt:
  source:
    engine: None
```

Reclass storage with data fetched from git:

See tests/pillar/storage_git.sls

Reclass storage with local data source:

See tests/pillar/storage_local.sls

Reclass storage with archive data source:

See tests/pillar/storage_archive.sls

Reclass storage with archive data source with content hash check:

See tests/pillar/storage_archive_public.sls

Reclass model with single node definition:
See tests/pillar/generate_single.sls

Reclass model with multiple node defined:

See tests/pillar/generate_multi.sls

Reclass model with multiple node defined and interpolation enabled:

See tests/pillar/generate_multi_interpolate.sls

Reclass storage with simple class mappings:

See tests/pillar/class_mapping.sls

Reclass models with dynamic node classification

See tests/pillar/node_classify.sls

Classify node after creation and unclassify on node deletion:

```
salt:
master:
reactor:
    reclass/minion/classify:
    - salt://reclass/reactor/node_register.sls
    reclass/minion/declassify:
    - salt://reclass/reactor/node_unregister.sls
```

Event to trigger the node classification:

```
salt-call event.send 'reclass/minion/classify' 
"{'node_master_ip': '$config_host', 'node_ip': '$node_ip', 'node_domain': '$node_domain', 'node_cluster': '$node_cluster', 'node_hostname': '$nodehostname', 'node_os': '$node_os'}"
```

Note

You can send any parameters in the event payload, all will be checked against dynamic node classification conditions.

Both actions will use the minion ID as the node_name to be updated.

Confirmation of node classification

Currently, Salt does not allow getting confirmation on minion upon successful reactor execution on event. However, there can be issues with reactor in Salt 2017.7 (https://github.com/saltstack/salt/issues/47539) or reactor register state can fail if pillar failed to
render, so node registration confirmation may be needed. To enable this functionality, add the
node_confirm_registration parameter to event data with value true:

```bash
call event.send 'reclass/minion/classify' "{'node_master_ip': \"$config_host\", 'node_ip': \"$node_ip\", 'node_domain': \"$node_domain\", 'node_cluster': \"$node_cluster\", 'node_hostname': \"$node_hostname\", 'node_os': \"$node_os\", node_confirm_registration: true}"```

Then on minion side execute:

```bash
salt-call mine.get 'salt:master' ${minion_id}.classified pillar```

If true is returned, then registration has passed successfully.

Event to trigger the node declassification:

```bash
call event.send 'reclass/minion/declassify'```

**Nodes definitions generator**

Generate nodes definitions by running:

```bash
call state.sls reclass.storage -l debug```

Remove unnecessary files from nodes/_generated:

```bash
reclass:
  storage:
    reclass_nodes_cleanup: true```

**Static node definition:**

```bash
reclass:
  storage:
    enabled: true
  node:
    openstack_benchmark_node01:
      classes:
      - cluster.example.openstack.benchmark
      domain: example.com
      name: bmk01
      params:
        linux_system_codename: xenial
        salt_master_host: 192.168.0.253
        single_address: 192.168.2.95```

**Multiple nodes definitions (using generator):**

```bash
reclass:
  storage:
    enabled: true```
Multiple nodes definitions (using generator) with IP address comprehension. Ranges are named and formatting symbol of the same name is replaced by IP address from the corresponding range:
start: 101
value: 192.168.2.<<tenant_address>>>

Read more

- http://reclass.pantsfullofunix.net/index.html
- http://reclass.pantsfullofunix.net/operations.html
SALT

Usage
Salt is a new approach to infrastructure management. Easy enough to get running in minutes, scalable enough to manage tens of thousands of servers, and fast enough to communicate with them in seconds.

Salt delivers a dynamic communication bus for infrastructures that can be used for orchestration, remote execution, configuration management and much more.

