# Red Hat OpenStack Platform 16.1

## Service Telemetry Framework 1.1

Installing and deploying Service Telemetry Framework 1.1

Last Updated: 2021-01-20

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Installing and deploying Service Telemetry Framework 1.1

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## Legal Notice



## Abstract

This guide contains information about installing the core components and deploying Service Telemetry Framework 1.1.

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# CHAPTER 1. INTRODUCTION TO SERVICE TELEMETRY FRAMEWORK

Service Telemetry Framework (STF) receives monitoring data from Red Hat OpenStack Platform or third-party nodes for storage, dashboarding, and alerting. The monitoring data can be either of two types:

**Metric**

a numeric measurement of an application or system

**Event**

irregular and discrete occurrences that happen in a system

The collection components that are required on the clients are lightweight. The multicast message bus that is shared by all clients and the deployment provides fast and reliable data transport. Other modular components for receiving and storing data are deployed in containers on OCP.

STF provides access to monitoring functions such as alert generation, visualization through dashboards, and single source of truth telemetry analysis to support orchestration.

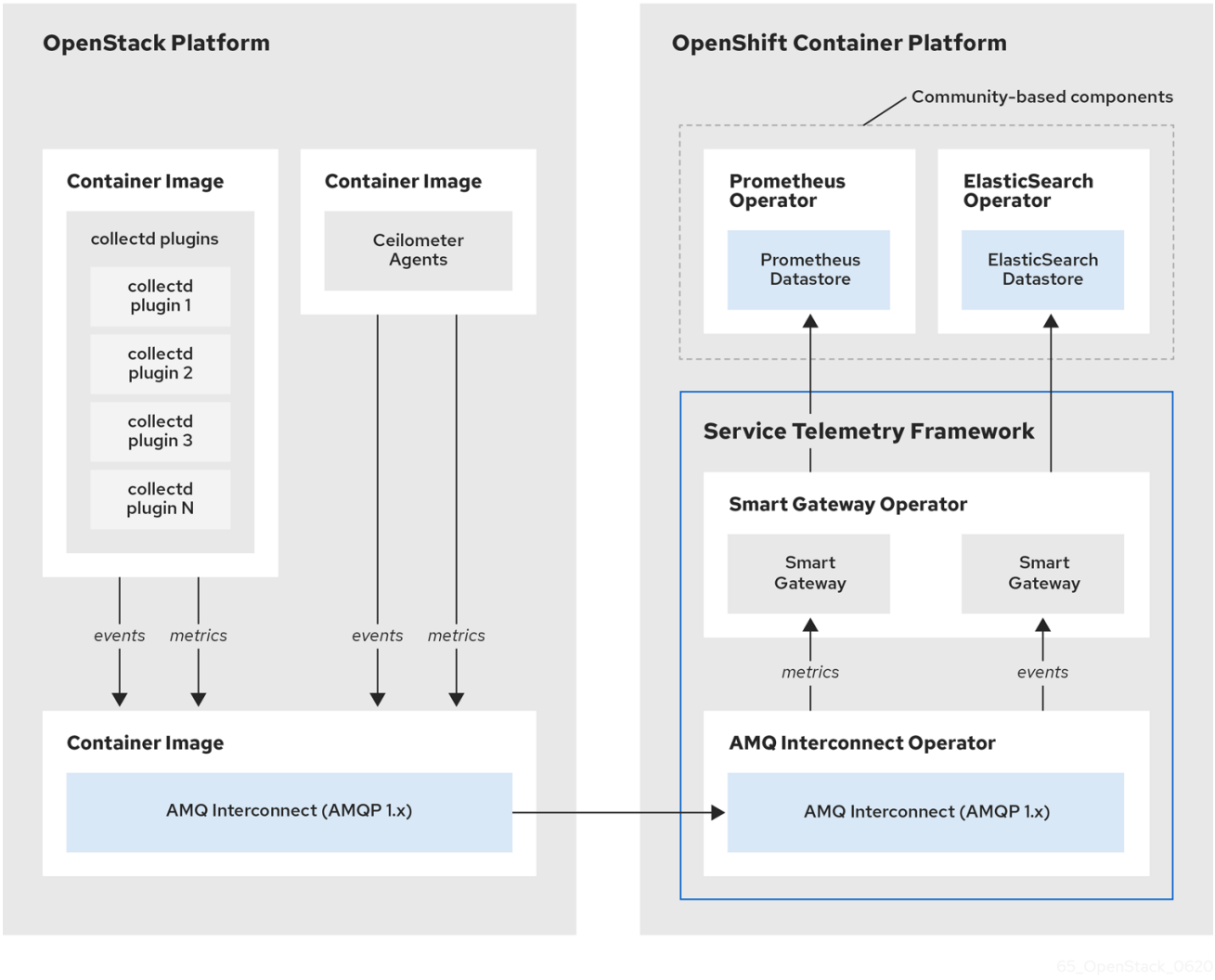
## 1.1. SERVICE TELEMETRY FRAMEWORK ARCHITECTURE

Service Telemetry Framework (STF) uses the components described in Table 1.1, “STF components”:

**Table 1.1. STF components**

| Client | Component | Server (OCP) |
|---|---|---|
| yes | An AMQP 1.x compatible messaging bus to shuttle the metrics to STF for storage in Prometheus | yes |
| no | Smart Gateway to pick metrics and events from the AMQP 1.x bus and to deliver events to ElasticSearch or to provide metrics to Prometheus | yes |
| no | Prometheus as time-series data storage | yes |
| no | ElasticSearch as events data storage | yes |
| yes | collectd to collect infrastructure metrics and events | no |
| yes | Ceilometer to collect Red Hat OpenStack Platform metrics and events | no |

Figure 1.1. Service Telemetry Framework architecture overview




## NOTE

The Service Telemetry Framework data collection components, collectd and Ceilometer, and the transport components, AMQ Interconnect and Smart Gateway, are fully supported. The data storage components, Prometheus and ElasticSearch, including the Operator artifacts, and visualization component Grafana are community-supported, and are not officially supported.

For metrics, on the client side, collectd provides infrastructure metrics (without project data), and Ceilometer provides Red Hat OpenStack Platform platform data based on projects or user workload. Both Ceilometer and collectd deliver data to Prometheus by using the AMQ Interconnect transport, delivering the data through the message bus. On the server side, a Golang application called the Smart Gateway takes the data stream from the bus and exposes it as a local scrape endpoint for Prometheus.

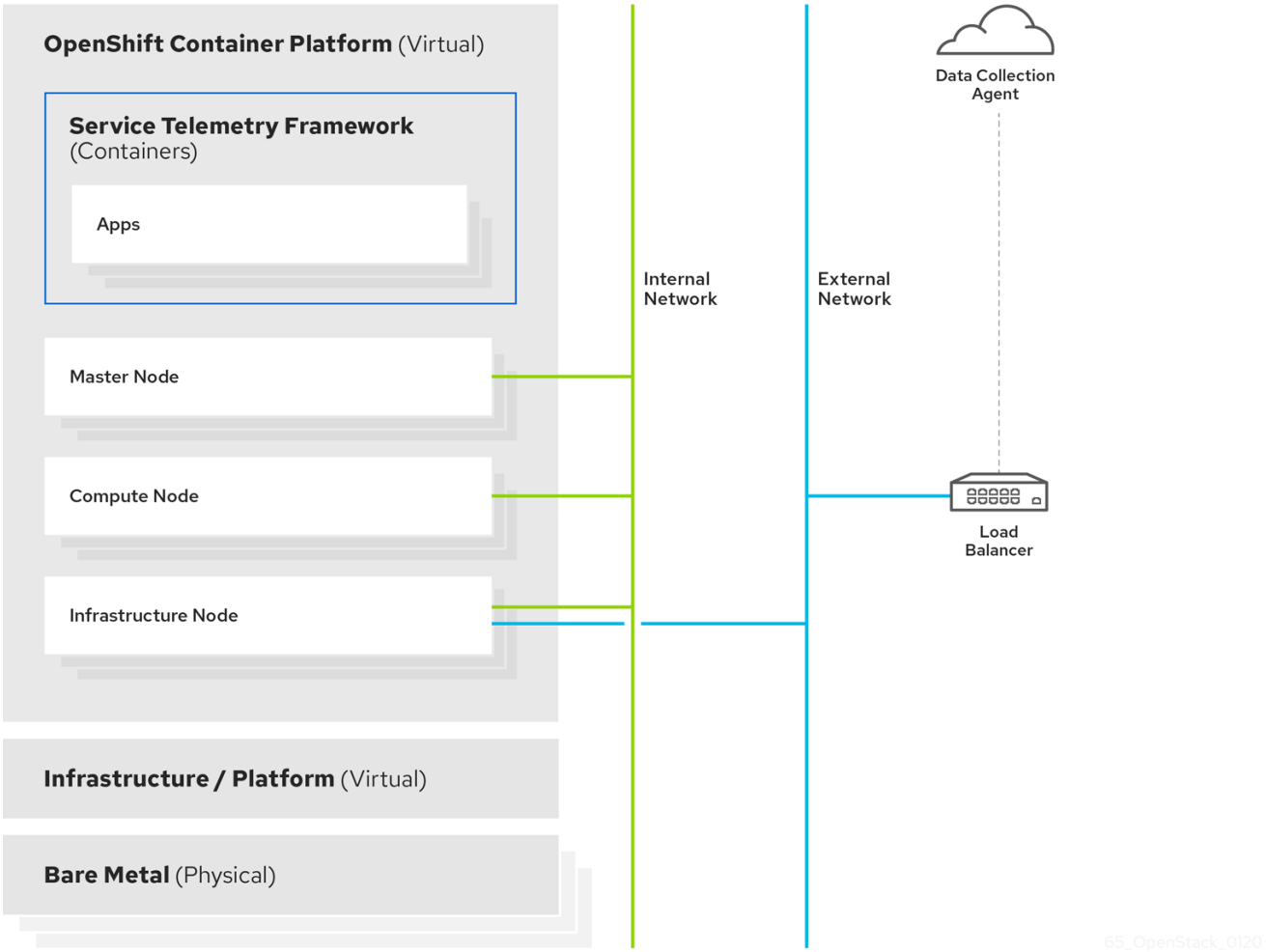
If you plan to collect and store events, collectd or Ceilometer delivers event data to the server side by using the AMQ Interconnect transport, delivering the data through the message bus. Another Smart Gateway writes the data to the ElasticSearch datastore.

Server-side STF monitoring infrastructure consists of the following layers:

- Service Telemetry Framework 1.1 (STF)

- Red Hat OpenShift Container Platform (OCP)
- Infrastructure platform

**Figure 1.2. Server-side STF monitoring infrastructure**




For more information about how to deploy Red Hat OpenShift Container Platform, see the OCP product documentation. You can install OCP on cloud platforms or on bare metal. For more information about STF performance and scaling, see https://access.redhat.com/articles/4907241.

**NOTE**

Do not install OCP on the same infrastructure that you want to monitor.

## 1.2. INSTALLATION SIZE

The size of your Red Hat OpenShift Container Platform installation depends on the following factors:

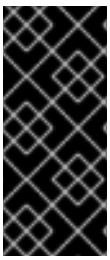
- The number of nodes you want to monitor.
- The number of metrics you want to collect.
- The resolution of metrics.
- The length of time that you want to store the data.

