Red Hat Enterprise Linux OpenStack Platform 7
Logging, Monitoring, and Troubleshooting Guide

An In-Depth Guide to OpenStack Logging, Monitoring, and Troubleshooting

OpenStack Team

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Abstract

This guide provides a detailed overview on logging and monitoring a Red Hat Enterprise Linux OpenStack Platform environment, and how to solve problems.

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PREFACE

This document provides an overview of the logging and monitoring capabilities that are availbale in a Red Hat Enterprise Linux OpenStack Platform environment, and how to troubleshoot possible issues.

CHAPTER 1. LOGGING

Red Hat Enterprise Linux OpenStack Platform writes informational messages to specific log files; you can use these messages for troubleshooting and monitoring system events.

Note

You need not attach the individual log files to your support cases manually. All the required information will be gathered automatically by the **`sosreport`** utility, which is described in Chapter 4, *Troubleshooting*.

1.1. LOG FILES FOR OPENSTACK SERVICES

Each OpenStack component has a separate logging directory containing files specific to a running service.

1.1.1. Bare Metal Provisioning (ironic) Log Files

Service	Service Name	Log Path
OpenStack Ironic API	openstack-ironic-api.service	/var/log/ironic/ironic-api.log
OpenStack Ironic Conductor	openstack-ironic-conductor.service	/var/log/ironic/ironic-conductor.log

1.1.2. Block Storage (cinder) Log Files

Service	Service Name	Log Path
Block Storage API	openstack-cinder-api.service	/var/log/cinder/api.log
Block Storage Backup	openstack-cinder-backup.service	/var/log/cinder/backup.log
Informational messages	The cinder-manage command	/var/log/cinder/cinder-manage.log
Block Storage Scheduler	openstack-cinder-scheduler.service	/var/log/cinder/scheduler.log

Service	Service Name	Log Path
Block Storage Volume	openstack-cinder-volume.service	/var/log/cinder/volume.log

1.1.3. Compute (nova) Log Files

Service	Service Name	Log Path
OpenStack Compute API service	openstack-nova-api.service	/var/log/nova/nova-api.log
OpenStack Compute certificate server	openstack-nova-cert.service	/var/log/nova/nova-cert.log
OpenStack Compute service	openstack-nova-compute.service	/var/log/nova/nova-compute.log
OpenStack Compute Conductor service	openstack-nova-conductor.service	/var/log/nova/nova-conductor.log
OpenStack Compute VNC console authentication server	openstack-nova-consoleauth.service	/var/log/nova/nova-consoleauth.log
Informational messages	nova-manage command	/var/log/nova/nova-manage.log
OpenStack Compute NoVNC Proxy service	openstack-nova-novncproxy.service	/var/log/nova/nova-novncproxy.log
OpenStack Compute Scheduler service	openstack-nova-scheduler.service	/var/log/nova/nova-scheduler.log

1.1.4. Dashboard (horizon) Log Files

Service	Service Name	Log Path
Log of certain user interactions	Dashboard interface	/var/log/horizon/horizon.log

The Apache HTTP server uses several additional log files for the Dashboard web interface, which can be accessed using a web browser or command-line clients (keystone, nova). The following log files can be helpful in tracking the usage of the Dashboard and diagnosing faults:

Purpose	Log Path
All processed HTTP requests	/var/log/httpd/horizon_access.log
HTTP errors	/var/log/httpd/horizon_error.log
Admin-role API requests	/var/log/httpd/keystone_wsgi_admin_access.log
Admin-role API errors	/var/log/httpd/keystone_wsgi_admin_error.log
Member-role API requests	/var/log/httpd/keystone_wsgi_main_access.log
Member-role API errors	/var/log/httpd/keystone_wsgi_main_error.log

Note

There is also **`/var/log/httpd/default_error.log`**, which stores errors reported by other web services running on the same host; for example, *nagios*.

1.1.5. Data Processing (sahara) Log Files

Service	Service Name	Log Path
Sahara API Server	openstack-sahara-all.service openstack-sahara-api.service	/var/log/sahara/sahara-all.log /var/log/messages
Sahara Engine Server	openstack-sahara-engine.service	/var/log/messages

1.1.6. Database as a Service (trove) Log Files

Service	Service Name	Log Path
OpenStack Trove API Service	openstack-trove-api.service	/var/log/trove/trove-api.log
OpenStack Trove Conductor Service	openstack-trove-conductor.service	/var/log/trove/trove-conductor.log
OpenStack Trove guestagent Service	openstack-trove-guestagent.service	/var/log/trove/logfile.txt
OpenStack Trove taskmanager Service	openstack-trove-taskmanager.service	/var/log/trove/trove-taskmanager.log

1.1.7. Identity Service (keystone) Log Files

Service	Service Name	Log Path
OpenStack Identity Service	openstack-keystone.service	/var/log/keystone/keystone.log

1.1.8. Image Service (glance) Log Files

Service	Service Name	Log Path
OpenStack Image Service API server	openstack-glance-api.service	/var/log/glance/api.log
OpenStack Image Service Registry server	openstack-glance-registry.service	/var/log/glance/registry.log

1.1.9. Networking (neutron) Log Files

Service	Service Name	Log Path
OpenStack Neutron DHCP Agent	neutron-dhcp-agent.service	/var/log/neutron/dhcp-agent.log

Service	Service Name	Log Path
OpenStack Networking Layer 3 Agent	neutron-l3-agent.service	/var/log/neutron/l3-agent.log
Metadata agent service	neutron-metadata-agent.service	/var/log/neutron/metadata-agent.log
Metadata namespace proxy	n/a	/var/log/neutron/neutron-ns-metadata-proxy-*UUID*.log
Open vSwitch agent	neutron-openvswitch-agent.service	/var/log/neutron/openvswitch-agent.log
OpenStack Networking service	neutron-server.service	/var/log/neutron/server.log

1.1.10. Object Storage (swift) Log Files

OpenStack Object Storage sends logs to the system logging facility only.

Note

By default, all Object Storage log files to /var/log/swift/swift.log, using the local0, local1, and local2 syslog facilities.

The log messages of Object Storage are classified into two broad categories: those by REST API services and those by background daemons. The API service messages contain one line per API request, in a manner similar to popular HTTP servers; both the frontend (Proxy) and backend (Account, Container, Object) services post such messages. The daemon messages are less structured and typically contain human-readable information about daemons performing their periodic tasks. However, regardless of which part of Object Storage produces the message, the source identity is always at the beginning of the line.

An example of a proxy message:

```
Apr 20 15:20:34 rhev-a24c-01 proxy-server: 127.0.0.1 127.0.0.1
20/Apr/2015/19/20/34 GET
/v1/AUTH_zaitcev%3Fformat%3Djson%26marker%3Dtestcont HTTP/1.0 200 -
python-swiftclient-2.1.0 AUTH_tk737d6... - 2 - txc454fa8ea4844d909820a-
0055355182 - 0.0162 - - 1429557634.806570053 1429557634.822791100
```

An example of ad-hoc messages from background daemons:

```
Apr 27 17:08:15 rhev-a24c-02 object-auditor: Object audit (ZBF). Since
Mon Apr 27 21:08:15 2015: Locally: 1 passed, 0 quarantined, 0 errors
files/sec: 4.34 , bytes/sec: 0.00, Total time: 0.23, Auditing time:
```

```
0.00, Rate: 0.00
Apr 27 17:08:16 rhev-a24c-02 object-auditor: Object audit (ZBF)
"forever" mode completed: 0.56s. Total quarantined: 0, Total errors: 0,
Total files/sec: 14.31, Total bytes/sec: 0.00, Auditing time: 0.02,
Rate: 0.04
Apr 27 17:08:16 rhev-a24c-02 account-replicator: Beginning replication
run
Apr 27 17:08:16 rhev-a24c-02 account-replicator: Replication run OVER
Apr 27 17:08:16 rhev-a24c-02 account-replicator: Attempted to replicate
5 dbs in 0.12589 seconds (39.71876/s)
Apr 27 17:08:16 rhev-a24c-02 account-replicator: Removed 0 dbs
Apr 27 17:08:16 rhev-a24c-02 account-replicator: 10 successes, 0
failures
```

1.1.11. Orchestration (heat) Log Files

Service	Service Name	Log Path
OpenStack Heat API Service	openstack-heat-api.service	/var/log/heat/heat-api.log
Openstack Heat Engine Service	openstack-heat-engine.service	/var/log/heat/heat-engine.log
Orchestration service events	n/a	/var/log/heat/heat-manage.log

1.1.12. Shared Filesystem Service (manila) Log Files

Service	Service Name	Log Path
OpenStack Manila API Server	openstack-manila-api.service	/var/log/manila/api.log
OpenStack Manila Scheduler	openstack-manila-scheduler.service	/var/log/manila/scheduler.log
OpenStack Manila Share Service	openstack-manila-share.service	/var/log/manila/share.log

Note

Some information from the Manila Python library can also be logged in **`/var/log/manila/manila-manage.log`**.