Sample metadata
Salt Master
Salt master with base formulas and pillar metadata back end:


Salt master with reclass ENC metadata back end:


Salt master with Architect ENC metadata back end:

salt:
  master:
    enabled: true
  pillar:
    engine: architect
    project: project-name
    host: architect-api
    port: 8181
    username: salt
    password: password

Salt master with multiple ext_pillars:

salt:
  master:
    enabled: true
  pillar:
    engine: salt
    source:
      engine: local
    ext_pillars:
      1:
        module: cmd_json
```yaml
2:
  module: cmd_yaml
  params: /usr/local/bin/get_yml.sh
```

Salt master with API:


Salt master with defined user ACLs:


Salt master with preset minions:

```yaml
salt:
  master:
    enabled: true
    minions:
      - name: 'node1.system.location.domain.com'
```

Salt master with pip based installation (optional):

```yaml
salt:
  master:
    enabled: true
    source:
      engine: pip
      version: 2016.3.0rc2
```

Install formula through system package management:

```yaml
salt:
  master:
    enabled: true
    environment:
      prd:
        keystone:
          source: pkg
          name: salt-formula-keystone
        nova:
          source: pkg
          name: salt-formula-keystone
          version: 0.1+0~20160818133412.24~1.gbp6e1ebb
```
Formula keystone is installed latest version and the formulas without version are installed in one call to aptpkg module. If the version attribute is present sls iterates over formulas and take action to install specific version or remove it. The version attribute may have these values [latest|purged|removed|<VERSION>].

Clone master branch of keystone formula as local feature branch:

```
salt:
  master:
    enabled: true
...
  environment:
    dev:
      formula:
        keystone:
          source: git
          address: git@github.com:openstack/salt-formula-keystone.git
          revision: master
          branch: feature
```

Salt master with specified formula refs (for example, for Gerrit review):

```
salt:
  master:
    enabled: true
...
  environment:
    dev:
      formula:
        keystone:
          source: git
          address: https://git.openstack.org/openstack/salt-formula-keystone
          revision: refs/changes/56/123456/1
```

Salt master logging configuration:

```
salt:
  master:
    enabled: true
  log:
    level: warning
    file: '/var/log/salt/master'
    level_logfile: warning
```
Salt minion logging configuration:

```yaml
salt:
  minion:
    enabled: true
    log:
      level: info
      file: '/var/log/salt/minion'
      level_logfile: warning
```

Salt master with logging handlers:

```yaml
salt:
  master:
    enabled: true
  handler:
    handler01:
      engine: udp
      bind:
        host: 127.0.0.1
        port: 9999
    handler02:
      engine: zmq
      bind:
        host: 127.0.0.1
        port: 9999
  minion:
    handler:
      handler01:
        engine: udp
        bind:
          host: 127.0.0.1
          port: 9999
    handler02:
      engine: zmq
      bind:
        host: 127.0.0.1
        port: 9999
```

Salt engine definition for saltgraph metadata collector:

```yaml
salt:
  master:
    engine:
      graph_metadata:
        engine: saltgraph
        host: 127.0.0.1
        port: 5432
        user: salt
        password: salt
        database: salt
```

Salt engine definition for Architect service:
salt:
  master:
    engine:
      architect:
        engine: architect
        project: project-name
        host: architect-api
        port: 8181
        username: salt
        password: password

Salt engine definition for sending events from docker events:

salt:
  master:
    engine:
      docker_events:
        docker_url: unix://var/run/docker.sock

Salt master peer setup for remote certificate signing:

salt:
  master:
    peer:
      ".*":
        - x509.sign_remote_certificate

Salt master backup configuration:

salt:
  master:
    backup: true
    initial_data:
      engine: backupninja
      home_dir: remote-backup-home-dir
      source: backup-node-host
      host: original-salt-master-id

Configure verbosity of state output (used for salt command):

salt:
  master:
    state_output: changes

Pass pillar render error to minion log:
Note
When set to False this option is great for debugging. However it is not recommended for any production environment as it may contain templating data as passwords, and so on, that minion should not expose.

```python
salt:
  master:
    pillar_safe_render_error: False
```

Enable Windows repository support:

```python
salt:
  master:
    win_repo:
      source: git
      address: https://github.com/saltstack/salt-winrepo-ng
      revision: master
```

Configure a gitfs_remotes resource:

```python
salt:
  master:
    gitfs_remotes:
      salt_formula:
        url: https://github.com/salt-formulas/salt-formula-salt.git
        enabled: true
        params:
          base: master
```

Read more about gitfs resource options in the official Salt documentation.