Installation of Service Telemetry Framework (STF) depends on the existing Red Hat OpenShift Container Platform environment. Ensure that you install monitoring for Red Hat OpenStack Platform on a platform separate from your Red Hat OpenStack Platform environment. You can install Red Hat OpenShift Container Platform (OCP) on baremetal or other supported cloud platforms. For more information about installing OCP, see OpenShift Container Platform 4.5 Documentation.

The size of your OCP environment depends on the infrastructure you select. For more information about minimum resources requirements when installing OCP on baremetal, see Minimum resource requirements in the *Installing a cluster on bare metal* guide. For installation requirements of the various public and private cloud platforms which you can install, see the corresponding installation documentation for your cloud platform of choice.

# CHAPTER 2. INSTALLING THE CORE COMPONENTS OF SERVICE TELEMETRY FRAMEWORK

Before you install Service Telemetry Framework (STF), ensure that Red Hat OpenShift Container Platform (OCP) version 4.5 is running and that you understand the core components of the framework. As part of the OCP installation planning process, ensure that the administrator provides persistent storage and enough resources to run the STF components on top of the OCP environment.



**IMPORTANT**

Red Hat OpenShift Container Platform version 4.5 is currently required for a successful installation of STF. To upgrade to later versions of STF, you must migrate installations of STF 1.0 that use an **OperatorSource** to **CatalogSource** . For more information about migrating, see Migrating Service Telemetry Framework v1.0 from OperatorSource to CatalogSource.

## 2.1. THE CORE COMPONENTS OF STF

The following STF core components are managed by Operators:

- Prometheus and AlertManager
- ElasticSearch
- Smart Gateway
- AMQ Interconnect

Each component has a corresponding Operator that you can use to load the various application components and objects.

### Additional resources

For more information about Operators, see the Understanding Operators guide.

## 2.2. PREPARING YOUR OCP ENVIRONMENT FOR STF

As you prepare your OCP environment for STF, you must plan for persistent storage, adequate resources, and event storage:

- Ensure that persistent storage is available in your Red Hat OpenShift Container Platform cluster to permit a production grade deployment. For more information, see Section 2.2.1, “Persistent volumes”.
- Ensure that enough resources are available to run the Operators and the application containers. For more information, see Section 2.2.2, “Resource allocation”.
- To install ElasticSearch, you must use a community catalog source. If you do not want to use a community catalog or if you do not want to store events, see Section 2.3, “Deploying STF to the OCP environment”.
- STF uses ElasticSearch to store events, which requires a larger than normal **vm.max_map_count**. The **vm.max_map_count** value is set by default in Red Hat OpenShift Container Platform. For more information about how to edit the value of

**vm.max_map_count**, see Section 2.2.3, "Node tuning operator".

### 2.2.1. Persistent volumes

STF uses persistent storage in OCP to instantiate the volumes dynamically so that Prometheus and ElasticSearch can store metrics and events. When persistent storage is enabled through the Service Telemetry Operator, the Persistent Volume Claims requested in an STF deployment results in an access mode of RWO (ReadWriteOnce). If your environment contains pre-provisioned persistent volumes, ensure that volumes of RWO are available in the OCP default configured **storageClass**. For more information about recommended configurable storage technology in Red Hat OpenShift Container Platform, see Recommended configurable storage technology .

#### Additional resources

For more information about configuring persistent storage for OCP, see Understanding persistent storage.

#### 2.2.1.1. Using ephemeral storage

**WARNING**

You can use ephemeral storage with STF. However, if you use ephemeral storage, you might experience data loss if a pod is restarted, updated, or rescheduled onto another node. Use ephemeral storage only for development or testing, and not production environments.

#### Additional resources

For more information about enabling ephemeral storage for STF, see Section 4.7.1, "Configuring ephemeral storage".

### 2.2.2. Resource allocation

To enable the scheduling of pods within the OCP infrastructure, you need resources for the components that are running. If you do not allocate enough resources, pods remain in a **Pending** state because they cannot be scheduled.

The amount of resources that you require to run STF depends on your environment and the number of nodes and clouds that you want to monitor.

#### Additional resources

- For recommendations about sizing for metrics collection, see https://access.redhat.com/articles/4907241.
- For information about sizing requirements for ElasticSearch, see https://www.elastic.co/guide/en/cloud-on-k8s/current/k8s-managing-compute-resources.html.

### 2.2.3. Node tuning operator

STF uses ElasticSearch to store events, which requires a larger than normal **vm.max_map_count**. The **vm.max_map_count** value is set by default in Red Hat OpenShift Container Platform.

**TIP**

If your host platform is a typical Red Hat OpenShift Container Platform 4 environment, do not make any adjustments. The default node tuning operator is configured to account for ElasticSearch workloads.

If you want to edit the value of **vm.max_map_count**, you cannot apply node tuning manually using the **sysctl** command because Red Hat OpenShift Container Platform manages nodes directly. To configure values and apply them to the infrastructure, you must use the node tuning operator. For more information, see Using the Node Tuning Operator .

In an OCP deployment, the default node tuning operator specification provides the required profiles for ElasticSearch workloads or pods scheduled on nodes. To view the default cluster node tuning specification, run the following command:

```
$ oc get Tuned/default -o yaml -n openshift-cluster-node-tuning-operator
```

The output of the default specification is documented at Default profiles set on a cluster . You can manage the assignment of profiles in the **recommend** section where profiles are applied to a node when certain conditions are met. When scheduling ElasticSearch to a node in STF, one of the following profiles is applied:

- **openshift-control-plane-es**
- **openshift-node-es**

When scheduling an ElasticSearch pod, there must be a label present that matches **tuned.openshift.io/elasticsearch**. If the label is present, one of the two profiles is assigned to the pod. No action is required by the administrator if you use the recommended Operator for ElasticSearch. If you use a custom-deployed ElasticSearch with STF, ensure that you add the **tuned.openshift.io/elasticsearch** label to all scheduled pods.

**Additional resources**

- For more information about virtual memory usage by ElasticSearch, see https://www.elastic.co/guide/en/elasticsearch/reference/current/vm-max-map-count.html
- For more information about how the profiles are applied to nodes, see Custom tuning specification.

## 2.3. DEPLOYING STF TO THE OCP ENVIRONMENT

You can deploy STF to the OCP environment in one of two ways:

- Deploy STF and store events with ElasticSearch. For more information, see Section 2.3.1, “Deploying STF to the OCP environment with ElasticSearch”.
- Deploy STF without ElasticSearch and disable events support. For more information, see Section 2.3.2, “Deploying STF to the OCP environment without ElasticSearch” .

### 2.3.1. Deploying STF to the OCP environment with ElasticSearch

Complete the following tasks:

1. Section 2.3.3, "Creating a namespace".
2. Section 2.3.4, "Creating an OperatorGroup".
3. Section 2.3.5, "Enabling the OperatorHub.io Community Catalog Source".
4. Section 2.3.6, "Enabling Red Hat STF Catalog Source".
5. Section 2.3.7, "Subscribing to the AMQ Certificate Manager Operator".
6. Section 2.3.8, "Subscribing to the Elastic Cloud on Kubernetes Operator".
7. Section 2.3.9, "Subscribing to the Service Telemetry Operator".
8. Section 2.3.11, "Creating a ServiceTelemetry object in OCP".

### 2.3.2. Deploying STF to the OCP environment without ElasticSearch

Complete the following tasks:

1. Section 2.3.3, "Creating a namespace".
2. Section 2.3.4, "Creating an OperatorGroup".
3. Section 2.3.6, "Enabling Red Hat STF Catalog Source".
4. Section 2.3.7, "Subscribing to the AMQ Certificate Manager Operator".
5. Section 2.3.9, "Subscribing to the Service Telemetry Operator".
6. Section 2.3.11, "Creating a ServiceTelemetry object in OCP".

### 2.3.3. Creating a namespace

Create a namespace to hold the STF components. The **service-telemetry** namespace is used throughout the documentation:

**Procedure**

- Enter the following command:

```
$ oc new-project service-telemetry
```

### 2.3.4. Creating an OperatorGroup

Create an OperatorGroup in the namespace so that you can schedule the Operator pods.

**Procedure**

- Enter the following command:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1
```

```
kind: OperatorGroup
metadata:
  name: service-telemetry-operator-group
  namespace: service-telemetry
spec:
  targetNamespaces:
  - service-telemetry
EOF
```

### Additional resources

For more information, see OperatorGroups.

## 2.3.5. Enabling the OperatorHub.io Community Catalog Source

Before you install ElasticSearch, you must have access to the resources on the OperatorHub.io Community Catalog Source:

### Procedure

- Enter the following command:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: CatalogSource
metadata:
  name: operatorhubio-operators
  namespace: openshift-marketplace
spec:
  sourceType: grpc
  image: quay.io/operator-framework/upstream-community-operators:latest
  displayName: OperatorHub.io Operators
  publisher: OperatorHub.io
EOF
```

## 2.3.6. Enabling Red Hat STF Catalog Source

Before you deploy STF on Red Hat OpenShift Container Platform, you must enable the catalog source.

### Procedure

1. Install a CatalogSource that contains the Service Telemetry Operator and the Smart Gateway Operator:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: CatalogSource
metadata:
  name: redhat-operators-stf
  namespace: openshift-marketplace
spec:
  displayName: Red Hat STF Operators
  image: quay.io/redhat-operators-stf/stf-catalog:latest
  publisher: Red Hat
```

```
  sourceType: grpc
  updateStrategy:
    registryPoll:
      interval: 30m
EOF
```

2. To validate the creation of your CatalogSource, use the **oc get catalogsources** command:

```
$ oc get -nopenshift-marketplace catalogsource redhat-operators-stf

NAME                  DISPLAY               TYPE   PUBLISHER   AGE
redhat-operators-stf   Red Hat STF Operators   grpc   Red Hat     62m
```

3. To validate that the Operators are available from the catalog, use the **oc get packagemanifest** command:

```
$ oc get packagemanifests | grep "Red Hat STF"

smart-gateway-operator                Red Hat STF Operators     63m
service-telemetry-operator            Red Hat STF Operators     63m
```

### 2.3.7. Subscribing to the AMQ Certificate Manager Operator

You must subscribe to the AMQ Certificate Manager Operator before you deploy the other STF components because the AMQ Certificate Manager Operator runs globally-scoped. The AMQ Certificate Manager Operator is not compatible with the dependency management of Operator Lifecycle Manager when you use it with other namespace-scoped operators.

**Procedure**

1. Subscribe to the AMQ Certificate Manager Operator, create the subscription, and validate the AMQ7 Certificate Manager:

NOTE

The AMQ Certificate Manager is installed globally for all namespaces, so the **namespace** value provided is **openshift-operators**. You might not see your **amq7-cert-manager.v1.0.0** ClusterServiceVersion in the **service-telemetry** namespace for a few minutes until the processing executes against the namespace.

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: Subscription
metadata:
  name: amq7-cert-manager
  namespace: openshift-operators
spec:
  channel: alpha
  installPlanApproval: Automatic
  name: amq7-cert-manager
```

```
  source: redhat-operators
  sourceNamespace: openshift-marketplace
EOF
```

2. To validate your **ClusterServiceVersion**, use the **oc get csv** command:

```
$ oc get --namespace openshift-operators csv

NAME                    DISPLAY                                VERSION   REPLACES   PHASE
amq7-cert-manager.v1.0.0   Red Hat Integration - AMQ Certificate Manager   1.0.0
Succeeded
```

Ensure that amq7-cert-manager.v1.0.0 has a phase **Succeeded**.