1.1.13. Telemetry (ceilometer) Log Files

Service	Service Name	Log Path
OpenStack ceilometer notification agent	openstack-ceilometer-notification.service	/var/log/ceilometer/agent-notification.log
OpenStack ceilometer alarm evaluation	openstack-ceilometer-alarm-evaluator.service	/var/log/ceilometer/alarm-evaluator.log
OpenStack ceilometer alarm notification	openstack-ceilometer-alarm-notifier.service	/var/log/ceilometer/alarm-notifier.log
OpenStack ceilometer API	openstack-ceilometer-api.service	/var/log/ceilometer/api.log
Informational messages	MongoDB integration	/var/log/ceilometer/ceilometer-dbsync.log
OpenStack ceilometer central agent	openstack-ceilometer-central.service	/var/log/ceilometer/central.log
OpenStack ceilometer collection	openstack-ceilometer-collector.service	/var/log/ceilometer/collector.log
OpenStack ceilometer compute agent	openstack-ceilometer-compute.service	/var/log/ceilometer/compute.log

1.1.14. Log Files for Supporting Services

The following services are used by the core OpenStack components and have their own log directories and files.

Service	Service Name	Log Path
Message broker (RabbitMQ)	rabbitmq-server.service	/var/log/rabbitmq/rabbit@*short_hostname*.log /var/log/rabbitmq/rabbit@*short_hostname*-sasl.log (for Simple Authentication and Security Layer related log messages)
Database server (MariaDB)	mariadb.service	/var/log/mariadb/mariadb.log
Document-oriented database (MongoDB)	mongod.service	/var/log/mongodb/mongodb.log
Virtual network switch (Open vSwitch)	openvswitch-nonetwork.service	/var/log/openvswitch/ovsdb-server.log /var/log/openvswitch/ovs-vswitchd.log

1.2. CONFIGURE LOGGING OPTIONS

Each component maintains its own separate logging configuration in its respective configuration file. For example, in Compute, these options are set in **`/etc/nova/nova.conf`**:

- Increase the level of informational logging by enabling debugging. This option greatly increases the amount of information captured, so you may want to consider using it only temporarily, or first reviewing your log rotation settings.

```
debug=True
```

- Enable verbose logging:

```
verbose=True
```

- Change the log file path:

```
log_dir=/var/log/nova
```

- Send your logs to a central syslog server:

```
use_syslog=True
syslog_log_facility=LOG_USER
```

Note

Options are also available for timestamp configuration and log formatting, among others. Review the component's configuration file for additional logging options.

1.3. REMOTE LOGGING INSTALLATION AND CONFIGURATION

1.3.1. Introduction to Remote Logging

All systems generate and update log files recording their actions and any problems they encounter. In a distributed or cloud computing environment that contains many systems, collecting these log files in a central location simplifies debugging.

The **rsyslog** service provides facilities both for running a centralized logging server and for configuring individual systems to send their log files to the centralized logging server. This is referred to as configuring the systems for *remote logging*.

1.3.2. Install rsyslog Server

The **rsyslog** package must be installed on the system that you intend to use as a centralized logging server and all systems that will be configured to send logs to it. To do so, log in as the *root* user and install the **rsyslog** package:

```
# yum install rsyslog
```

The **rsyslog** package is installed and ready to be configured.

1.3.3. Configure rsyslog on the Centralized Logging Server

The steps in this procedure must be followed on the system that you intend to use as your centralized logging sever. All steps in this procedure must be run while logged in as the *root* user.

1. Configure SELinux to allow **rsyslog** traffic.

   ```
   # semanage port -a -t syslogd_port_t -p udp 514
   ```

2. Open the **/etc/rsyslog.conf** file in a text editor.

   a. Add the following lines to the file, defining the location logs will be saved to:

   ```
   $template TmplMsg, "/var/log/%HOSTNAME%/%PROGRAMNAME%.log"
   $template TmplAuth, "/var/log/%HOSTNAME%/%PROGRAMNAME%.log"

   authpriv.*   ?TmplAuth
   *.info,mail.none,authpriv.none,cron.none   ?TmplMsg
   ```

   b. Remove the comment character (#) from the beginning of these lines in the file:

   ```
   #$ModLoad imudp
   #$UDPServerRun 514
   ```

   c. Save the changes to the **/etc/rsyslog.conf** file.

Your centralized log server is now configured to receive and store log files from the other systems in your environment.

1.3.4. Configure rsyslog on Individual Nodes

Apply the steps listed in this procedure to each of your systems to configure them to send logs to a centralized log server. All steps listed in this procedure must be performed while logged in as the *root* user.

1. Edit the **/etc/rsyslog.conf**, and specify the address of your centralized log server by adding the following:

   ```
   *.*   @YOURSERVERADDRESS:YOURSERVERPORT
   ```

   Replace *YOURSERVERADDRESS* with the address of the centralized logging server. Replace *YOURSERVERPORT* with the port on which the rsyslog service is listening. For example:

   ```
   *.*   @192.168.20.254:514
   ```

   Or:

   ```
   *.*   @@log-server.example.com:514
   ```

   The single @ sign specifies the UDP protocol for transmission. Use @@ to specify the TCP protocol for transmission.

   Important

   The use of the wildcard (*****) character in these example configurations indicates to rsyslog that log entries from all log facilities and of all log priorities must be sent to the remote rsyslog server.

   For information on applying more precise filtering of log files refer to the manual page for the rsyslog configuration file, **rsyslog.conf**. Access the manual page by running **man rsyslog.conf**.

2. Once the *rsyslog* service is started or restarted the system will send all log messages to the centralized logging server.

1.3.5. Start the rsyslog Server

The **rsyslog** service must be running on both the centralized logging server and the systems attempting to log to it.

The steps in this procedure must be performed while logged in as the *root* user.

1. Start the rsyslog service:

   ```
   # service rsyslog start
   ```

2. Ensure the rsyslog service starts automatically in the future:

   ```
   # chkconfig rsyslog on
   ```

The **`rsyslog`** service has been started. The service will start sending or receiving log messages based on its local configuration.

CHAPTER 2. MONITORING USING THE TELEMETRY SERVICE

For help with the ceilometer command, use:

```
# ceilometer help
```

For help with the subcommands, use:

```
# ceilometer help subcommand
```

2.1. VIEW EXISTING ALARMS

To list configured Telemetry alarms, use:

```
# ceilometer alarm-list
```

To list configured meters for a resource, use:

```
# ceilometer meter-list --query resource=UUID
+--------------------------+------------+----------+----------+---
-------+----------+
| Name                     | Type       | Unit     | Resource  |
User ID  | Project  |
+--------------------------+------------+----------+----------+---
-------+----------+
| cpu                      | cumulative | ns       | 5056eda...|
b0e500...| f23524...|
| cpu_util                 | gauge      | %        | 5056eda...|
b0e500...| f23524...|
| disk.ephemeral.size      | gauge      | GB       | 5056eda...|
b0e500...| f23524...|
| disk.read.bytes          | cumulative | B        | 5056eda...|
b0e500...| f23524...|

| instance                 | gauge      | instance  | 5056eda...|
b0e500...| f23524...|
| instance:m1.tiny         | gauge      | instance  | 5056eda...|
b0e500...| f23524...|
| memory                   | gauge      | MB       | 5056eda...|
b0e500...| f23524...|
| vcpus                    | gauge      | vcpu     | 5056eda...|
b0e500...| f23524...|
+--------------------------+------------+----------+-------------
------------------+
```

Where *UUID* is the resource ID for an existing resource (for example, an instance, image, or volume).

2.2. CONFIGURE AN ALARM

To configure an alarm to activate when a threshold value is crossed, use the **ceilometer alarm-**

`threshold-create` command with the following syntax:

```
# ceilometer alarm-threshold-create --name alarm-name [--description
alarm-text] --meter-name meter-name --threshold value
```

Example

To configure an alarm that activates when the average CPU utilization for an individual instance exceeds 50% for three consecutive 600s (10 minute) periods, use:

```
# ceilometer alarm-threshold-create --name cpu_high --description 'CPU
usage high' --meter-name cpu_usage_high --threshold 50 --comparison-
operator gt --statistic avg --period 600 --evaluation-periods 3 --
alarm-action 'log://' --query resource_id=5056eda6-8a24-4f52-9cc4-
c3ddb6fb4a69
```

In this example, the notification action is a log message.