Event/Reactor systems
Salt to synchronize node pillar and modules after start:

```python
salt:
  master:
    reactor:
      salt/minion/*/start:
        - salt://salt/reactor/node_start.sls
```

Trigger basic node install:
salt:
  master:
  reactor:
    salt/minion/install:
      - salt://salt/reactor/node_install.sls

Sample event to trigger the node installation:

```
salt-call event.send 'salt/minion/install'
```

Run any defined orchestration pipeline:

salt:
  master:
  reactor:
    salt/orchestrate/start:
      - salt://salt/reactor/orchestrate_start.sls

Event to trigger the orchestration pipeline:

```
salt-call event.send 'salt/orchestrate/start' "{'orchestrate': 'salt/orchestrate/infra_install.sls'}"
```

Synchronise modules and pillars on minion start:

salt:
  master:
  reactor:
    'salt/minion/*/start':
      - salt://salt/reactor/minion_start.sls

Add and/or remove the minion key:

salt:
  master:
  reactor:
    salt/key/create:
      - salt://salt/reactor/key_create.sls
    salt/key/remove:
      - salt://salt/reactor/key_remove.sls

Event to trigger the key creation:

```
salt-call event.send 'salt/key/create' \> "{'node_id': 'id-of-minion', 'node_host': '172.16.10.100', 'orch_post_create': 'kubernetes.orchestrate.compute_install', 'post_create_pillar': {'node_name': 'id-of-minion'}}"
```
Note
You can add pass additional orch_pre_create, orch_post_create, orch_pre_remove or orch_post_remove parameters to the event to call extra orchestrate files. This can be useful for example for registering/unregistering nodes from the monitoring alarms or dashboards.

The key creation event needs to be run from other machine than the one being registered.

Event to trigger the key removal:

```bash
call event.send 'salt/key/remove'
```

Control VM provisioning:

```yaml
_param:
  vcp_links: &vcp_links
  - type: phy
    id: ens2
    name: ens2
  private-ipv4: &private-ipv4
  - id: private-ipv4
    type: ipv4
    link: ens2
    netmask: 255.255.255.0
    routes:
      - gateway: 192.168.0.1
        netmask: 0.0.0.0
        network: 0.0.0.0
  virt:
    disk:
      three_disks:
        - system:
            size: 4096
            image: ubuntu.qcow
        - repository_snapshot:
            size: 8192
            image: snapshot.qcow
        - cinder-volume:
            size: 2048
  nic:
    control:
      - name: nic01
        bridge: br-pxe
        model: virtio
      - name: nic02
        bridge: br-cp
```
model: virtio
- name: nic03
  bridge: br-store-front
model: virtio
- name: nic04
  bridge: br-public
model: virtio
- name: nic05
  bridge: br-prv
model: virtio
virtualport:
  type: openvswitch

salt:
control:
  enabled: true
timezone: UTC
cpu: 2
ram: 4
disk_profile: three_disks
cluster:
mycluster:
  domain: neco.virt.domain.com
engine: virt
# Cluster global settings
rng: false
enable_vnc: True
seed: cloud-init
cloud_init:
  user_data:
    disable_ec2_metadata: true
    resize_rootfs: True
timezone: UTC
ssh_deletekeys: True
ssh_genkeytypes: ['rsa', 'dsa', 'ecdsa']
ssh_svcname: ssh
locale: en_US.UTF-8
disable_root: true
apt_preserve_sources_list: false
apt:
sources_list: ""
sources:
  ubuntu.list:
    source: ${linux:system:repo:ubuntu:source}
mcp_saltstack.list:
    source: ${linux:system:repo:mcp_saltstack:source]
node:
There are two methods to seed an initial Salt minion configuration to Libvirt VMs: mount a disk and update a filesystem or create a ConfigDrive with a Cloud-init config. This is controlled by the “seed” parameter on cluster and node levels. When set to _True_ or “qemu-nbd”, the old method of mounting a disk will be used. When set to “cloud-init”, the new method will be used. When set to _False_, no seeding will happen. The default value is _True_, meaning the “qemu-nbd” method will be used. This is done for backward compatibility and may be changed in future.
The recommended method is to use Cloud-init. It’s controlled by the “cloud_init” dictionary on cluster and node levels. Node level parameters are merged on top of cluster level parameters. The Salt Minion config is populated automatically based on a VM name and config settings of the minion who is actually executing a state. To override them, add the “salt_minion” section into the “user_data” section as shown above. It is possible to disable Cloud-init by setting “cloud_init.enabled” to _False_.