### 2.3.8. Subscribing to the Elastic Cloud on Kubernetes Operator

Before you install the Service Telemetry Operator and if you plan to store events in ElasticSearch, you must enable the Elastic Cloud Kubernetes Operator.

**Procedure**

1. Apply the following manifest to your OCP environment to enable the Elastic Cloud on Kubernetes Operator:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: Subscription
metadata:
  name: elastic-cloud-eck
  namespace: service-telemetry
spec:
  channel: stable
  installPlanApproval: Automatic
  name: elastic-cloud-eck
  source: operatorhubio-operators
  sourceNamespace: openshift-marketplace
EOF
```

2. To verify that the **ClusterServiceVersion** for ElasticSearch Cloud on Kubernetes **succeeded**, enter the **oc get csv** command:

```
$ oc get csv

NAME                    DISPLAY                          VERSION   REPLACES   PHASE
elastic-cloud-eck.v1.2.1   Elastic Cloud on Kubernetes              1.2.1            Succeeded
```

### 2.3.9. Subscribing to the Service Telemetry Operator

You must subscribe to the Service Telemetry Operator, which manages the STF instances.

**Procedure**

1. To create the Service Telemetry Operator subscription, enter the **oc apply -f** command:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: Subscription
metadata:
  name: service-telemetry-operator
  namespace: service-telemetry
spec:
  channel: stable
  installPlanApproval: Automatic
  name: service-telemetry-operator
  source: redhat-operators-stf
  sourceNamespace: openshift-marketplace
EOF
```

2. To validate the Service Telemetry Operator and the dependent operators, enter the following command:

```
$ oc get csv --namespace service-telemetry
NAME                            DISPLAY                                       VERSION   REPLACES
PHASE
amq7-cert-manager.v1.0.0        Red Hat Integration - AMQ Certificate Manager   1.0.0
Succeeded
amq7-interconnect-operator.v1.2.1   Red Hat Integration - AMQ Interconnect       1.2.1
Succeeded
elastic-cloud-eck.v1.2.1        Elastic Cloud on Kubernetes                     1.2.1
Succeeded
prometheusoperator.0.37.0       Prometheus Operator                             0.37.0
Succeeded
service-telemetry-operator.v1.1.0   Service Telemetry Operator                  1.1.0
Succeeded
smart-gateway-operator.v2.1.0   Smart Gateway Operator                          2.1.0
Succeeded
```

### 2.3.10. Overview of the ServiceTelemetry object

IMPORTANT

Versions of Service Telemetry Operator prior to v1.1.0 used a flat API (**servicetelemetry.infra.watch/v1alpha1**) interface for creating the **ServiceTelemetry** object. In Service Telemetry Operator v1.1.0, there is a dictionary-based API interface (**servicetelemetry.infra.watch/v1beta1**) to allow for better control of STF deployments, including managing multi-cluster deployments natively, and allowing the management of additional storage backends in the future. Ensure that any previously created **ServiceTelemetry** objects are updated to the new interface.

To deploy the Service Telemetry Framework, you must create an instance of **ServiceTelemetry** in OCP. The **ServiceTelemetry** object is made up of the following major configuration parameters:

- **alerting**
- **backends**
- **clouds**

- **graphing**
- **highAvailability**
- **transports**

Each of these top-level configuration parameters provides various controls for a Service Telemetry Framework deployment.

#### 2.3.10.1. backends

Use the **backends** parameter to control which storage backends are available for storage of metrics and events, and to control the enablement of Smart Gateways, as defined by the **clouds** parameter. For more information, see Section 2.3.10.2, "clouds".

Currently, you can use Prometheus as the metrics backend, and ElasticSearch as the events backend.

##### 2.3.10.1.1. Enabling Prometheus as a storage backend for metrics

**Procedure**

- To enable Prometheus as a storage backend for metrics, configure the **ServiceTelemetry** object:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: default
  namespace: service-telemetry
spec:
  backends:
    metrics:
      prometheus:
        enabled: true
```

##### 2.3.10.1.2. Enabling ElasticSearch as a storage backend for events

To enable events support in STF, you must enable the Elastic Cloud for Kubernetes Operator. For more information, see Section 2.3.8, "Subscribing to the Elastic Cloud on Kubernetes Operator" .

By default, ElasticSearch storage of events is disabled. For more information, see Section 2.3.2, "Deploying STF to the OCP environment without ElasticSearch".

#### 2.3.10.2. clouds

Use the **clouds** parameter to control which Smart Gateway objects are deployed, thereby providing the interface for multiple monitored cloud environments to connect to an instance of STF. If a supporting backend is available, then metrics and events Smart Gateways for the default cloud configuration are created. By default, the Service Telemetry Operator creates Smart Gateways for **cloud1**.

You can create a list of cloud objects to control which Smart Gateways are created for each cloud defined. Each cloud is made up of data types and collectors. Data types are **metrics** or **events**. Each data type is made up of a list of collectors and the message bus subscription address. Available collectors are **collectd** and **ceilometer**. Ensure that the subscription address for each of these collectors is unique for every cloud, data type, and collector combination.

The default **cloud1** configuration is represented by the following **ServiceTelemetry** object, providing subscriptions and data storage of metrics and events for both collectd and Ceilometer data collectors for a particular cloud instance:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: stf-default
  namespace: service-telemetry
spec:
  clouds:
    - name: cloud1
      metrics:
        collectors:
          - collectorType: collectd
            subscriptionAddress: collectd/telemetry
          - collectorType: ceilometer
            subscriptionAddress: anycast/ceilometer/metering.sample
      events:
        collectors:
          - collectorType: collectd
            subscriptionAddress: collectd/notify
          - collectorType: ceilometer
            subscriptionAddress: anycast/ceilometer/event.sample
```

Each item of the **clouds** parameter represents a cloud instance. The cloud instances are made up of 3 top-level parameters: **name**, **metrics**, and **events**. The metrics and events parameters represent the corresponding backend for storage of that data type. The **collectors** parameter then specifies a list of objects made up of two parameters, **collectorType** and **subscriptionAddress**, and these represent an instance of the Smart Gateway. The collectorType specifies data collected by either collectd or Ceilometer. The subscriptionAddress parameter provides the AMQ Interconnect address that a Smart Gateway instance should subscribe to.

#### 2.3.10.3. alerting

Use the **alerting** parameter to control creation of an Alertmanager instance and the configuration of the storage backend. By default, **alerting** is enabled. For more information, see Section 4.2, “Alerts”.

#### 2.3.10.4. graphing

Use the **graphing** parameter to control the creation of a Grafana instance. By default, **graphing** is disabled. For more information, see Section 4.5, “Dashboards”.

#### 2.3.10.5. highAvailability

Use The **highAvailability** parameter to control the instantiation of multiple copies of STF components to reduce recovery time of components that fail or are rescheduled. By default, **highAvailability** is disabled. For more information, see Section 4.4, “High availability”.

#### 2.3.10.6. transports

Use the **transports** parameter to control the enablement of the message bus for a STF deployment. The only transport currently supported is AMQ Interconnect. Ensure that it is enabled for proper operation of STF. By default, the qdr transport is enabled.

### 2.3.11. Creating a ServiceTelemetry object in OCP

Create a **ServiceTelemetry** object in OCP to result in the creation of supporting components for a Service Telemetry Framework deployment. For more information, see Section 2.3.10, "Overview of the ServiceTelemetry object".

**Procedure**

1. To create a **ServiceTelemetry** object that results in a default STF deployment, create a **ServiceTelemetry** object with an empty **spec** object:

```
$ oc apply -f - <<EOF
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: default
  namespace: service-telemetry
spec: {}
EOF
```

Creating a default **ServiceTelemetry** object results in a STF deployment with the following defaults:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: default
spec:
  alerting:
    enabled: true
    alertmanager:
      storage:
        strategy: persistent
        persistent:
          storageSelector: {}
          pvcStorageRequest: 20G
  backends:
    metrics:
      prometheus:
        enabled: true
        scrapeInterval: 10s
        storage:
          strategy: persistent
          persistent:
            storageSelector: {}
            pvcStorageRequest: 20G
    events:
      elasticsearch:
        enabled: false
        storage:
          strategy: persistent
          persistent:
            pvcStorageRequest: 20Gi
  graphing:
    enabled: false
```

```
    grafana:
      ingressEnabled: false
      adminPassword: secret
      adminUser: root
      disableSignoutMenu: false
  transports:
    qdr:
      enabled: true
  highAvailability:
    enabled: false
  clouds:
    - name: cloud1
      metrics:
        collectors:
          - collectorType: collectd
            subscriptionAddress: collectd/telemetry
          - collectorType: ceilometer
            subscriptionAddress: anycast/ceilometer/metering.sample
      events:
        collectors:
          - collectorType: collectd
            subscriptionAddress: collectd/notify
          - collectorType: ceilometer
            subscriptionAddress: anycast/ceilometer/event.sample
```

2. Optional: To create a **ServiceTelemetry** object that results in collection and storage of events for the default cloud, enable the ElasticSearch backend:

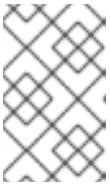
```
$ oc apply -f - <<EOF
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: default
  namespace: service-telemetry
spec:
  backends:
    events:
      elasticsearch:
        enabled: true
EOF
```

3. To view the STF deployment logs in the Service Telemetry Operator, use the **oc logs** command:

```
$ oc logs --selector name=service-telemetry-operator -c ansible
```

```
PLAY RECAP ***
localhost                  : ok=55   changed=0    unreachable=0    failed=0    skipped=16
rescued=0    ignored=0
```

4. **View the pods and the status of each pod to determine that all workloads are operating nominally:**



NOTE

If you set **backends.events.elasticsearch.enabled: true**, the notification Smart Gateways reports **Error** and **CrashLoopBackOff** error messages for a period of time before ElasticSearch starts.