To edit an existing threshold alarm, use the **`ceilometer alarm-threshold-update`** command together with the alarm ID, followed by one or more options to be updated.

Example

To increase the alarm threshold to 75%, use:

```
# ceilometer alarm-threshold-update 35addb25-d488-4a74-a038-
076aad3a3dc3 --threshold=75
```

2.3. DISABLE OR DELETE AN ALARM

To disable an alarm, use:

```
# ceilometer alarm-threshold-update --enabled False ALARM_ID
```

To delete an alarm, use:

```
# ceilometer alarm-delete ALARM_ID
```

2.4. VIEW SAMPLES

To list all the samples for a particular meter name, use:

```
# ceilometer sample-list --meter METER_NAME
```

To list samples only for a particular resource within a range of time stamps, use:

```
# ceilometer sample-list --meter METER_NAME --query
'resource_id=INSTANCE_ID;timestamp>_START_TIME_;timestamp>=END_TIME'
```

Where *START_TIME* and *END_TIME* are in the form *iso-dateThh:mm:ss*.

Example

To query an instance for samples taken between **13:10:00** and **14:25:00**, use:

```
# ceilometer sample-list --meter cpu --query 'resource_id=5056eda6-
8a24-4f52-9cc4-c3ddb6fb4a69;timestamp>2015-01-
12T13:10:00;timestamp>=2015-01-12T14:25:00'
+------------------+------+-----------+--------------+------+----
-----------------+
| Resource ID      | Name | Type      | Volume       | Unit |
Timestamp          |
+------------------+------+-----------+--------------+------+----
-----------------+
| 5056eda6-8a24-... | cpu  | cumulative | 3.5569e+11    | ns   | 2015-
01-12T14:21:44 |
| 5056eda6-8a24-... | cpu  | cumulative | 3.0041e+11    | ns   | 2015-
01-12T14:11:45 |
| 5056eda6-8a24-... | cpu  | cumulative | 2.4811e+11    | ns   | 2015-
01-12T14:01:54 |
| 5056eda6-8a24-... | cpu  | cumulative | 1.3743e+11    | ns   | 2015-
01-12T13:30:54 |
| 5056eda6-8a24-... | cpu  | cumulative | 84710000000.0 | ns   | 2015-
01-12T13:20:54 |
| 5056eda6-8a24-... | cpu  | cumulative | 31170000000.0 | ns   | 2015-
01-12T13:10:54 |
+------------------+------+-----------+--------------+------+----
-----------------+
```

2.5. CREATE A SAMPLE

Samples can be created for sending to the Telemetry service and they need not correspond to a previously defined meter. Use the following syntax:

```
# ceilometer sample-create --resource_id RESOURCE_ID --meter-name
METER_NAME --meter-type METER_TYPE --meter-unit METER_UNIT --sample-
volume SAMPLE_VOLUME
```

Where *METER_TYPE* can be one of:

- Cumulative — a running total
- Delta — a change or difference over time
- Gauge — a discrete value

Example

```
# ceilometer sample-create -r 5056eda6-8a24-4f52-9cc4-c3ddb6fb4a69 -m
On_Time_Mins --meter-type cumulative --meter-unit mins --sample-volume
0
+------------------+--------------------------------------------+
| Property         | Value                                      |
+------------------+--------------------------------------------+
| message_id       | 521f138a-9a84-11e4-8058-525400ee874f       |
| name             | On_Time_Mins                               |
```

```
| project_id        | f2352499957d4760a00cebd26c910c0f           |
| resource_id       | 5056eda6-8a24-4f52-9cc4-c3ddb6fb4a69       |
| resource_metadata | {}                                         |
| source            | f2352499957d4760a00cebd26c910c0f:openstack |
| timestamp         | 2015-01-12T17:56:23.179729                 |
| type              | cumulative                                 |
| unit              | mins                                       |
| user_id           | b0e5000684a142bd89c4af54381d3722           |
| volume            | 0.0                                        |
+-------------------+--------------------------------------------+
```

Where **volume**, normally the value obtained as a result of the sampling action, is in this case the value being created by the command.

Note

Samples are not updated because the moment a sample is created, it is sent to the Telemetry service. Samples are essentially messages, which is why they have a message ID. To create new samples, repeat the **sample-create** command and update the **--sample-volume** value.

2.6. VIEW CLOUD USAGE STATISTICS

OpenStack administrators can use the dashboard to view cloud statistics.

1. As an admin user in the dashboard, select **Admin** > **System** > **Resource Usage**.
2. Click one of the following:
   - Daily Report — View a report of daily usage per project. Select the date range and a limit for the number of projects, and click **Generate Report**; the daily usage report is displayed.
   - Stats — View a graph of metrics grouped by project. Select the values and time period using the drop-down menus; the displayed graph is automatically updated.

The **ceilometer** command line client can also be used for viewing cloud usage statics.

Example

To view all the statistics for the **cpu_util** meter, use:

```
# ceilometer statistics --meter cpu_util
+--------+---------------+--------------+-----+-----+------+------
-+------+--------
| Period | Period Start   |Period End     | Max | Min | Avg  | Sum   |
Count| Dura...
+--------+---------------+--------------+-----+-----+------+------
-+------+--------
| 0      | 2015-01-09T14: |2015-01-09T14:2| 9.44| 0.0 | 6.75 | 337.94|
50   | 2792...
+--------+---------------+--------------+-----+-----+------+------
-+------+--------
```

Example

Statistics can be restricted to a specific resource by means of the **`--query`** option, and restricted to a specific range by means of the **`timestamp`** option.

```
# ceilometer statistics --meter cpu_util --query 'resource_id=5056eda6-
8a24-4f52-9cc4-c3ddb6fb4a69;timestamp>2015-01-
12T13:00:00;timestamp<=2015-01-13T14:00:00'
+--------+----------------+---------------+-----+-----+------+------
-+------+--------
| Period | Period Start   |Period End     | Max | Min | Avg  | Sum   |
Count| Dura...
+--------+----------------+---------------+-----+-----+------+------
-+------+--------
| 0      | 2015-01-12T20:1|2015-01-12T20:1| 9.44| 5.95| 8.90 | 347.10|
39   | 2465...
+--------+----------------+---------------+-----+-----+------+------
-+------+--------
```

CHAPTER 3. MONITORING USING NAGIOS

3.1. INSTALL THE NAGIOS SERVICE

The Nagios monitoring system can be used to provide monitoring and alerts for the OpenStack network and infrastructure. The following installation procedure installs:

nagios

Nagios program that monitors hosts and services on the network, and which can send email or page alerts when a problem arises and when a problem is resolved.

nagios-devel

Includes files which can be used by Nagios-related applications.

nagios-plugins*

Nagios plugins for Nagios-related applications (including ping and nrpe).

gd

Graphics Library, for dynamically creating images

gd-devel

Development libraries for Graphics Library (gd)

php

HTML-embedded scripting language, used by Nagios for the web interface.

gcc, glibc and glibc-common

GNU compiler collection, together with standard programming libraries and binaries (including locale support).

openssl

OpenSSL toolkit, which provides support for secure communication between machines.

Install the required packages as the *root* user, using the *yum* command:

```
# yum install nagios nagios-devel nagios-plugins\* gd gd-devel php gcc
glibc glibc-common openssl
```

Note

If any of the packages are not immediately available (for example, gd-devel or gcc), you might have to enable the optional Red Hat channel using *subscription-manager*:

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

3.1.1. Nagios Service Placement

Consider deploying Nagios to a server that is external to the OpenStack environment, allowing it to receive diagnostic information in the event of system issues. In addition, there are a number of points to review for optimal Nagios placement:

1. Nagios services can have high CPU overhead if SSH is used.
2. Nagios should be hosted on a securely locked down server, especially if security events are being monitored. The Nagios server will receive traffic from a broad scope of systems. If security segmentation is a requirement, then this would be considered a privileged system, subject to additional firewall rules than what would apply to an OpenStack node.
3. Nagios servers may receive a considerable amount of network traffic, resulting in resource contention.

3.1.2. Install the NRPE Addon

NRPE (Nagios Remote Plugin Executor) plugins are compiled executables or scripts that are used to check the status of a host's service, and report back to the Nagios service. If the OpenStack cloud is distributed across machines, the NPRE addon can be used to run access plugin information on those remote machines.