To enable Redis plugin for the Salt caching subsystem, use the below pillar structure:

```yaml
salt:
  master:
    cache:
      plugin: redis
      host: localhost
      port: 6379
      db: '0'
      password: pass_word
      bank_prefix: 'MCP'
      bank_keys_prefix: 'MCPKEY'
      key_prefix: 'KEY'
      separator: '@'
```

Jinja options

Use the following options to update default Jinja renderer options. Salt recognize Jinja options for templates and for the sls files.

For full list of options, see Jinja documentation: http://jinja.pocoo.org/docs/api/#high-level-api

```
salt:
  renderer:
    # for templates
    jinja: &jina_env
    # Default Jinja environment options
    block_start_string: '{%'
    block_end_string: '%}'}
    variable_start_string: '{{'
    variable_end_string: '}}'
    comment_start_string: '{#'
    comment_end_string: '#}'}
    keep_trailing_newline: False
    newline_sequence: '\n'
    # Next two are enabled by default in Salt
    trim_blocks: True
    lstrip_blocks: True
    # Next two are not enabled by default in Salt
    # but worth to consider to enable in future for salt-formulas
    line_statement_prefix: '%'
```
line_comment_prefix: '##'

# for .sls state files
jinja_sls: *jinja_env

With the line_statement/comment* _prefix options enabled following code statements are valid:

```python
%- set myvar = 'one'

## You can mix even with '{%
{% set myvar = 'two' %} ## comment
%- set mylist = ['one', 'two', 'three'] ## comment

## comment
%- for item in mylist: ## comment
  {{- item }}
%- endfor
```

Encrypted pillars

Note

NACL and the below configuration will be available in Salt > 2017.7.

External resources:

- Tutorial to configure the Salt and Reclass ext_pillar and NAACL: [http://apealive.net/post/2017-09-salt-nacl-ext-pillar/](http://apealive.net/post/2017-09-salt-nacl-ext-pillar/)

Configure salt NACL module:

```
pip install --upgrade libnacl==1.5.2
salt-call --local nacl.keygen /etc/salt/pki/master/nacl
```

```
salt:
  master:
    pillar:
      reclass: *reclass
      nacl:
```
### index: 99

**nacl:**
- **box_type:** sealedbox
- **sk_file:** /etc/salt/pki/master/nacl
- **pk_file:** /etc/salt/pki/master/nacl.pub
  
  #sk: None
  #pk: None

### NACL encrypt secrets:

```bash
call --local nacl.enc 'my_secret_value' pk_file=/etc/salt/pki/master/nacl.pub
hXTkJpC1hcKMS7yZVGESutWrkvzusXfETXkacSkIlxYjfWDIMJmR37MlmthdlgjXpg4f2AIKb8tc9Woma7q
# or
salt-run nacl.enc 'myotherpass'
ADDFD0Rav6p6+63soj7Htfrncp5rrDVyeE4BSPO7ipq8fZuLDIVAzQf4PCbDqi+Fau5KD3/J/E+Pw=
```

### NACL encrypted values on pillar:

Use Boxed syntax NACL[CryptedValue=] to encode value on pillar:

```yaml
my_pillar:
  my_nacl:
    key0: unencrypted_value
    key1: NACL[hXTkJpC1hcKMS7yZVGESutWrkvzusXfETXkacSkIlxYjfWDIMJmR37MlmthdlgjXpg4f2AIKb8tc9Woma7q]
```

### NACL large files:

```bash
call nacl.enc_file /tmp/cert.crt out=/srv/salt/env/dev/cert.nacl
# or more advanced
cert=$(cat /tmp/cert.crt)
call --out=newline_values_only nacl.enc_pub data=""cert"" > /srv/salt/env/dev/cert.nacl
```

### NACL within template/native pillars:

```yaml
pillarexample:
  user: root
  password1: {{salt.nacl.dec('DRB7Q6/X5gGSRCTpZyxS6hlbWj0IIUA+uaVvyou3vJ4=')|json}}
  cert_key: {{salt.nacl.dec_file('/srv/salt/env/dev/certs/example.com/cert.nacl')|json}}
  cert_key2: {{salt.nacl.dec_file('salt:///certs/example.com/cert2.nacl')|json}}
```