```
$ oc get pods

NAME                                              READY   STATUS    RESTARTS   AGE
alertmanager-default-0                            2/2     Running   0          38s
default-cloud1-ceil-meter-smartgateway-58d8876857-lbf9d   1/1     Running   0
159m
default-cloud1-coll-meter-smartgateway-8645d64f5f-rxfpb   2/2     Running   0
159m
default-interconnect-79d9994b5-xnfvv              1/1     Running   0          167m
elastic-operator-746f86c956-jkvcq                 1/1     Running   0          6h23m
interconnect-operator-5b474bdddc-sztsj            1/1     Running   0          6h19m
prometheus-default-0                              3/3     Running   1          5m39s
prometheus-operator-7dfb478c8b-bfd4j              1/1     Running   0          6h19m
service-telemetry-operator-656fc8ccb6-4w8x4       2/2     Running   0          98m
smart-gateway-operator-7f49676d5d-nqzmp           2/2     Running   0          6h21m
```

## 2.4. REMOVING STF FROM THE OCP ENVIRONMENT

Remove STF from an OCP environment if you no longer require the STF functionality.

Complete the following tasks:

1. Section 2.4.1, “Deleting the namespace”.
2. Section 2.4.2, “Removing the CatalogSource”.

### 2.4.1. Deleting the namespace

To remove the operational resources for STF from OCP, delete the namespace.

Procedure

1. Run the **oc delete** command:

```
$ oc delete project service-telemetry
```

2. Verify that the resources have been deleted from the namespace:

```
$ oc get all
No resources found.
```

### 2.4.2. Removing the CatalogSource

If you do not expect to install Service Telemetry Framework again, delete the CatalogSource. When you remove the CatalogSource, PackageManifests related to STF are removed from the Operator Lifecycle Manager catalog.

Procedure

1. Delete the CatalogSource:

```
$ oc delete --namespace=openshift-marketplace catalogsource redhat-operators-stf
catalogsource.operators.coreos.com "redhat-operators-stf" deleted
```

2. Verify that the STF PackageManifests are removed from the platform. If successful, the following command returns no result:

```
$ oc get packagemanifests | grep "Red Hat STF"
```

3. If you enabled the OperatorHub.io Community Catalog Source during the installation process and you no longer need this catalog source, delete it:

```
$ oc delete --namespace=openshift-marketplace catalogsource operatorhubio-
operators
catalogsource.operators.coreos.com "operatorhubio-operators" deleted
```

### Additional resources

For more information about the OperatorHub.io Community Catalog Source, see Section 2.3, “Deploying STF to the OCP environment”.

# CHAPTER 3. COMPLETING THE SERVICE TELEMETRY FRAMEWORK CONFIGURATION

## 3.1. CONNECTING RED HAT OPENSTACK PLATFORM TO SERVICE TELEMETRY FRAMEWORK

To collect metrics, events, or both, and to send them to the Service Telemetry Framework (STF) storage domain, you must configure the Red Hat OpenStack Platform overcloud to enable data collection and transport.

To deploy data collection and transport to STF on Red Hat OpenStack Platform cloud nodes that employ routed L3 domains, such as distributed compute node (DCN) or spine-leaf, see Section 3.2, “Deploying to non-standard network topologies”.

## 3.2. DEPLOYING TO NON-STANDARD NETWORK TOPOLOGIES

If your nodes are on a separate network from the default **InternalApi** network, you must make configuration adjustments so that AMQ Interconnect can transport data to the Service Telemetry Framework (STF) server instance. This scenario is typical in a spine-leaf or a DCN topology. For more information about DCN configuration, see the Spine Leaf Networking guide.

If you use STF with Red Hat OpenStack Platform 16.1 and plan to monitor your Ceph, Block, or Object storage nodes, you must make configuration changes that are similar to the configuration changes that you make to the spine-leaf and DCN network configuration. To monitor Ceph nodes, use the **CephStorageExtraConfig** parameter to define which network interface to load into the AMQ Interconnect and collectd configuration files.

```
CephStorageExtraConfig:
  tripleo::profile::base::metrics::collectd::amqp_host: "%{hiera('storage')}"
  tripleo::profile::base::metrics::qdr::listener_addr: "%{hiera('storage')}"
  tripleo::profile::base::ceilometer::agent::notification::notifier_host_addr: "%
{hiera('storage')}"
```

Similarly, you must specify **BlockStorageExtraConfig** and **ObjectStorageExtraConfig** parameters if your environment uses Block and Object storage roles.

The deployment of a spine-leaf topology involves creating roles and networks, then assigning those networks to the available roles. When you configure data collection and transport for STF for an Red Hat OpenStack Platform deployment, the default network for roles is **InternalApi**. For Ceph, Block and Object storage roles, the default network is **Storage**. Because a spine-leaf configuration can result in different networks being assigned to different Leaf groupings and those names are typically unique, additional configuration is required in the **parameter_defaults** section of the Red Hat OpenStack Platform environment files.

Procedure

1. Document which networks are available for each of the Leaf roles. For examples of network name definitions, see Creating a network data filein the*Spine Leaf Networking* guide. For more information about the creation of the Leaf groupings (roles) and assignment of the networks to those groupings, see Creating a roles data filein the*Spine Leaf Networking* guide.

2. Add the following configuration example to the **ExtraConfig** section for each of the leaf roles. In this example, **internal_api_subnet** is the value defined in the **name_lower** parameter of your network definition (with **_subnet** appended to the name for Leaf 0) , and is the network to which the **ComputeLeaf0** leaf role is connected. In this case, the network identification of 0 corresponds to the Compute role for leaf 0, and represents a value that is different from the default internal API network name.
For the **ComputeLeaf0** leaf role, specify extra configuration to perform a hiera lookup to determine which network interface for a particular network to assign to the collectd AMQP host parameter. Perform the same configuration for the AMQ Interconnect listener address parameter.

```
ComputeLeaf0ExtraConfig:
› tripleo::profile::base::metrics::collectd::amqp_host: "%
{hiera('internal_api_subnet')}"
› tripleo::profile::base::metrics::qdr::listener_addr: "%{hiera('internal_api_subnet')}"
```

Additional leaf roles typically replace **_subnet** with **_leafN** where **N** represents a unique indentifier for the leaf.

```
ComputeLeaf1ExtraConfig:
› tripleo::profile::base::metrics::collectd::amqp_host: "%{hiera('internal_api_leaf1')}"
› tripleo::profile::base::metrics::qdr::listener_addr: "%{hiera('internal_api_leaf1')}"
```

This example configuration is on a CephStorage leaf role:

```
CephStorageLeaf0ExtraConfig:
› tripleo::profile::base::metrics::collectd::amqp_host: "%{hiera('storage_subnet')}"
› tripleo::profile::base::metrics::qdr::listener_addr: "%{hiera('storage_subnet')}"
```

## 3.3. CONFIGURING RED HAT OPENSTACK PLATFORM OVERCLOUD FOR SERVICE TELEMETRY FRAMEWORK

To configure the Red Hat OpenStack Platform overcloud, you must configure the data collection applications and the data transport to STF, and deploy the overcloud.

To configure the Red Hat OpenStack Platform overcloud, complete the following tasks:

1. Section 3.3.1, “Retrieving the AMQ Interconnect route address”
2. Section 3.3.2, “Configuring the STF connection for the overcloud”
3. Section 3.3.3, “Validating client-side installation”

Additional resources

- To collect data through AMQ Interconnect, see The amqp1 plug-in in the *Monitoring Tools Configuration* guide.

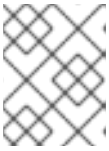
### 3.3.1. Retrieving the AMQ Interconnect route address

When you configure the Red Hat OpenStack Platform overcloud for STF, you must provide the AMQ Interconnect route address in the STF connection file.

Procedure

1. Log in to your Red Hat OpenShift Container Platform (OCP) environment.
2. In the **service-telemetry** project, retrieve the AMQ Interconnect route address:

```
$ oc get routes -ogo-template='{{ range .items }}{{printf "%s\n" .spec.host }}{{ end }}' |
grep "\-5671"
default-interconnect-5671-service-telemetry.apps.infra.watch
```



NOTE

If your STF installation differs from the documentation, ensure that you retrieve the correct AMQ Interconnect route address.

### 3.3.2. Configuring the STF connection for the overcloud

To configure the STF connection, you must create a file that contains the connection configuration of the AMQ Interconnect for the overcloud to the STF deployment. Enable the collection of events and storage of the events in STF and deploy the overcloud.

Procedure

1. Log in to the Red Hat OpenStack Platform undercloud as the **stack** user.
2. Create a configuration file called **stf-connectors.yaml** in the/**home**/**stack** directory.

IMPORTANT

The Service Telemetry Operator simplifies the deployment of all data ingestion and data storage components for single cloud deployments. To share the data storage domain with multiple clouds, see Section 4.6, “Multiple cloud configuration”.

Additionally, setting **EventPipelinePublishers** and **MetricPipelinePublishers** to empty lists results in no metric or event data passing to Red Hat OpenStack Platform legacy telemetry components, such as Gnocchi or Panko. If you need to send data to additional pipelines, the Ceilometer polling interval of 5 seconds as specified in **ExtraConfig** might overwhelm the legacy components. If you configure a longer polling interval, you must also modify STF to avoid stale metrics, resulting in what appears to be missing data in Prometheus.

If an adjustment needs to be made to the polling interval, then modify the ServiceTelemetry object **backends.metrics.prometheus.scrapeInterval** parameter from the default value of **10s** to double the polling interval of the data collectors. For example, if **CollectdAmqpInterval** and **ceilometer::agent::polling::polling_interval** are adjusted to **30** then set the **backends.metrics.prometheus.scrapeInterval** to a value of **60s**.

3. In the **stf-connectors.yaml** file, configure the **MetricsQdrConnectors** address to connect the AMQ Interconnect on the overcloud to the STF deployment.
   - Add the **CeilometerQdrPublishMetrics: true** parameter to enable collection and transport of Ceilometer metrics to STF.

- Add the **CeilometerQdrPublishEvents: true** parameter to enable collection and transport of Ceilometer events to STF.
- Add the **EventPiplinePublishers: []** and **MetricPipelinePublishers: []** to avoid writing data to Gnocchi and Panko.
- Add the **ManagePolling: true** and **ManagePipeline: true** parameters to allow full control of Ceilometer polling and pipeline configuration.
- Add the **ExtraConfig** parameter **ceilometer::agent::polling::polling_interval** to set the polling interval of Ceilometer to be compatible with the default STF scrape interval.
- Replace the **host** parameter with the value of **HOST/PORT** that you retrieved in Section 3.3.1, "Retrieving the AMQ Interconnect route address".

```
parameter_defaults:
  EventPipelinePublishers: []
  MetricPipelinePublishers: []
  CeilometerQdrPublishEvents: true
  CeilometerQdrPublishMetrics: true
  MetricsQdrConnectors:
  - host: default-interconnect-5671-service-telemetry.apps.infra.watch
    port: 443
    role: edge
    sslProfile: sslProfile
    verifyHostname: false
  ExtraConfig:
    ceilometer::agent::polling::polling_interval: 5
```

4. Add the following files to your Red Hat OpenStack Platform director deployment to setup collectd and AMQ Interconnect:
   - the **stf-connectors.yaml** environment file
   - the **enable-stf.yaml** file that ensures that the environment is being used during the overcloud deployment
   - the **ceilometer-write-qdr.yaml** file that ensures that Ceilometer telemetry is sent to STF

```
openstack overcloud deploy <other arguments>
  --templates /usr/share/openstack-tripleo-heat-templates \
  --environment-file <...other-environment-files...> \
  --environment-file /usr/share/openstack-tripleo-heat-
templates/environments/metrics/ceilometer-write-qdr.yaml \
  --environment-file /usr/share/openstack-tripleo-heat-
templates/environments/enable-stf.yaml \
  --environment-file /home/stack/stf-connectors.yaml
```

5. Deploy the Red Hat OpenStack Platform overcloud.

### 3.3.3. Validating client-side installation

To validate data collection from the STF storage domain, query the data sources for delivered data. To validate individual nodes in the Red Hat OpenStack Platform deployment, connect to the console using SSH.

TIP

Some telemetry data is only available when Red Hat OpenStack Platform has active workloads.

Procedure

1. Log in to an overcloud node, for example, controller-0.
2. Ensure that **metrics_qdr** container is running on the node:

```
$ sudo podman container inspect --format '{{.State.Status}}' metrics_qdr

running
```

3. Return the internal network address on which AMQ Interconnect is running, for example, **172.17.1.44** listening on port**5666**:

```
$ sudo podman exec -it metrics_qdr cat /etc/qpid-dispatch/qdrouterd.conf

listener {
    host: 172.17.1.44
    port: 5666
    authenticatePeer: no
    saslMechanisms: ANONYMOUS
}
```

4. Return a list of connections to the local AMQ Interconnect:

```
$ sudo podman exec -it metrics_qdr qdstat --bus=172.17.1.44:5666 --connections

Connections
  id   host                                                    container
role    dir  security                        authentication  tenant