NRPE and the Nagios plugins must be installed on each remote machine to be monitored. On the remote machine, and as the *root* user, execute the following:

```
# yum install -y nrpe nagios-plugins\* openssl
```

After the installation, you can view all available plugins in the **/usr/lib64/nagios/plugins/** directory.

Note

SSH can also be used to access remote Nagios plugins. However, this can result in too high a CPU load on both the Nagios host and remote machine, and is not recommended.

3.2. CONFIGURE NAGIOS

Nagios is composed of a server, plugins that report object/host information from both local and remote machines back to the server, a web interface, and configuration that ties all of it together.

At a minimum, the following must be done:

1. Check web-interface user name and password, and check basic configuration.
2. Add OpenStack monitoring to the local server.
3. If the OpenStack cloud includes distributed hosts:
    a. Install and configure NRPE on each remote machine (that has services to be monitored).
    b. Tell Nagios which hosts are being monitored.
    c. Tell Nagios which services are being monitored for each host.

Table 3.1. Nagios Configuration Files

File Name	Description
/etc/nagios/nagios.cfg	Main Nagios configuration file.
/etc/nagios/cgi.cfg	CGI configuration file.
/etc/httpd/conf.d/nagios.conf	Nagios configuration for httpd.
/etc/nagios/passwd	Password file for Nagios users.
/usr/local/nagios/etc/ResourceName.cfg	Contains user-specific settings.
/etc/nagios/objects/ObjectsDir/ObjectsFile.cfg	Object definition files that are used to store information about items such as services or contact groups.
/etc/nagios/nrpe.cfg	NRPE configuration file.

3.2.1. Configure HTTPD for Nagios

By default, when Nagios is installed, the default httpd user and password is: *nagiosadmin* / *nagiosadmin*. This value can be viewed in the **`/etc/nagios/cgi.cfg`** file.

To configure HTTPD for nagios, follow these steps:

1. Log in as the *root* user.
2. To change the default password for the user *nagiosadmin*, execute:

```
# htpasswd -c /etc/nagios/passwd nagiosadmin
```

Note

To create a new user, use the following command with the new user's name:

```
# htpasswd /etc/nagios/passwd newUserName
```

3. Update the *nagiosadmin* email address in **`/etc/nagios/objects/contacts.cfg`**:

```
define contact{
    contact_name    nagiosadmin             ; Short name of user
    [...snip...]
    email           yourName@example.com    ; << CHANGE THIS
    }
```

4. Verify that the basic configuration is working:

```
# nagios -v /etc/nagios/nagios.cfg
```

If errors occur, check the parameters set in **/etc/nagios/nagios.cfg**.

5. Ensure that Nagios is started automatically when the system boots:

```
# chkconfig --add nagios
# chkconfig nagios on
```

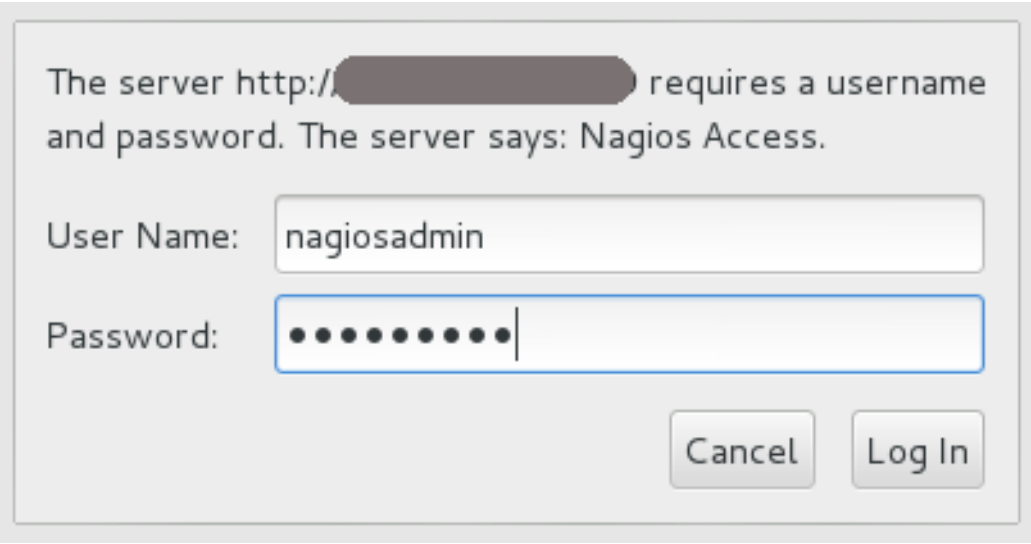
6. Start up Nagios and restart httpd:

```
# service httpd restart
# service nagios start
```

7. Check your Nagios access by using the following URL in your browser, and using the nagiosadmin user and the password that was set in Step 2:

```
http://nagiosHostURL/nagios
```

Figure 3.1. Nagios Login



Note

If the Nagios URL cannot be accessed, ensure your firewall rules have been set up correctly.

3.2.2. Configure Nagios to Monitor OpenStack Services

By default, on the Nagios server, the **/etc/nagios/objects/localhost.cfg** file is used to define services for basic local statistics; for example, swap usage or the number of current users. You can always comment these services out if they are no longer needed by prefacing each line with a '#' character. This same file can be used to add new OpenStack monitoring services.

Note

Additional service files can be used, but they must be specified as a *cfg_file* parameter in the **/etc/nagios/nagios.cfg** file.

1. Log in as the root user.
2. Write a short script for the item to be monitored (for example, whether a service is running), and place it in the **/usr/lib64/nagios/plugins** directory.

   For example, the following script checks the number of Compute instances, and is stored in a file named **nova-list**:

   ```
   #!/bin/env bash
   export OS_USERNAME=userName
   export OS_TENANT_NAME=tenantName
   export OS_PASSWORD=password
   export OS_AUTH_URL=http://identityURL:35357/v2.0/

   data=$(nova list  2>&1)
   rv=$?

   if [ "$rv" != "0" ] ; then
       echo $data
       exit $rv
   fi

   echo "$data" | grep -v -e '--------' -e '| Status |' -e '^$' |
   wc -l
   ```

3. Ensure the script is executable:

   ```
   # chmod a+x nova-list
   ```

4. In the **/etc/nagios/objects/commands.cfg** file, specify a command section for each new script:

   ```
   define command {
           command_line
   /usr/lib64/nagios/plugins/nova-list
           command_name                    nova-list
   }
   ```

5. In the **/etc/nagios/objects/localhost.cfg** file, define a service for each new item, using the defined command. For example:

   ```
   define service {
           check_command   nova-list
   ```

```
        host_name       localURL
        name            nova-list
        normal_check_interval   5
        service_description     Number of nova vm instances
        use             generic-service
        }
```

6. Restart nagios using:

```
# service nagios restart
```

3.2.3. Configure NRPE

To set up monitoring on each remote machine, execute the following as the *root* user:

1. In the **/etc/nagios/nrpe.cfg** file, add the central Nagios server IP address in the **allowed_hosts** line:

```
allowed_hosts=127.0.0.1, NagiosServerIP
```

2. In the **/etc/nagios/nrpe.cfg** file, add any commands to be used to monitor the OpenStack services. For example:

```
command[keystone]=/usr/lib64/nagios/plugins/check_procs -c 1: -w
3: -C keystone-all
```

   Each defined command can then be specified in the **services.cfg** file on the Nagios monitoring server.

Note

Any complicated monitoring can be placed into a script, and then referred to in the command definition.

3. Next, configure the firewall to allow **nrpe** traffic.

4. Start the NRPE service:

```
# service nrpe start
```

3.2.4. Create Host Definitions

If additional machines are being used in the cloud, in addition to the host on which Nagios is installed, they must be made known to Nagios by configuring them in an objects file:

1. Log in as the *root* user.

2. In the **/etc/nagios/objects/** directory, create a **hosts.cfg** file.

3. In the file, specify a *host* section for each machine on which an OpenStack service is running and should be monitored:

```
define host{
    use linux-server
    host_name remoteHostName
    alias remoteHostAlias
    address remoteAddress
}
```

where:

- **host_name** = Name of the remote machine to be monitored (typically listed in the local **/etc/hosts** file). This name is used to reference the host in service and host group definitions.
- **alias** = Name used to easily identify the host (typically the same as the **host_name**).
- **address** = Host address (typically its IP address, although a FQDN can be used instead, just make sure that DNS services are available).