### Salt Syndic

The master of masters:

```yaml
salt:
  master:
    enabled: true
    order_masters: True
```
Lower syndicated master:

```yaml
salt:
syndic:
  enabled: true
  master:
    host: master-of-master-host
  timeout: 5
```

Syndicated master with multiple master of masters:

```yaml
salt:
syndic:
  enabled: true
masters:
  - host: master-of-master-host1
  - host: master-of-master-host2
  timeout: 5
```

Salt Minion

Minion ID by default triggers dependency on Linux formula, as it uses fqdn configured from linux.system.name and linux.system.domain pillar. To override, provide exact minion ID you require. The same can be set for master ID rendered at master.conf.

```yaml
salt:
minion:
  id: minion1.production
  master:
    id: master.production
```

Simplest Salt minion setup with central configuration node:


Multi-master Salt minion setup:


Salt minion with salt mine options:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/minion_mine.sls

Salt minion with graphing dependencies:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/minion_graph.sls
Salt minion behind HTTP proxy:

```yaml
salt:
  minion:
    proxy:
      host: 127.0.0.1
      port: 3128
```

Salt minion to specify non-default HTTP backend. The default tornado backend does not respect HTTP proxy settings set as environment variables. This is useful for cases where you need to set no_proxy lists.

```yaml
salt:
  minion:
    backend: urllib2
```

Salt minion with PKI certificate authority (CA):

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/minion_pki_ca.sls

Salt minion using PKI certificate


Salt minion trust CA certificates issued by salt CA on a specific host (ie: salt-master node):

```yaml
salt:
  minion:
    trusted_ca_minions:
      - cfg01
```

Salt Minion Proxy

Salt proxy pillar:

```yaml
salt:
  minion:
    proxy_minion:
      master: localhost
      device:
        vsrx01.mydomain.local:
          enabled: true
          engine: napalm
        csr1000v.mydomain.local:
          enabled: true
          engine: napalm
```
Note
This is pillar of the real salt-minion

Proxy pillar for IOS device:

```
proxy:
  proxypyte: napalm
  driver: ios
  host: csr1000v.mydomain.local
  username: root
  passwd: r00tme
```

Note
This is pillar of the node that's not able to run salt-minion itself.

Proxy pillar for JunOS device:

```
proxy:
  proxypyte: napalm
  driver: junos
  host: vsrx01.mydomain.local
  username: root
  passwd: r00tme
  optional_args:
    config_format: set
```

Note
This pillar applies to the node that can not run salt-minion itself.

Salt SSH
Salt SSH with sudoer using key:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/master_ssh_minion_key.sls

Salt SSH with sudoer using password:
Salt SSH with root using password:


Salt control (cloud/kvm/docker)
Salt cloud with local OpenStack provider:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/control_cloud_openstack.sls

Salt cloud with Digital Ocean provider:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/control_cloud_digitalocean.sls

Salt virt with KVM cluster:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/control_virt.sls

Salt virt with custom destination for image file:

https://github.com/salt-formulas/salt-formula-salt/blob/master/tests/pillar/control_virt_custom.sls

Salt shared library

This formula includes ‘sharedlib’ execution module which is a kind of ‘library’ of function and / or classes to be used in Jinja templates or directly as execution module.

‘sharedlib’ implements a loader that is able to scan nested directories and import Python classes / functions from nested modules. Salt doesn’t allow this as it only imports top-level modules:

https://github.com/saltstack/salt/issues/37273

‘sharedlib’ implements 4 main functions:

- ‘sharedlib.list’ - search and print functions / classes found in nested directories
- ‘sharedlib.info’ - print docstring of a function (if it exists)
- ‘sharedlib.get’ - get function / class object, but not execute it immediately
- ‘sharedlib.call’ - get function / class and execute / initialize it with arguments given.

Each of the commands above also have it’s own docstring so it’s possible to use them on a system:

```
# salt-call sys.doc sharedlib.list
local:
    --------
sharedlib.list:
```

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List available functions.