========================================================================
========================================================================
========================================================================
============================================================
  1    default-interconnect-5671-service-telemetry.apps.infra.watch:443      default-
interconnect-7458fd4d69-bgzfb                                              edge    out
TLSv1.2(DHE-RSA-AES256-GCM-SHA384)  anonymous-user
  12   172.17.1.44:60290
openstack.org/om/container/controller-0/ceilometer-agent-
notification/25/5c02cee550f143ec9ea030db5cccba14  normal  in   no-security
no-auth
  16   172.17.1.44:36408                                          metrics
normal  in   no-security                  anonymous-user
  899  172.17.1.44:39500                                          10a2e99d-1b8a-4329-b48c-
4335e5f75c84                                                       normal  in   no-security
no-auth
```

There are four connections:

- Outbound connection to STF

- Inbound connection from ceilometer
- Inbound connection from collectd
- Inbound connection from our **qdstat** client
  The outbound STF connection is provided to the **MetricsQdrConnectors** host parameter and is the route for the STF storage domain. The other hosts are internal network addresses of the client connections to this AMQ Interconnect.

5. To ensure that messages are being delivered, list the links, and view the **_edge** address in the **deliv** column for delivery of messages:

```
$ sudo podman exec -it metrics_qdr qdstat --bus=172.17.1.44:5666 --links
Router Links
  type      dir  conn id  id    peer  class   addr                 phs  cap  pri  undel  unsett  deliv
presett  psdrop  acc  rej  rel     mod  delay  rate

================================================================================
================================================================================
=====
  endpoint  out  1       5         local   _edge                  250  0    0    0      2979926  0
0       0    0    2979926  0    0      0
  endpoint  in   1       6                                        250  0    0    0      0        0        0      0
0    0       0    0      0
  endpoint  in   1       7                                        250  0    0    0      0        0        0      0
0    0       0    0      0
  endpoint  out  1       8                                        250  0    0    0      0        0        0      0
0    0       0    0      0
  endpoint  in   1       9                                        250  0    0    0      0        0        0      0
0    0       0    0      0
  endpoint  out  1       10                                       250  0    0    0      911      911      0
0    0    0       0    911    0
  endpoint  in   1       11                                       250  0    0    0      0        911      0      0
0    0       0    0      0
  endpoint  out  12      32        local   temp.lSY6Mcicol4J2Kp   250  0    0    0      0
0       0       0    0    0      0    0      0
  endpoint  in   16      41                                       250  0    0    0      2979924  0        0
0    0    2979924  0    0      0
  endpoint  in   912     1834      mobile  $management            0    250  0    0      0        1
0       0       1    0    0      0    0      0
  endpoint  out  912     1835      local   temp.9Ok2resl9tmt+CT   250  0    0    0      0
0       0       0    0    0      0    0      0
```

6. To list the addresses from Red Hat OpenStack Platform nodes to STF, connect to OCP to get the AMQ Interconnect pod name and list the connections. List the available AMQ Interconnect pods:

```
$ oc get pods -l application=default-interconnect

NAME                                  READY   STATUS    RESTARTS   AGE
default-interconnect-7458fd4d69-bgzfb   1/1     Running   0          6d21h
```

7. Connect to the pod and run the **qdstat --connections** command to list the known connections:

```
$ oc exec -it default-interconnect-7458fd4d69-bgzfb -- qdstat --connections

2020-04-21 18:25:47.243852 UTC
default-interconnect-7458fd4d69-bgzfb

Connections
  id  host            container                                          role    dir  security
authentication  tenant  last dlv      uptime

========================================================================
========================================================================
=========================================
  5   10.129.0.110:48498  bridge-3f5                                     edge    in   no-security
anonymous-user          000:00:00:02  000:17:36:29
  6   10.129.0.111:43254  rcv[default-cloud1-ceil-meter-smartgateway-58f885c76d-
xmxwn]  edge    in   no-security                  anonymous-user          000:00:00:02
000:17:36:20
  7   10.130.0.109:50518  rcv[default-cloud1-coll-event-smartgateway-58fbbd4485-rl9bd]
normal  in   no-security                  anonymous-user          -             000:17:36:11
  8   10.130.0.110:33802  rcv[default-cloud1-ceil-event-smartgateway-6cfb65478c-g5q82]
normal  in   no-security                  anonymous-user          000:01:26:18
000:17:36:05
  22  10.128.0.1:51948   Router.ceph-0.redhat.local                     edge    in
TLSv1/SSLv3(DHE-RSA-AES256-GCM-SHA384)  anonymous-user          000:00:00:03
000:22:08:43
  23  10.128.0.1:51950   Router.compute-0.redhat.local                    edge    in
TLSv1/SSLv3(DHE-RSA-AES256-GCM-SHA384)  anonymous-user          000:00:00:03
000:22:08:43
  24  10.128.0.1:52082   Router.controller-0.redhat.local                 edge    in
TLSv1/SSLv3(DHE-RSA-AES256-GCM-SHA384)  anonymous-user          000:00:00:00
000:22:08:34
  27  127.0.0.1:42202    c2f541c1-4c97-4b37-a189-a396c08fb079                  normal
in   no-security                  no-auth                 000:00:00:00  000:00:00:00
```

In this example, there are three **edge** connections from the Red Hat OpenStack Platform nodes with connection **id** 22, 23, and 24.

8. To view the number of messages delivered by the network, use each address with the **oc exec** command:

```
$ oc exec -it default-interconnect-7458fd4d69-bgzfb -- qdstat --address

2020-04-21 18:20:10.293258 UTC
default-interconnect-7458fd4d69-bgzfb

Router Addresses
  class  addr                    phs  distrib    pri  local  remote  in          out         thru
fallback

========================================================================
========================================
  mobile  anycast/ceilometer/event.sample    0    balanced   -    1      0       970         970
0     0
  mobile  anycast/ceilometer/metering.sample  0    balanced   -    1      0       2,344,833
2,344,833    0     0
```

```
mobile  collectd/notify                 0    multicast  -    1     0      70          70          0     0
mobile  collectd/telemetry              0    multicast  -    1     0      216,128,890
216,128,890  0     0
```

# CHAPTER 4. ADVANCED FEATURES

The following optional features can provide additional functionality to the Service Telemetry Framework (STF):



## 4.1. CUSTOMIZING THE DEPLOYMENT

The Service Telemetry Operator watches for a **ServiceTelemetry** manifest to load into Red Hat OpenShift Container Platform (OCP). The Operator then creates other objects in memory, which results in the dependent Operators creating the workloads they are responsible for managing.

WARNING

When you override the manifest, you must provide the entire manifest contents, including object names or namespaces. There is no dynamic parameter substitution when you override a manifest.

Use manifest overrides only as a last resort short circuit.

To override a manifest successfully with Service Telemetry Framework (STF), deploy a default environment using the core options only. For more information about the core options, see Section 2.3.11, “Creating a ServiceTelemetry object in OCP”. When you deploy STF, use the **oc get** command to retrieve the default deployed manifest. When you use a manifest that was originally generated by Service Telemetry Operator, the manifest is compatible with the other objects that are managed by the Operators.

For example, when the **backends.metrics.prometheus.enabled: true** parameter is configured in the **ServiceTelemetry** manifest, the Service Telemetry Operator requests components for metrics retrieval and storage using the default manifests. In some cases, you might want to override the default manifest. For more information, see Section 4.1.1, “Manifest override parameters”.

### 4.1.1. Manifest override parameters

This table describes the available parameters that you can use to override a manifest, along with the corresponding retrieval commands.

Table 4.1. Manifest override parameters

| Override parameter | Description | Retrieval command |
|---|---|---|
| **alertmanagerManifest** | Override the **Alertmanager** object creation. The Prometheus Operator watches for **Alertmanager** objects. | **oc get alertmanager default -oyaml** |
| **alertmanagerConfigManifest** | Override the **Secret** that contains the Alertmanager configuration. The Prometheus Operator uses a secret named **alertmanager-{{ alertmanager-name }}**, for example, **default**, to provide the **alertmanager.yaml** configuration to Alertmanager. | **oc get secret alertmanager-default -oyaml** |
| **elasticsearchManifest** | Override the **ElasticSearch** object creation. The Elastic Cloud on Kuberneters Operator watches for **ElasticSearch** objects. | **oc get elasticsearch elasticsearch -oyaml** |
| **interconnectManifest** | Override the **Interconnect** object creation. The AMQ Interconnect Operator watches for **Interconnect** objects. | **oc get interconnect default-interconnect -oyaml** |
| **prometheusManifest** | Override the **Prometheus** object creation. The Prometheus Operator watches for **Prometheus** objects. | **oc get prometheus default -oyaml** |
| **servicemonitorManifest** | Override the **ServiceMonitor** object creation. The Prometheus Operator watches for **ServiceMonitor** objects. | **oc get servicemonitor default -oyaml** |

### 4.1.2. Overriding a managed manifest

Edit the **ServiceTelemetry** object and provide a parameter and manifest. For a list of available manifest override parameters, see Section 4.1, "Customizing the deployment". The default **ServiceTelemetry** object is **default**. Use **oc get servicetelemetry** to list the available STF deployments.

TIP

The **oc edit** command loads the default system editor. To override the default editor, pass or set the environment variable **EDITOR** to the preferred editor. For example,**EDITOR=nano oc edit servicetelemetry default**.

Procedure

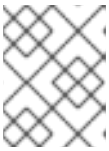
1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Load the **ServiceTelemetry** object into an editor:

```
$ oc edit servicetelemetry default
```

4. To modify the **ServiceTelemetry** object, provide a manifest override parameter and the contents of the manifest to write to OCP instead of the defaults provided by STF.



NOTE

The trailing pipe (|) after entering the manifest override parameter indicates that the value provided is multi-line.

```
$ oc edit stf default

apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  ...
spec:
  alertmanagerConfigManifest: | 1
    apiVersion: v1
    kind: Secret
    metadata:
      name: 'alertmanager-default'
      namespace: 'service-telemetry'
    type: Opaque
    stringData:
      alertmanager.yaml: |-
        global:
          resolve_timeout: 10m
        route:
          group_by: ['job']
          group_wait: 30s
          group_interval: 5m
          repeat_interval: 12h
          receiver: 'null'
        receivers:
        - name: 'null' 2
status:
  ...
```

1. Manifest override parameter is defined in the **spec** of the **ServiceTelemetry** object.
2. End of the manifest override content.

5. Save and close.

## 4.2. ALERTS

You create alert rules in Prometheus and alert routes in Alertmanager. Alert rules in Prometheus servers send alerts to an Alertmanager, which manages the alerts. Alertmanager can silence, inhibit, or aggregate alerts, and send notifications using email, on-call notification systems, or chat platforms.

To create an alert, complete the following tasks:

1. Create an alert rule in Prometheus. For more information, see Section 4.2.1, "Creating an alert rule in Prometheus".
2. Create an alert route in Alertmanager. For more information, see Section 4.2.3, "Creating an alert route in Alertmanager".

### Additional resources

For more information about alerts or notifications with Prometheus and Alertmanager, see https://prometheus.io/docs/alerting/overview/

To view an example set of alerts that you can use with Service Telemetry Framework (STF), see https://github.com/infrawatch/service-telemetry-operator/tree/master/deploy/alerts

### 4.2.1. Creating an alert rule in Prometheus

Prometheus evaluates alert rules to trigger notifications. If the rule condition returns an empty result set, the condition is false. Otherwise, the rule is true and it triggers an alert.

Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Create a **PrometheusRule** object that contains the alert rule. The Prometheus Operator loads the rule into Prometheus:

```
$ oc apply -f - <<EOF
apiVersion: monitoring.coreos.com/v1
kind: PrometheusRule
metadata:
  creationTimestamp: null
  labels:
    prometheus: default
    role: alert-rules
  name: prometheus-alarm-rules
```

```
  namespace: service-telemetry
spec:
  groups:
    - name: ./openstack.rules
      rules:
        - alert: Metric Listener down
          expr: collectd_qpid_router_status < 1 # To change the rule, edit the value of the
expr parameter.
EOF
```

4. To verify that the rules have been loaded into Prometheus by the Operator, create a pod with access to **curl**:

```
$ oc run curl --generator=run-pod/v1 --image=radial/busyboxplus:curl -i --tty
```

5. Run **curl** to access the**prometheus-operated** service to return the rules loaded into memory:

```
[ root@curl:/ ]$ curl prometheus-operated:9090/api/v1/rules
{"status":"success","data":{"groups":
[{"name":"./openstack.rules","file":"/etc/prometheus/rules/prometheus-default-
rulefiles-0/service-telemetry-prometheus-alarm-rules.yaml","rules":[{"name":"Metric
Listener down","query":"collectd_qpid_router_status \u003c 1","duration":0,"labels":
{},"annotations":{},"alerts":[],"health":"ok","type":"alerting"}],"interval":30}]}}
```

6. To verify that the output shows the rules loaded into the **PrometheusRule** object, for example the output contains the defined **./openstack.rules**, exit from the pod:

```
[ root@curl:/ ]$ exit
```

7. Clean up the environment by deleting the **curl** pod:

```
$ oc delete pod curl

pod "curl" deleted
```

### Additional resources

For more information on alerting, see https://github.com/coreos/prometheus-operator/blob/master/Documentation/user-guides/alerting.md

## 4.2.2. Configuring custom alerts

You can add custom alerts to the **PrometheusRule** object that you created inSection 4.2.1, “Creating an alert rule in Prometheus”.

### Procedure

1. Use the **oc edit** command:

```
$ oc edit prometheusrules prometheus-alarm-rules
```

2. Edit the PrometheusRules manifest.

3. Save and close.

Additional resources

- For more information about configuring alerting rules, see https://prometheus.io/docs/prometheus/latest/configuration/alerting_rules/.
- For more information about PrometheusRules objects, see https://github.com/coreos/prometheus-operator/blob/master/Documentation/user-guides/alerting.md

### 4.2.3. Creating an alert route in Alertmanager

Use Alertmanager to deliver alerts to an external system, such as email, IRC, or other notification channel. The Prometheus Operator manages the Alertmanager configuration as an Red Hat OpenShift Container Platform (OCP) secret. STF by default deploys a basic configuration that results in no receivers:

```
alertmanager.yaml: |-
  global:
    resolve_timeout: 5m
  route:
    group_by: ['job']
    group_wait: 30s
    group_interval: 5m
    repeat_interval: 12h
    receiver: 'null'
  receivers:
  - name: 'null'
```

To deploy a custom Alertmanager route with STF, an **alertmanagerConfigManifest** parameter must be passed to the Service Telemetry Operator that results in an updated secret, managed by the Prometheus Operator. For more information, see Section 4.1.2, “Overriding a managed manifest”.

Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Edit the **ServiceTelemetry** object for your STF deployment

```
$ oc edit stf default
```

4. Add a new parameter, **alertmanagerConfigManifest**, and the **Secret** object contents to define the **alertmanager.yaml** configuration for Alertmanager:

NOTE

This step loads the default template that is already managed by Service Telemetry Operator. To verify that the changes are populating correctly, change a value, return the **alertmanager-default** secret, and verify that the new value is loaded into memory. For example, change the value **global.resolve_timeout** from **5m** to **10m**.

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: default
  namespace: service-telemetry
spec:
  backends:
    metrics:
      prometheus:
        enabled: true
  alertmanagerConfigManifest: |
    apiVersion: v1
    kind: Secret
    metadata:
      name: 'alertmanager-default'
      namespace: 'service-telemetry'
    type: Opaque
    stringData:
      alertmanager.yaml: |-
        global:
          resolve_timeout: 10m
        route:
          group_by: ['job']
          group_wait: 30s
          group_interval: 5m
          repeat_interval: 12h
          receiver: 'null'
        receivers:
        - name: 'null'
```

5. Verify that the configuration was applied to the secret:

```
$ oc get secret alertmanager-default -o go-template='{{index .data
"alertmanager.yaml" | base64decode }}'

global:
  resolve_timeout: 10m
route:
  group_by: ['job']
  group_wait: 30s
  group_interval: 5m
  repeat_interval: 12h
  receiver: 'null'
receivers:
- name: 'null'
```

6. To verify the configuration has been loaded into Alertmanager, create a pod with access to **curl**:

```
$ oc run curl --generator=run-pod/v1 --image=radial/busyboxplus:curl -i --tty
```

7. Run **curl** against the **alertmanager-operated** service to retrieve the status and **configYAML** contents and review the supplied configuration matches the configuration loaded into Alertmanager:

```
[ root@curl:/ ]$ curl alertmanager-operated:9093/api/v1/status

{"status":"success","data":{"configYAML":"global:\n  resolve_timeout: 10m\n
http_config: {}\n  smtp_hello: localhost\n  smtp_require_tls: true\n  pagerduty_url:
https://events.pagerduty.com/v2/enqueue\n  hipchat_api_url:
https://api.hipchat.com/\n  opsgenie_api_url: https://api.opsgenie.com/\n
wechat_api_url: https://qyapi.weixin.qq.com/cgi-bin/\n  victorops_api_url:
https://alert.victorops.com/integrations/generic/20131114/alert/\nroute:\n  receiver:
\"null\"\n  group_by:\n  - job\n  group_wait: 30s\n  group_interval: 5m\n
repeat_interval: 12h\nreceivers:\n- name: \"null\"\ntemplates: []\n",...}}
```

8. Verify that the **configYAML** field contains the expected changes. Exit from the pod:

```
[ root@curl:/ ]$ exit
```

9. To clean up the environment, delete the **curl** pod:

```
$ oc delete pod curl

pod "curl" deleted
```

Additional resources

- For more information about the Red Hat OpenShift Container Platform secret and the Prometheus operator, see Alerting.

## 4.3. CONFIGURING SNMP TRAPS

You can integrate Service Telemetry Framework (STF) with an existing infrastructure monitoring platform that receives notifications via SNMP traps. To enable SNMP traps, modify the **ServiceTelemetry** object and configure the **snmpTraps** parameters.

For more information about configuring alerts, see Section 4.2, “Alerts”.

Prerequisites

- Know the IP address or hostname of the SNMP trap receiver where you want to send the alerts

Procedure

1. To enable SNMP traps, modify the **ServiceTelemetry** object:

```
$ oc edit stf default
```

2. Set the **alerting.alertmanager.receivers.snmpTraps** parameters:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
...
spec:
  ...
  alerting:
    alertmanager:
      receivers:
        snmpTraps:
          enabled: true
          target: 10.10.10.10
```

3. Ensure that you set the value of **target** to the IP address or hostname of the SNMP trap receiver.

## 4.4. HIGH AVAILABILITY

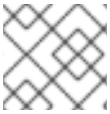
High availability is the ability of Service Telemetry Framework (STF) to rapidly recover from failures in its component services. Although Red Hat OpenShift Container Platform (OCP) restarts a failed pod if nodes are available to schedule the workload, this recovery process might take more than one minute, during which time events and metrics are lost. A high availability configuration includes multiple copies of STF components, reducing recovery time to approximately 2 seconds. To protect against failure of an OCP node, deploy STF to an OCP cluster with three or more nodes.

NOTE

STF is not yet a fully fault tolerant system. Delivery of metrics and events during the recovery period is not guaranteed.

Enabling high availability has the following effects:

- Three ElasticSearch pods run instead of the default one.
- The following components run two pods instead of the default one:
  - AMQ Interconnect
  - Alertmanager
  - Prometheus
  - Events Smart Gateway
  - Collectd Metrics Smart Gateway
- Recovery time from a lost pod in any of these services reduces to approximately 2 seconds.



NOTE

The Ceilometer Metrics Smart Gateway is not yet HA

### 4.4.1. Configuring high availability

To configure STF for high availability, add **highAvailability.enabled: true** to the ServiceTelemetry object in OCP. You can this set this parameter at installation time or, if you already deployed STF, complete the following steps:

Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Use the oc command to edit the ServiceTelemetry object:

```
$ oc edit stf default
```

4. Add **highAvailability.enabled: true** to the **spec** section:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
...
spec:
  ...
  highAvailability:
    enabled: true
```

5. Save your changes and close the object.

## 4.5. DASHBOARDS

Use third-party application Grafana to visualize system-level metrics gathered by collectd for each individual host node. For more information about configuring collectd, see Section 3.3, "Configuring Red Hat OpenStack Platform overcloud for Service Telemetry Framework".

### 4.5.1. Setting up Grafana to host the dashboard

Grafana is not included in the default Service Telemetry Framework (STF) deployment so you must deploy the Grafana Operator from OperatorHub.io. Using the Service Telemetry Operator to deploy Grafana results in a Grafana instance and the configuration of the default data sources for the local STF deployment.

#### Prerequisites

Enable OperatorHub.io catalog source for the Grafana Operator. For more information, see Section 2.3.5, "Enabling the OperatorHub.io Community Catalog Source".

Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Deploy the Grafana operator:

```
$ oc apply -f - <<EOF
apiVersion: operators.coreos.com/v1alpha1
kind: Subscription
metadata:
  name: grafana-operator
  namespace: service-telemetry
spec:
  channel: alpha
  installPlanApproval: Automatic
  name: grafana-operator
  source: operatorhubio-operators
  sourceNamespace: openshift-marketplace
EOF
```

4. To verify that the operator launched successfully, run the **oc get csv** command. If the value of the PHASE column is **Succeeded**, the operator launched successfully:

```
$ oc get csv
```

```
NAME                          DISPLAY                          VERSION   REPLACES
PHASE
grafana-operator.v3.2.0       Grafana Operator                 3.2.0
Succeeded
...
```

5. To launch a Grafana instance, create or modify the **ServiceTelemetry** object. Set **graphing.enabled** to **true**.

```
$ oc edit stf default
```

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
...
spec:
  ...
  graphing:
    enabled: true
```

6. Verify that the Grafana instance deployed:

```
$ oc get pod -l app=grafana
```

```
NAME                                  READY   STATUS    RESTARTS   AGE
grafana-deployment-7fc7848b56-sbkhv   1/1     Running   0          1m
```

### 4.5.2. Importing dashboards

The Grafana Operator can import and manage dashboards by creating **GrafanaDashboard** objects. You can view example dashboards at https://github.com/infrawatch/dashboards.

Procedure

1. Import a dashboard:

```
$ oc apply -f
https://raw.githubusercontent.com/infrawatch/dashboards/master/deploy/rhos-
dashboard.yaml
```

```
grafanadashboard.integreatly.org/rhos-dashboard created
```

2. Verify that the resources installed correctly:

```
$ oc get grafanadashboards
```

```
NAME            AGE
rhos-dashboard  7d21h
```

```
$ oc get grafanadatasources
```

```
NAME                  AGE
default-ds-prometheus  20h
```

3. Expose the grafana service as a route:

```
$ oc create route edge dashboards --service=grafana-service --insecure-
policy="Redirect" --port=3000
```

4. Retrieve the Grafana route address:

```
$ oc get route dashboards
```

```
NAME         HOST/PORT                                                PATH   SERVICES
PORT   TERMINATION     WILDCARD
dashboards   dashboards-service-
telemetry.apps.stfcloudops1.lab.upshift.rdu2.redhat.com          grafana-service   3000
edge/Redirect   None
```

The **HOST/PORT** value is the Grafana route address.

5. Navigate to https://<GRAFANA-ROUTE-ADDRESS> in a web browser. Replace <GRAFANA-ROUTE-ADDRESS> with the **HOST/PORT** value that you retrieved in the previous step.

6. To view the dashboard, click Dashboards and Manage.

### 4.5.3. Viewing and editing queries

Procedure

1. Log in to Red Hat OpenShift Container Platform. To view and edit queries, log in as the **admin** user.

2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. To retrieve the default username and password, describe the Grafana object using the **oc describe** command:

```
$ oc describe grafana default
```

**TIP**

To set the admin username and password through the **ServiceTelemetry** object, use the **graphing.grafana.adminUser** and **graphing.grafana.adminPassword** parameters.

### 4.5.4. The Grafana infrastructure dashboard

The infrastructure dashboard shows metrics for a single node at a time. Select a node from the upper left corner of the dashboard.

#### 4.5.4.1. Top panels

| Title | Unit | Description |
|---|---|---|
| Current Global Alerts | - | Current alerts fired by Prometheus |
| Recent Global Alerts | - | Recently fired alerts in 5m time steps |
| Status Panel | - | Node status: up, down, unavailable |
| Uptime | s/m/h/d/M/Y | Total operational time of node |
| CPU Cores | cores | Total number of cores |
| Memory | bytes | Total memory |
| Disk Size | bytes | Total storage size |
| Processes | processes | Total number of processes listed by type |
| Load Average | processes | Load average represents the average number of running and uninterruptible processes residing in the kernel execution queue. |

#### 4.5.4.2. Networking panels

**Panels that display the network interfaces of the node.**

| Panel | Unit | Description |
|---|---|---|
| Physical Interfaces Ingress Errors | errors | Total errors with incoming data |
| Physical Interfaces Egress Errors | errors | Total errors with outgoing data |
| Physical Interfaces Ingress Error Rates | errors/s | Rate of incoming data errors |
| Physical Interfaces egress Error Rates | errors/s | Rate of outgoing data errors |
| Physical Interfaces Packets Ingress pps Incoming packets per second | Physical Interfaces Packets Egress | pps |
| Outgoing packets per second | Physical Interfaces Data Ingress | bytes/s |
| Incoming data rates | Physical Interfaces Data Egress | bytes/s |
| Outgoing data rates | Physical Interfaces Drop Rate Ingress | pps |
| Incoming packets drop rate | Physical Interfaces Drop Rate Egress | pps |

### 4.5.4.3. CPU panels

**Panels that display CPU usage of the node.**

| Panel | Unit | Description |
|---|---|---|
| Current CPU Usage | percent | Instantaneous usage at the time of the last query. |
| Aggregate CPU Usage | percent | Average non-idle CPU activity of all cores on a node. |
| Aggr. CPU Usage by Type | percent | Shows time spent for each type of thread averaged across all cores. |

### 4.5.4.4. Memory panels

**Panels that display memory usage on the node.**

| Panel | Unit | Description |
|---|---|---|
| Memory Used | percent | Amount of memory being used at time of last query. |
| Huge Pages Used | hugepages | Number of hugepages being used.<br><br>Memory |

#### 4.5.4.5. Disk/file system

**Panels that display space used on disk.**

| Panel | Unit | Description | Notes |
|---|---|---|---|
| Disk Space Usage | percent | Total disk use at time of last query. | |
| Inode Usage | percent | Total inode use at time of last query. | |
| Aggregate Disk Space Usage | bytes | Total disk space used and reserved. | Because this query relies on the **df** plugin, temporary file systems that do not necessarily use disk space are included in the results. The query tries to filter out most of these, but it might not be exhaustive. |
| Disk Traffic | bytes/s | Shows rates for both reading and writing. | |
| Disk Load | percent | Approximate percentage of total disk bandwidth being used. The weighted I/O time series includes the backlog that might be accumulating. For more information, see the collectd disk plugin docs. | |
| Operations/s | ops/s | Operations done per second | |

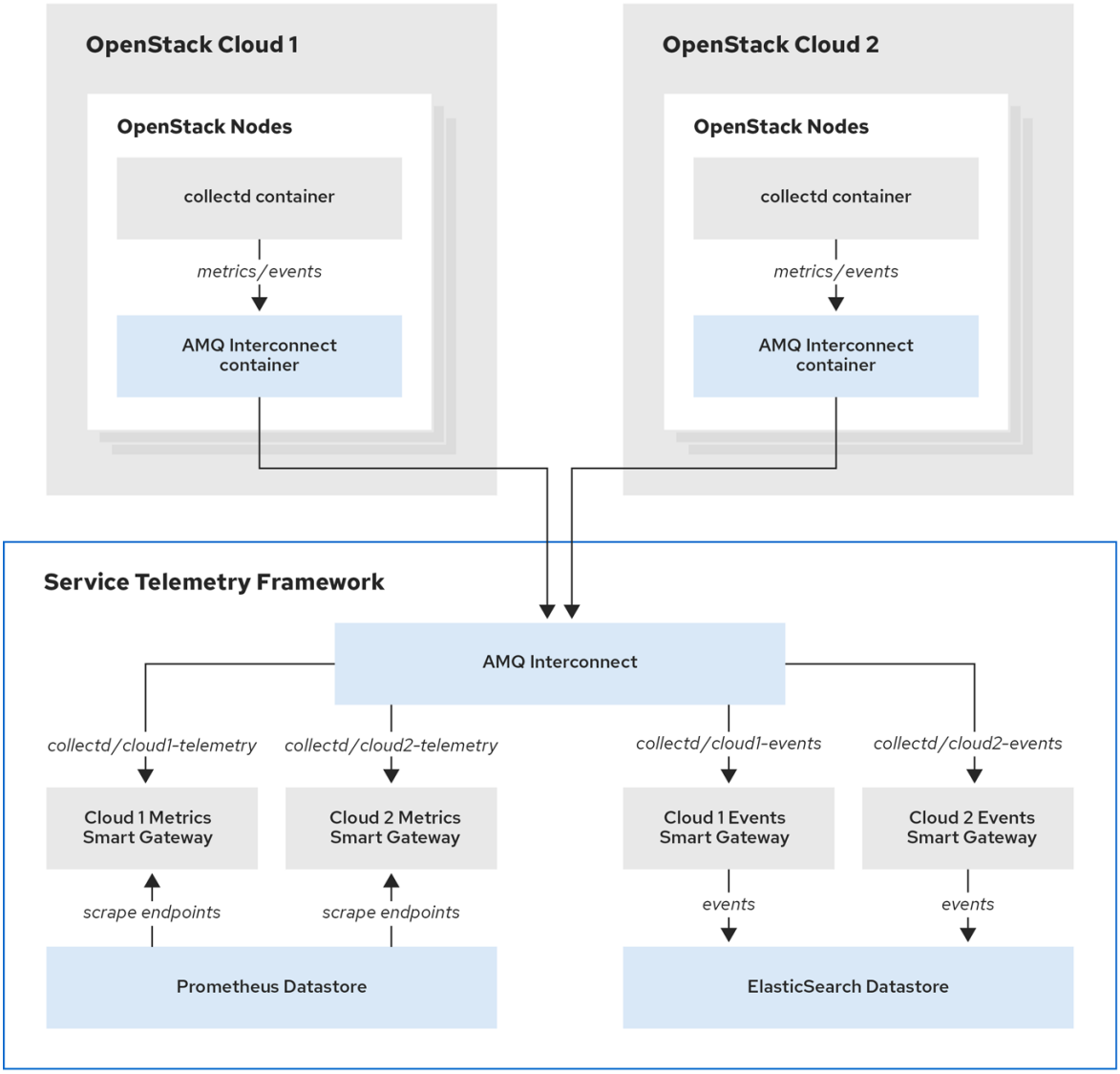
| Panel | Unit | Description | Notes |
|---|---|---|---|
| Average I/O Operation Time | seconds | Average time each I/O operation took to complete. This average is not accurate, see the collectd disk plugin docs. | |

## 4.6. MULTIPLE CLOUD CONFIGURATION

**You can configure multiple Red Hat OpenStack Platform clouds to target a single instance of Service Telemetry Framework (STF):**

1. **Plan the AMQP address prefixes that you want to use for each cloud. For more information, see Section 4.6.1, "Planning AMQP address prefixes".**
2. **Deploy metrics and events consumer Smart Gateways for each cloud to listen on the corresponding address prefixes. For more information, see Section 4.6.2, "Deploying Smart Gateways".**
3. **Configure each cloud to send its metrics and events to STF on the correct address. For more information, see Section 4.6.4, "Creating the OpenStack environment file".**

Figure 4.1. Two Red Hat OpenStack Platform clouds connect to STF

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## 4.6.1. Planning AMQP address prefixes

By default, Red Hat OpenStack Platform nodes get data through two data collectors; collectd and Ceilometer. These components send telemetry data or notifications to the respective AMQP addresses, for example, **collectd/telemetry**, where STF Smart Gateways listen on those addresses for monitoring data.

To support multiple clouds and to identify which cloud generated the monitoring data, configure each cloud to send data to a unique address. Prefix a cloud identifier to the second part of the address. The following list shows some example addresses and identifiers:

- **collectd/cloud1-telemetry**
- **collectd/cloud1-notify**
- **anycast/ceilometer/cloud1-metering.sample**
- **anycast/ceilometer/cloud1-event.sample**
- **collectd/cloud2-telemetry**

- **collectd/cloud2-notify**
- **anycast/ceilometer/cloud2-metering.sample**
- **anycast/ceilometer/cloud2-event.sample**
- **collectd/us-east-1-telemetry**
- **collectd/us-west-3-telemetry**

### 4.6.2. Deploying Smart Gateways

You must deploy a Smart Gateway for each of the data collection types for each cloud; one for collectd metrics, one for collectd events, one for Ceilometer metrics, and one for Ceilometer events. Configure each of the Smart Gateways to listen on the AMQP address that you define for the corresponding cloud. Smart Gateways are defined via the **clouds** parameter in the **ServiceTelemetry** manifest.

When you deploy STF for the first time, Smart Gateway manifests are created that define the initial Smart Gateways for a single cloud. When deploying Smart Gateways for multiple cloud support, you deploy multiple Smart Gateways for each of the data collection types that handle the metrics and the events data for each cloud. The initial Smart Gateways are defined under **cloud1** with the following subscription addresses:

| collector | type | default subscription address |
|---|---|---|
| collectd | metrics | collectd/telemetry |
| collectd | events | collectd/notify |
| Ceilometer | metrics | anycast/ceilometer/metering.sample |
| Ceilometer | events | anycast/ceilometer/event.sample |

#### Prerequisites

You have determined your naming scheme and have created your list of clouds objects. For more information about determining your naming scheme, see ]. For more information about creating the content for the **clouds** parameter, see xref:clouds_installing-the-core-components-of-stf[.

#### Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Edit the **default** ServiceTelemetry object and add a**clouds** parameter with your configuration:

```
$ oc edit stf default
```

-

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  ...
spec:
  ...
  clouds:
  - name: cloud1
    events:
      collectors:
      - collectorType: collectd
        subscriptionAddress: collectd/cloud1-notify
      - collectorType: ceilometer
        subscriptionAddress: anycast/ceilometer/cloud1-event.sample
    metrics:
      collectors:
      - collectorType: collectd
        subscriptionAddress: collectd/cloud1-telemetry
      - collectorType: ceilometer
        subscriptionAddress: anycast/ceilometer/cloud1-metering.sample
  - name: cloud2
    events:
      ...
```

4. Save the ServiceTelemetry object.

5. Verify that each Smart Gateway is running. This can take several minutes depending on the number of Smart Gateways:

```
$ oc get po -l app=smart-gateway
```

```
NAME                                              READY   STATUS    RESTARTS   AGE
default-cloud1-ceil-event-smartgateway-6cfb65478c-g5q82   1/1     Running   0          13h
default-cloud1-ceil-meter-smartgateway-58f885c76d-xmxwn   1/1     Running   0          13h
default-cloud1-coll-event-smartgateway-58fbbd4485-rl9bd   1/1     Running   0          13h
default-cloud1-coll-meter-smartgateway-7c6fc495c4-jn728   2/2     Running   0          13h
```

### 4.6.3. Deleting the default Smart Gateways

After you configure STF for multiple clouds, you can delete the default Smart Gateways if they are no longer in use. The Service Telemetry Operator can remove **SmartGateway** objects that have been created but are no longer listed in the ServiceTelemetry **clouds** list of objects. You can enable the removal of SmartGateway objects that are not defined by the **clouds** parameter by setting **cloudsRemoveOnMissing: true** in the **ServiceTelemetry** manifest.