For example:

```
define host{
  host_name     Server-ABC
  alias     OS-ImageServices
  address   192.168.1.254
}
```

4. In the **/etc/nagios/nagios.cfg** file, under the **OBJECT CONFIGURATION FILES** section, specify the following line:

```
cfg_file=/etc/nagios/objects/hosts.cfg
```

3.2.5. Create Service Definitions for Remote Services

To monitor remote services, you must define those services in a new file; in this procedure, **/etc/nagios/objects/services.cfg**:

1. Log in as the *root* user.
2. In the **/etc/nagios/objects/commands.cfg** file, specify the following to handle the use of the **check_nrpe** plugin with remote scripts or plugins:

```
define command{
        command_name    check_nrpe
        command_line    $USER1$/check_nrpe -H $HOSTADDRESS$ -c
$ARG1$
 }
```

3. In the **/etc/nagios/objects/** directory, create the **services.cfg** file.
4. In the file, specify the following **service** sections for each remote OpenStack host to be monitored:

```
##Basic remote checks#############
##Remember that remoteHostName is defined in the hosts.cfg file.
```

```
define service{
    use generic-service
    host_name remoteHostName
    service_description PING
    check_command check_ping!100.0,20%!500.0,60%
}

define service{
    use generic-service
    host_name remoteHostName
    service_description Load Average
    check_command check_nrpe!check_load
}

##OpenStack Service Checks#######
define service{
    use generic-service
    host_name remoteHostName
    service_description Identity Service
    check_command check_nrpe!keystone
}
```

The above sections ensure that a server heartbeat, load check, and the OpenStack Identity service status are reported back to the Nagios server. All OpenStack services can be reported, just ensure that a matching command is specified in the remote server's **`nrpe.cfg`** file.

5. In the **`/etc/nagios/nagios.cfg`** file, under the **`OBJECT CONFIGURATION FILES`** section, specify the following line:

```
cfg_file=/etc/nagios/objects/services.cfg
```

3.2.6. Verify the Nagios Configuration

1. Log in as the *root* user.
2. Verify that the updated configuration is working:

```
# nagios -v /etc/nagios/nagios.cfg
```

If errors occur, check the parameters set in **`/etc/nagios/nagios.cfg`**, **`/etc/nagios/services.cfg`**, and **`/etc/nagios/hosts.cfg`**.

3. Restart Nagios:

```
# service nagios restart
```

4. Log in to the Nagios dashboard again by using the following URL in your browser, and using the *nagiosadmin* user and the password that was set in the beginning:

```
http://nagiosHostURL/nagios
```

CHAPTER 4. TROUBLESHOOTING

This chapter contains logging and support information to assist with troubleshooting your Red Hat Enterprise Linux OpenStack Platform deployment.

4.1. SUPPORT

If client commands fail or you run into other issues, contact Red Hat Technical Support with a description of what happened, the full console output, all log files referenced in the console output, and an **sosreport** from the node that is (or might be) in trouble. For example, if you encounter a problem on the compute level, run **sosreport** on the Nova node, or if it is a networking issue, run the utility on the Neutron node. For general deployment issues, it is best to run **sosreport** on the cloud controller.

For information about the **sosreport** command (**sos** package), refer to What is a sosreport and how to create one in Red Hat Enterprise Linux 4.6 and later.

Check also the **/var/log/messages** file for any hints.

4.2. TROUBLESHOOT IDENTITY CLIENT (KEYSTONE) CONNECTIVITY PROBLEMS

When the Identity client (**keystone**) is unable to contact the Identity service it returns an error:

```
Unable to communicate with identity service: [Errno 113] No route to
host. (HTTP 400)
```

To debug the issue check for these common causes:

Identity service is down

On the system hosting the Identity service check the service status:

```
# openstack-status | grep keystone
openstack-keystone:                     active
```

If the service is not running then log in as the root user and start it.

```
# service openstack-keystone start
```

Firewall is not configured properly

The firewall might not be configured to allow TCP traffic on ports **5000** and **35357**. If so, see *Configure the Firewall to Allow Identity Service Traffic* in the Installation Reference for instructions on how to correct this.

Service Endpoints not defined correctly

On the system hosting the Identity service check that the endpoints are defined correctly.

1. Obtain the administration token:

```
# grep admin_token /etc/keystone/keystone.conf
admin_token = 0292d404a88c4f269383ff28a3839ab4
```

2. Determine the correct administration endpoint for the Identity service:

```
http://IP:35357/VERSION
```

Replace *IP* with the IP address or host name of the system hosting the Identity service. Replace *VERSION* with the API version (**v2.0**, or **v3**) that is in use.

3. Unset any pre-defined Identity service related environment variables:

```
# unset OS_USERNAME OS_TENANT_NAME OS_PASSWORD OS_AUTH_URL
```

4. Use the administration token and endpoint to authenticate with the Identity service. Confirm that the Identity service endpoint is correct:

```
# keystone --os-token=TOKEN \
           --os-endpoint=ENDPOINT \
           endpoint-list
```

Verify that the listed **publicurl**, **internalurl**, and **adminurl** for the Identity service are correct. In particular ensure that the IP addresses and port numbers listed within each endpoint are correct and reachable over the network.

If these values are incorrect then see *Create the Identity Service Endpoint* in the Installation Reference for information on adding the correct endpoint. Once the correct endpoints have been added, remove any incorrect endpoints using the **endpoint-delete** action of the **keystone** command:

```
# keystone --os-token=TOKEN \
           --os-endpoint=ENDPOINT \
           endpoint-delete ID
```

Replace *TOKEN* and *ENDPOINT* with the values identified previously. Replace *ID* with the identity of the endpoint to remove as listed by the **endpoint-list** action.

4.3. TROUBLESHOOT OPENSTACK NETWORKING ISSUES

This section discusses the different commands you can use and procedures you can follow to troubleshoot the OpenStack Networking service issues.

Debugging Networking Device

- Use the **ip a** command to display all the physical and virtual devices.
- Use the **ovs-vsctl show** command to display the interfaces and bridges in a virtual switch.
- Use the **ovs-dpctl show** command to show datapaths on the switch.

Tracking Networking Packets

- Use the **tcpdump** command to see where packets are not getting through.

```
# tcpdump -n -i INTERFACE -e -w FILENAME
```

Replace *INTERFACE* with the name of the network interface to see where the packets are not getting through. The interface name can be the name of the bridge or host Ethernet device.

The **-e** flag ensures that the link-level header is dumped (in which the **vlan** tag will appear).

The **-w** flag is optional. You can use it only if you want to write the output to a file. If not, the output is written to the standard output (**stdout**).

For more information about **tcpdump**, refer to its manual page by running **man tcpdump**.

Debugging Network Namespaces

- Use the **ip netns list** command to list all known network namespaces.
- Use the **ip netns exec** command to show routing tables inside specific namespaces.

```
# ip netns exec NAMESPACE_ID bash
# route -n
```

Start the **ip netns exec** command in a bash shell so that subsequent commands can be invoked without the **ip netns exec** command.

4.4. TROUBLESHOOT NETWORKS AND ROUTES TAB DISPLAY ISSUES IN THE DASHBOARD

The *Networks* and *Routers* tabs only appear in the dashboard when the environment is configured to use OpenStack Networking. In particular note that by default the PackStack utility currently deploys Nova Networking and as such in environments deployed in this manner the tab will not be visible.

If OpenStack Networking is deployed in the environment but the tabs still do not appear ensure that the service endpoints are defined correctly in the Identity service, that the firewall is allowing access to the endpoints, and that the services are running.

4.5. TROUBLESHOOT INSTANCE LAUNCHING ERRORS IN THE DASHBOARD

When using the dashboard to launch instances if the operation fails, a generic **ERROR** message is displayed. Determining the actual cause of the failure requires the use of the command line tools.

Use the **nova list** command to locate the unique identifier of the instance. Then use this identifier as an argument to the **nova show** command. One of the items returned will be the error condition. The most common value is **NoValidHost**.

This error indicates that no valid host was found with enough available resources to host the instance. To work around this issue, consider choosing a smaller instance size or increasing the overcommit allowances for your environment.

Note

To host a given instance, the compute node must have not only available CPU and RAM resources but also enough disk space for the ephemeral storage associated with the instance.

4.6. TROUBLESHOOT KEYSTONE V3 DASHBOARD AUTHENTICATION

django_openstack_auth is a pluggable Django authentication back end, that works with Django's contrib.auth framework, to authenticate a user against the OpenStack Identity service API. Django_openstack_auth uses the token object to encapsulate user and Keystone related information. The dashboard uses the token object to rebuild the Django user object.