.. code-block::

    salt-call sharedlib.list

Usage examples:

```bash
# salt-call sharedlib.list
local:
    ---------
    sharedlib.list:
        ---------
        classes:
            - misc.Test
            - misc2.Test
        functions:
            - misc.cast_dict_keys_to_int

# salt-call sharedlib.info misc.cast_dict_keys_to_int
local:
    ---------
    sharedlib.info:
        ---------
        misc.cast_dict_keys_to_int:

        Return a dictionary with keys casted to int.
        This usually is required when you want sort the dict later.

        Jinja example:

        .. code-block: jinja

        {%- set ruleset = salt['sharedlib.call']('misc.cast_dict_keys_to_int', c.get('ruleset', {})) %}

        .. code-block:: jinja

        {%- set func = salt['sharedlib.get']('misc.cast_dict_keys_to_int') %}
        {%- for c_name, c in t.chains.items() %}
        {%- set ruleset = func(c.get('ruleset', {})) %}
        {%- for rule_id, r in ruleset | dictsort %}
            ...
        {%- endfor %}
```

Usage

Working with salt-cloud:
salt-cloud -m /path/to/map --assume-yes

Debug LIBCLOUD for salt-cloud connection:

```
export LIBCLOUD_DEBUG=/dev/stderr; salt-cloud --list-sizes provider_name --log-level all
```

Read more

- [https://github.com/saltstack-formulas/salt-formula](https://github.com/saltstack-formulas/salt-formula)

salt-cloud

- [http://www.blog.sandro-mathys.ch/2013/07/setting-user-password-when-launching.html](http://www.blog.sandro-mathys.ch/2013/07/setting-user-password-when-launching.html)
- [http://docs.saltstack.com/topics/cloud/digitalocean.html](http://docs.saltstack.com/topics/cloud/digitalocean.html)

**Metadata schema specifications for Salt minion**

**Core properties**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>masters</td>
<td>array</td>
<td>List of Salt masters to connect to. For details, see: Master definition</td>
</tr>
<tr>
<td>enabled</td>
<td>boolean</td>
<td>Enables the Salt minion role.</td>
</tr>
</tbody>
</table>

**Master definition**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>master</td>
<td>string</td>
<td>Hostname or IP address of the masters server</td>
</tr>
</tbody>
</table>
SPHINX

Usage

Sphinx is a tool that makes it easy to create intelligent and beautiful documentation, written by Georg Brandl and licensed under the BSD license. It was originally created for the new Python documentation, and it has excellent facilities for the documentation of Python projects. The C/C++ projects are already supported as well, and it is planned to add special support for other languages as well.

Sample pillars

Sample documentation with local source:

```yaml
sphinx:
  server:
    enabled: true
  doc:
    board:
      builder: 'html'
      source:
        engine: local
        path: '/path/to/sphinx/documentation'
```

Sample documentation with Git source:

```yaml
sphinx:
  server:
    enabled: true
  doc:
    board:
      builder: 'html'
      source:
        engine: git
        address: 'git@repo1.domain.com/repo.git'
        revision: master
```

Sample documentation with Reclass source:

```yaml
sphinx:
  server:
    enabled: true
  doc:
    board:
      builder: 'html'
      source:
        engine: reclass
```
Sample documentation with pillar-schema source:

```yaml
sphinx:
  server:
    enabled: true
  doc:
    schemas_doc:
      author: Author
      year: Year
      version: Version
      builder: 'html'
      source:
        engine: pillar-schema
```

Read more

- [http://sphinx-doc.org/tutorial.html](http://sphinx-doc.org/tutorial.html)
XTRABACKUP

Usage
Xtrabackup allows you to backup and restore databases from full backups or full backups and its incrementals.

Sample pillars
Backup client with ssh/rsync remote host:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 3
    hours_before_full: 48
    hours_before_incr: 12
    database:
      user: username
      password: password
    target:
      host: cfg01
```

Note
The full_backups_to_keep parameter states how many backup will be stored locally on xtrabackup client. More options to relocate local backups can be done using salt-formula-backupninja.

Backup client using DB API instead of socket (still needs to be run on the same server as DB):

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 3
    hours_before_full: 48
    hours_before_incr: 12
    database:
      user: username
      password: password
    host: localhost
    port: 3306
    target:
      host: cfg01
```
DB user username must have “RELOAD” and “REPLICATION CLIENT” privileges on all databases.