The token object currently stores:

- Keystone token
- User information
- Scope
- Roles
- Service catalog

The dashboard uses Django's sessions framework for handling user session data. The following is a list of numerous session back ends available, which are controlled through the SESSION_ENGINE setting in your local_settings.py file:

- Local Memory Cache
- Memcached
- Database
- Cached Database
- Cookies

In some cases, particularly when a signed cookie session back end is used and, when having many or all services enabled all at once, the size of cookies can reach its limit and the dashboard can fail to log in. One of the reasons for the growth of cookie size is the service catalog. As more services are registered, the bigger the size of the service catalog would be.

In such scenarios, to improve the session token management, include the following configuration settings for logging in to the dashboard, especially when using Keystone v3 authentication.

1. In /usr/share/openstack-dashboard/openstack_dashboard/settings.py add the following configuration:

```
DATABASES =
{
  'default':
  {
    'ENGINE': 'django.db.backends.mysql',
```

```
    'NAME': 'horizondb',
    'USER': 'User Name',
    'PASSWORD': 'Password',
    'HOST': 'localhost',
   }
}
```

2. In the same file, change SESSION_ENGINE to:

```
SESSION_ENGINE = 'django.contrib.sessions.backends.cached_db'
```

3. Connect to the database service using the mysql command, replacing USER with the user name by which to connect. The USER must be a root user (or at least as a user with the correct permission: create db).

```
# mysql -u USER -p
```

4. Create the Horizon database.

```
mysql > create database horizondb;
```

5. Exit the mysql client.

```
mysql > exit
```

6. Change to the openstack_dashboard directory and sync the database using:

```
# cd /usr/share/openstack-dashboard/openstack_dashboard
$ ./manage.py syncdb
```

   You do not need to create a superuser, so answer 'n' to the question.

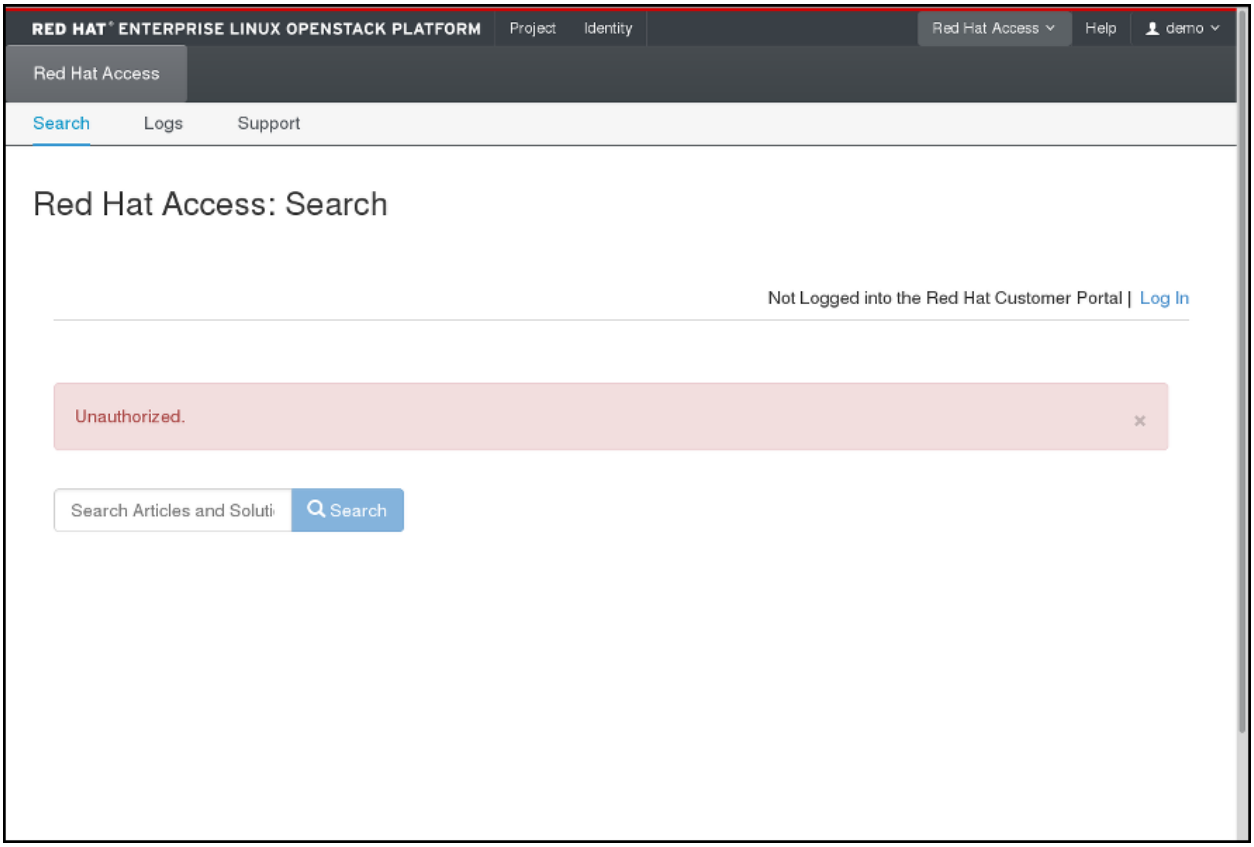
7. Restart Apache http server. For Red Hat Enterprise Linux:

```
#service httpd restart
```

4.7. OPENSTACK DASHBOARD - RED HAT ACCESS TAB

The *Red Hat Access* tab, which is part of the OpenStack dashboard, allows you to search for and read articles or solutions from the Red Hat Customer Portal, view logs from your instances and diagnose them, and work with your customer support cases.

Figure 4.1. Red Hat Access Tab.



Important

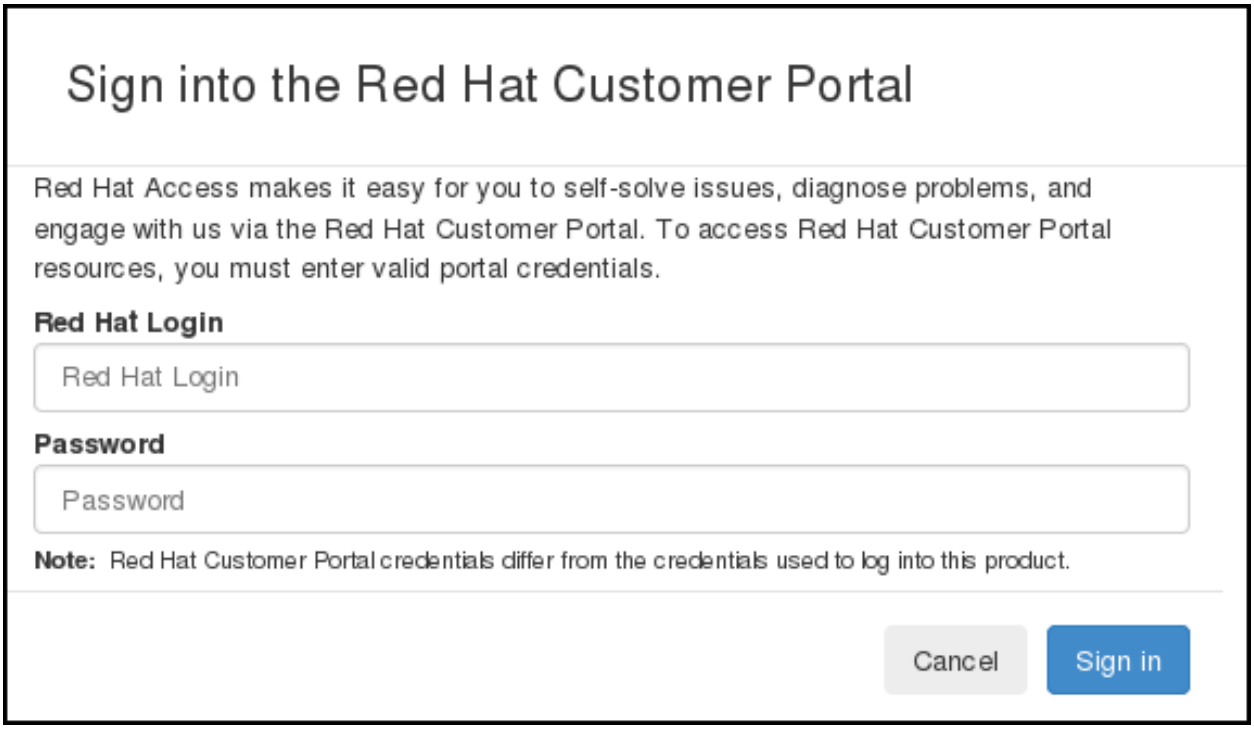
You must be logged in to the Red Hat Customer Portal in the browser in order to be able to use the functions provided by the Red Hat Access tab.

If you are not logged in, you can do so now:

1. Click *Log In*.
2. Enter your Red Hat login.
3. Enter your Red Hat password.
4. Click *Sign in*.

This is how the form looks:

Figure 4.2. Logging in to the Red Hat Customer Portal.

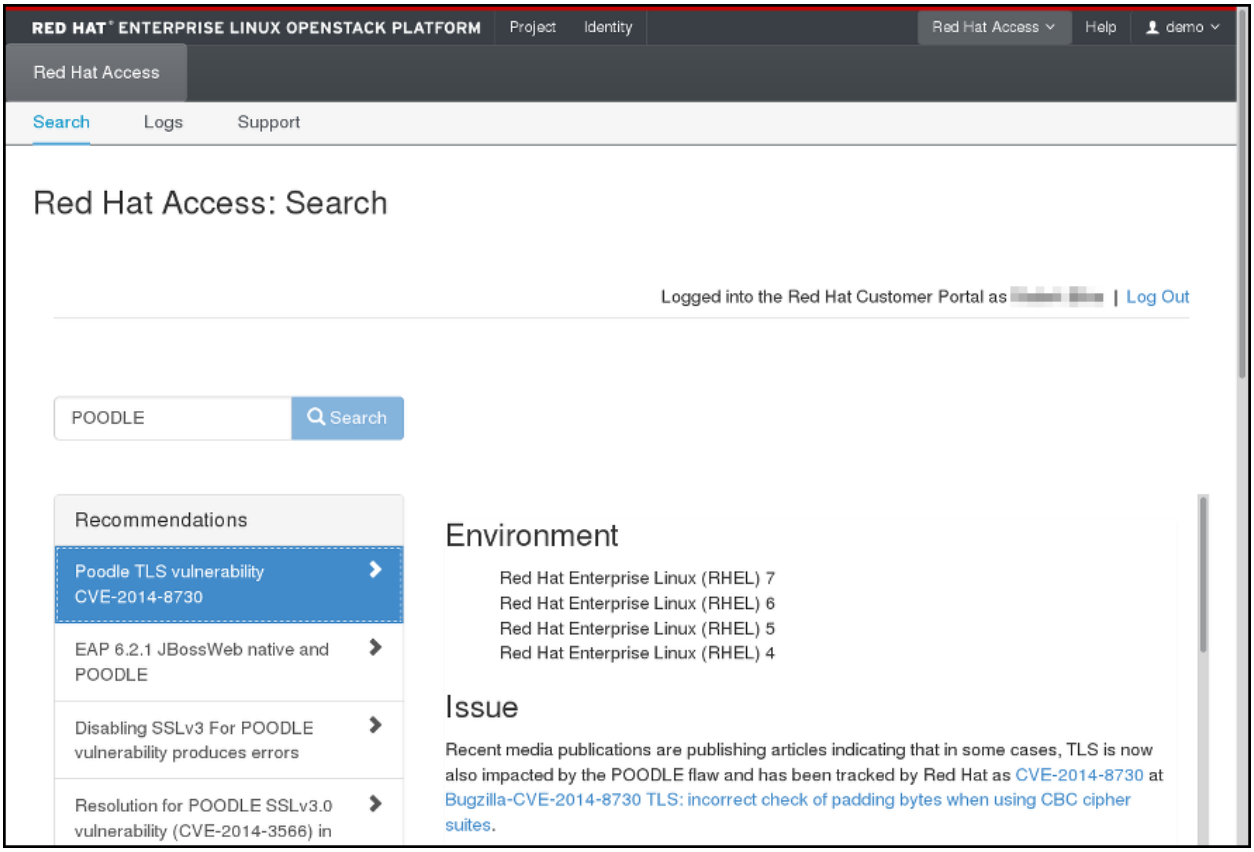


If you do not log in now, you will be prompted for your Red Hat login and password when you use one of the functions that require authentication.

4.7.1. Search

You can search for articles and solutions from Red Hat Customer Portal by entering one or more search keywords. The titles of the relevant articles and solutions will then be displayed. Click on a title to view the given article or solution:

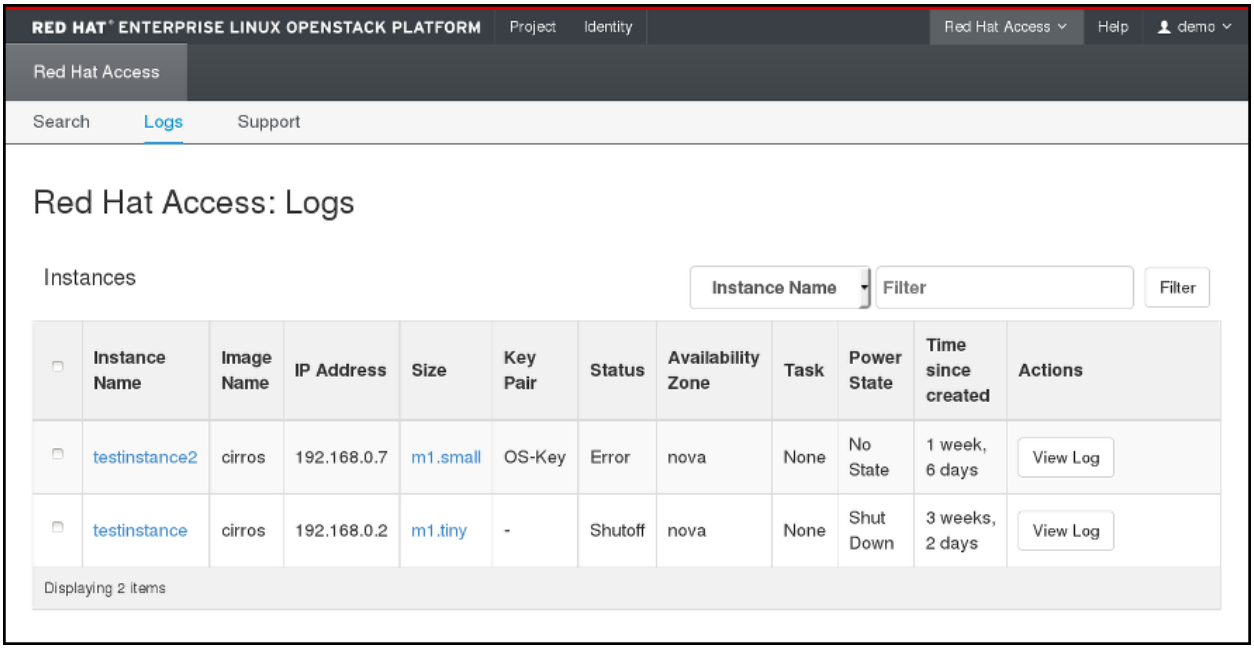
Figure 4.3. Example of Search Results on the Red Hat Access Tab.



4.7.2. Logs

Here you can read logs from your OpenStack instances:

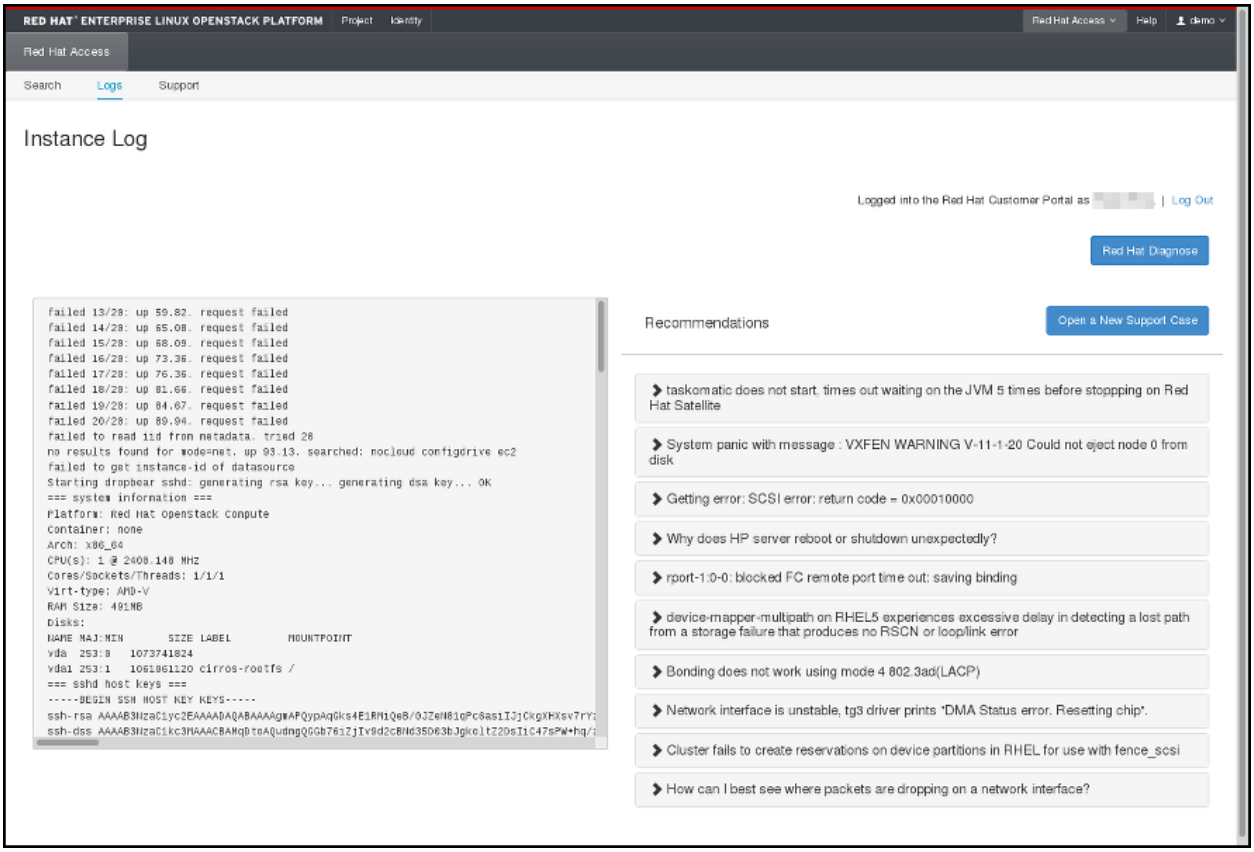
Figure 4.4. Instance Logs on the Red Hat Access Tab.



Find the instance of your choice in the table. If you have many instances, you can filter them by name, status, image ID, or flavor ID. Click *View Log* in the *Actions* column for the instance to check.

When an instance log is displayed, you can click *Red Hat Diagnose* to get recommendations regarding its contents:

Figure 4.5. Instance Logs on the Red Hat Access Tab.

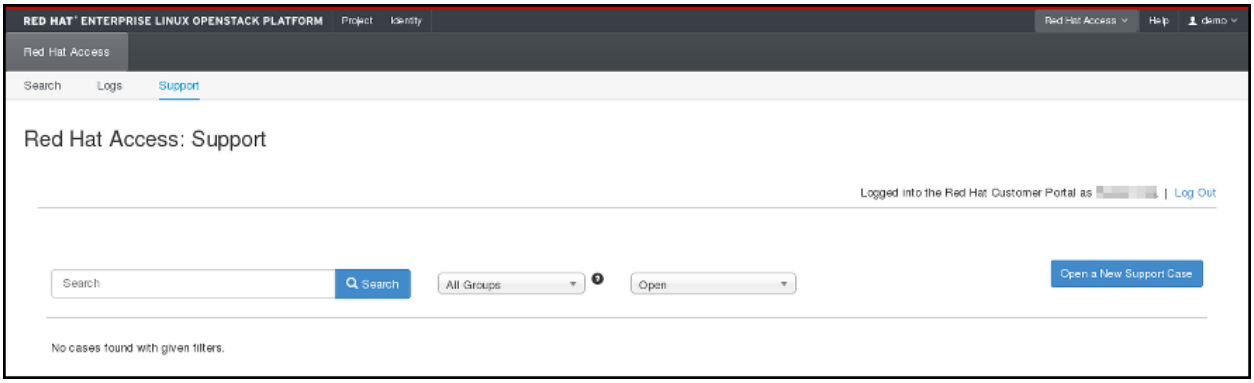


If none of the recommendations are useful or a genuine problem has been logged, click *Open a New Support Case* to report the problem to Red Hat Support.

4.7.3. Support

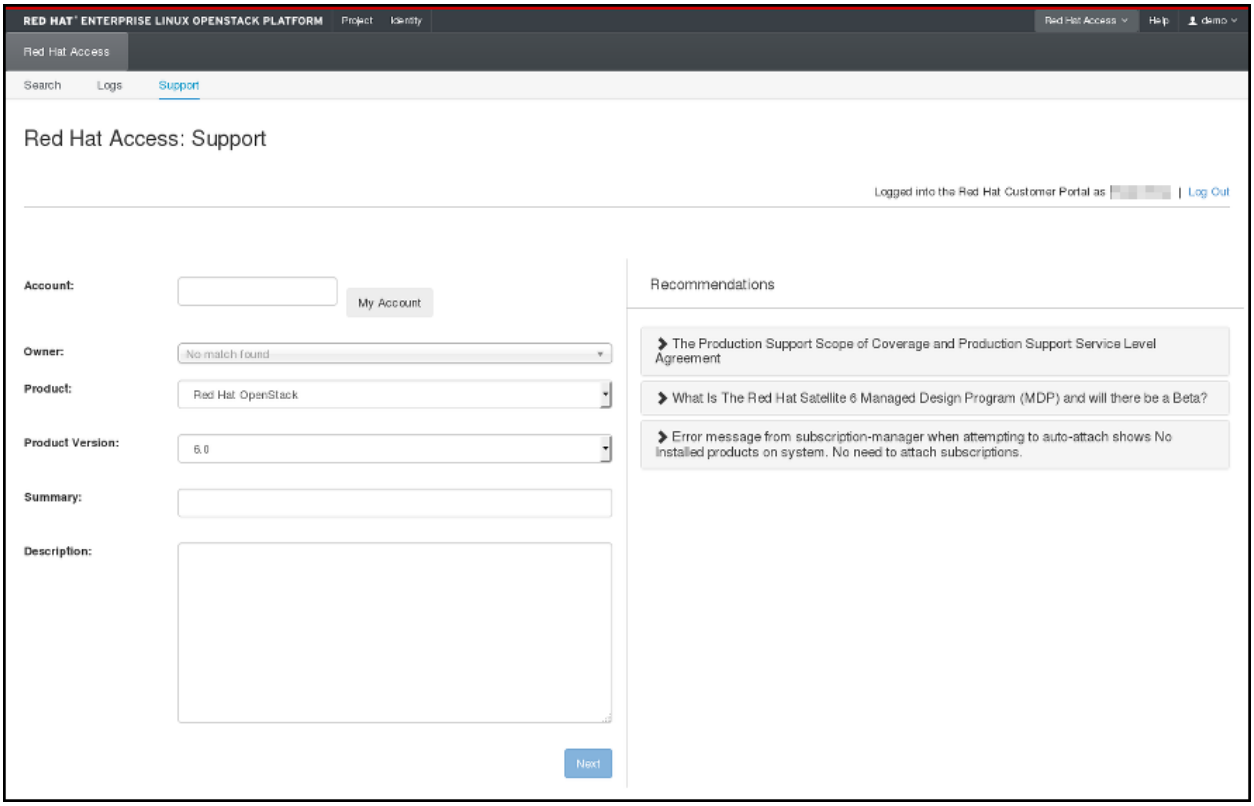
The last option in the Red Hat Access Tab allows you to search for your support cases at the Red Hat Customer Portal:

Figure 4.6. Search for Support Cases.



You can also open a new support case by clicking the appropriate button and filling out the form on the following page:

Figure 4.7. Open a New Support Case.


RED HAT® ENTERPRISE LINUX OPENSTACK PLATFORM
Project
Identity
Red Hat Access
Help
demo
Red Hat Access
Search
Logs
Support
Red Hat Access: Support
Logged into the Red Hat Customer Portal as
Log Out
Account:
My Account
Owner:
No match found
Product:
Red Hat OpenStack
Product Version:
6.0
Summary:
Description:
Next
Recommendations
The Production Support Scope of Coverage and Production Support Service Level Agreement
What Is The Red Hat Satellite 6 Managed Design Program (MDP) and will there be a Beta?
Error message from subscription-manager when attempting to auto-attach shows No installed products on system. No need to attach subscriptions.