Backup client with local backup only:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 3
    hours_before_full: 48
    hours_before_incr: 12
  database:
    user: username
    password: password
```

Note
The full_backups_to_keep parameter states how many backup will be stored locally on xtrabackup client.

Backup client with ssh/rsync to remote host with compression, IO throttling and non-default backup directory on server:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 3
    hours_before_full: 48
    hours_before_incr: 12
    compression: true
    compression_threads: 2
    throttle: 20
  database:
    user: username
    password: password
  target:
    host: cfg01
  server:
    enabled: false
    backup_dir: /srv/backup
```
More options to relocate local backups can be done using salt-formula-backupninja.

If the server section is omitted, backups will be made to default location, same on both client and server side.

Backup client at exact times:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 3
    incr_before_full: 3
    backup_dir: /var/backups/mysql/xtrabackup
    backup_times:
      day_of_week: 0
      hour: 4
      minute: 52
    compression: true
    compression_threads: 2
    database:
      user: user
      password: password
    target:
      host: host01
```

Parameters in backup_times section can be used to set up exact time the cron job should be executed. In this example, the backup job would be executed every Sunday at 4:52 AM. If any of the individual backup_times parameters is not defined, the default * value will be used. For example, if minute parameter is *, it will run the backup every minute, which is usually not desired.

Available parameters include:

- day_of_week
- day_of_month
- month
- hour
- minute.
See the crontab reference for further info on how to set these parameters.

Note
Please be aware that only backup_times section OR hours_before_full(incr) can be defined. If both are defined. The backup_times section will be preferred.

Note
New parameter incr_before_full needs to be defined. This number sets number of incremental backups to be run, before a full backup is performed.

Backup server rsync and non-default backup directory:

```yaml
xtrabackup:
  server:
    enabled: true
    hours_before_full: 48
    full_backups_to_keep: 5
    key:
      xtrabackup_pub_key:
        enabled: true
        key:
      backup_dir: /srv/backup
```

Note
The hours_before_full parameter should have the same value as is stated on xtrabackup client.
Note
If the backup_dir argument is ommited backups will be made to default location, same on both client and server side.

Backup server without strict client restriction:

```yaml
xtrabackup:
  server:
    restrict_clients: false
```

Backup server at exact times:

```yaml
xtrabackup:
  server:
    enabled: true
    full_backups_to_keep: 3
    incr_before_full: 3
    backup_dir: /srv/backup
    backup_times:
      day_of_week: 0
      hour: 4
      minute: 52
    key:
      xtrabackup_pub_key:
        enabled: true
        key: key
```

Note
Parameters in backup_times section can be used to set up exact time the cron job should be executed. In this example, the backup job would be executed every Sunday at 4:52 AM. If any of the individual backup_times parameters is not defined, the default value will be used. For example, if minute parameter is *, it will run the backup every minute, which is usually not desired.

See the crontab reference for further info on how to set these parameters.

Note
Please be aware that only backup_times section OR hours_before_full(incr) can be defined. If both are defined. The backup_times section will be preferred.
Note

New parameter incr_before_full needs to be defined. This number sets number of incremental backups to be run, before a full backup is performed.

Client restore from local backups:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 5
    hours_before_full: 48
    hours_before_incr: 12
    restore_full_latest: 1
    restore_from: local
    compression: true
    compressThreads: 2
  database:
    user: username
    password: password
  target:
    host: cfg01
  qpress:
    source: tar
    name: url
```

Note

restore_full_latest param with a value of 1 means to restore db from the last full backup and its increments. 2 would mean to restore second latest full backup and its increments.

Client restore from remote backups:

```yaml
xtrabackup:
  client:
    enabled: true
    full_backups_to_keep: 5
    hours_before_full: 48
    hours_before_incr: 12
    restore_full_latest: 1
    restore_from: remote
    compression: true
```
compressThreads: 2

database:
  user: username
  password: password

target:
  host: cfg01

tqpress:
  source: tar
  name: url

Note

The restore_full_latest parameter with a value of 1 means to restore db from the last full backup and its increments. 2 would mean to restore second latest full backup and its increments

Read more

- https://labs.riseup.net/code/projects/xtrabackup/wiki/Configuration
- http://www.debian-administration.org/articles/351
- https://github.com/riseuplabs/puppet-xtrabackup
- http://www.ushills.co.uk/2008/02/backup-with-xtrabackup.html