TIP

If you do not want any Smart Gateways deployed, define an empty clouds object using the **clouds: {}** parameter.

WARNING

The **cloudsRemoveOnMissing** parameter is disabled by default. If you enable the **cloudsRemoveOnMissing** parameter, you remove any manually created **SmartGateway** objects in the current namespace without any possibility to restore.

Procedure

1. Define your **clouds** parameter with the list of cloud objects to be managed by the Service Telemetry Operator. For more information, see Section 2.3.10.2, "clouds".
2. Edit the ServiceTelemetry object and add the **cloudsRemoveOnMissing** parameter:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  ...
spec:
  ...
  cloudsRemoveOnMissing: true
  clouds:
    ...
```

3. Save the modifications.
4. Verify that the Operator deleted the Smart Gateways. This can take several minutes while the Operators reconcile the changes:

```
$ oc get smartgateways
```

### 4.6.4. Creating the OpenStack environment file

To label traffic according to the cloud of origin, you must create a configuration with cloud-specific instance names. Create an **stf-connectors.yaml** file and adjust the values of **CeilometerQdrEventsConfig**, **CeilometerQdrMetricsConfig** and **CollectdAmqpInstances** to match the AMQP address prefix scheme. For more information, see Section 4.6.1, "Planning AMQP address prefixes".

WARNING

Remove **enable-stf.yaml** and **ceilometer-write-qdr.yaml** environment file references from your overcloud deployment. This configuration is redundant and results in duplicate information being sent from each cloud node.

Procedure

1. Create the **stf-connectors.yaml** file and modify it to match the AMQP address that you want for this cloud deployment:

stf-connectors.yaml

```
resource_registry:
  OS::TripleO::Services::Collectd: /usr/share/openstack-tripleo-heat-templates/deployment/metrics/collectd-container-puppet.yaml
  OS::TripleO::Services::MetricsQdr: /usr/share/openstack-tripleo-heat-templates/deployment/metrics/qdr-container-puppet.yaml
  OS::TripleO::Services::CeilometerAgentCentral: /usr/share/openstack-tripleo-heat-templates/deployment/ceilometer/ceilometer-agent-central-container-puppet.yaml
  OS::TripleO::Services::CeilometerAgentNotification: /usr/share/openstack-tripleo-heat-templates/deployment/ceilometer/ceilometer-agent-notification-container-puppet.yaml
  OS::TripleO::Services::CeilometerAgentIpmi: /usr/share/openstack-tripleo-heat-templates/deployment/ceilometer/ceilometer-agent-ipmi-container-puppet.yaml
  OS::TripleO::Services::ComputeCeilometerAgent: /usr/share/openstack-tripleo-heat-templates/deployment/ceilometer/ceilometer-agent-compute-container-puppet.yaml
  OS::TripleO::Services::Redis: /usr/share/openstack-tripleo-heat-templates/deployment/database/redis-pacemaker-puppet.yaml

parameter_defaults:
  EnableSTF: true

  EventPipelinePublishers: []
  MetricPipelinePublishers: []
  CeilometerEnablePanko: false
  CeilometerQdrPublishEvents: true
  CeilometerQdrEventsConfig:
    driver: amqp
    topic: cloud1-event   (1)
  CeilometerQdrMetricsConfig:
    driver: amqp
    topic: cloud1-metering   (2)


  CollectdConnectionType: amqp1
  CollectdAmqpInterval: 5
  CollectdDefaultPollingInterval: 5

  CollectdAmqpInstances:
    cloud1-notify:   (3)
      notify: true
      format: JSON
      presettle: false
    cloud1-telemetry:   (4)
      format: JSON
      presettle: true

  MetricsQdrAddresses:
    - prefix: collectd
      distribution: multicast
```

```
    - prefix: anycast/ceilometer
      distribution: multicast

  MetricsQdrSSLProfiles:
    - name: sslProfile

  MetricsQdrConnectors:
    - host: stf-default-interconnect-5671-service-telemetry.apps.infra.watch   5
      port: 443
      role: edge
      verifyHostname: false
      sslProfile: sslProfile
```

1. Define the topic for Ceilometer events. This value is the address format of **anycast/ceilometer/cloud1-event.sample**.
2. Define the topic for Ceilometer metrics. This value is the address format of **anycast/ceilometer/cloud1-metering.sample**.
3. Define the topic for collectd events. This value is the format of **collectd/cloud1-notify**.
4. Define the topic for collectd metrics. This value is the format of **collectd/cloud1-telemetry**.
5. Adjust the **MetricsQdrConnectors** host to the address of the STF route.

2. Ensure that the naming convention in the **stf-connectors.yaml** file aligns with the **spec.amqpUrl** field in the Smart Gateway configuration. For example, configure the **CeilometerQdrEventsConfig.topic** field to a value of**cloud1-event**.
3. Save the file in a directory for custom environment files, for example **/home/stack/custom_templates/**.
4. Source the authentication file:

```
[stack@undercloud-0 ~]$ source stackrc

(undercloud) [stack@undercloud-0 ~]$
```

5. Include the **stf-connectors.yaml** file in the**overcloud deployment** command, along with any other environment files relevant to your environment:

```
(undercloud) [stack@undercloud-0 ~]$ openstack overcloud deploy \
--templates /usr/share/openstack-tripleo-heat-templates \
...
-e /home/stack/custom_templates/stf-connectors.yaml \
...
```

### Additional resources

For information about validating the deployment, see Section 3.3.3, “Validating client-side installation”.

## 4.6.5. Querying metrics data from multiple clouds

Data stored in Prometheus has a *service* label attached according to the Smart Gateway it was scraped from. You can use this label to query data from a specific cloud.

To query data from a specific cloud, use a Prometheus **promql** query that matches the associated *service* label; for example:**collectd_uptime{service="default-cloud1-coll-meter-smartgateway"}**.

## 4.7. EPHEMERAL STORAGE

Use ephemeral storage to run Service Telemetry Framework (STF) without persistently storing data in your Red Hat OpenShift Container Platform (OCP) cluster. Ephemeral storage is not recommended in a production environment due to the volatility of the data in the platform when operating correctly and as designed. For example, restarting a pod or rescheduling the workload to another node results in the loss of any local data written since the pod started.

### 4.7.1. Configuring ephemeral storage

To configure STF components for ephemeral storage, add **...storage.strategy: ephemeral** to the corresponding parameter. For example, to enable ephemeral storage for the Prometheus backend, set **backends.metrics.prometheus.storage.strategy: ephemeral**. Components that support configuration of ephemeral storage include **alerting.alertmanager**, **backends.metrics.prometheus**, and **backends.events.elasticsearch**. You can add ephemeral storage configuration at installation time or, if you already deployed STF, complete the following steps:

Procedure

1. Log in to Red Hat OpenShift Container Platform.
2. Change to the **service-telemetry** namespace:

```
$ oc project service-telemetry
```

3. Edit the ServiceTelemetry object:

```
$ oc edit stf default
```

4. Add the **...storage.strategy: ephemeral** parameter to the**spec** section of the relevant component:

```
apiVersion: infra.watch/v1beta1
kind: ServiceTelemetry
metadata:
  name: stf-default
  namespace: service-telemetry
spec:
  alerting:
    enabled: true
    alertmanager:
      storage:
        strategy: ephemeral
  backends:
    metrics:
      prometheus:
        enabled: true
        storage:
```

```
      strategy: ephemeral
  events:
    elasticsearch:
      enabled: true
      storage:
        strategy: ephemeral
```

5. Save your changes and close the object.

## 4.8. MONITORING THE RESOURCE USAGE OF RED HAT OPENSTACK PLATFORM SERVICES

Monitor the resource usage of the Red Hat OpenStack Platform services, such as the APIs and other infrastructure processes, to identify bottlenecks in the overcloud by showing services running out of compute power. Enable the **collectd-libpod-stats** plug-in to gather CPU and memory usage metrics for every container running in the overcloud.

Prerequisites

- You have created the **stf-connectors.yaml** file. For more information, seeSection 3.3, “Configuring Red Hat OpenStack Platform overcloud for Service Telemetry Framework”.
- You are using the most current version of Red Hat OpenStack Platform: 16.1.

Procedure

1. Open the **stf-connectors.yaml** file.
2. Add the following configuration to **parameter_defaults**:

```
CollectdEnableLibpodstats: true
```

3. Continue with the overcloud deployment procedure.

# APPENDIX A. COLLECTD PLUG-INS

This section contains a complete list of collectd plug-ins and configurations for Red Hat OpenStack Platform 16.1.

collectd-aggregation

- collectd::plugin::aggregation::aggregators
- collectd::plugin::aggregation::interval

collectd-amqp1

collectd-apache

- collectd::plugin::apache::instances (ex.: {*localhost* ⇒ {*url* ⇒ *http://localhost/mod_status?auto*}})
- collectd::plugin::apache::interval

collectd-apcups

collectd-battery

- collectd::plugin::battery::values_percentage
- collectd::plugin::battery::report_degraded
- collectd::plugin::battery::query_state_fs
- collectd::plugin::battery::interval

collectd-ceph

- collectd::plugin::ceph::daemons
- collectd::plugin::ceph::longrunavglatency
- collectd::plugin::ceph::convertspecialmetrictypes

collectd-cgroups

- collectd::plugin::cgroups::ignore_selected
- collectd::plugin::cgroups::interval

collectd-conntrack

- None

collectd-contextswitch

- collectd::plugin::contextswitch::interval

collectd-cpu

- collectd::plugin::cpu::reportbystate
- collectd::plugin::cpu::reportbycpu
- collectd::plugin::cpu::valuespercentage
- collectd::plugin::cpu::reportnumcpu
- collectd::plugin::cpu::reportgueststate
- collectd::plugin::cpu::subtractgueststate
- collectd::plugin::cpu::interval

collectd-cpufreq

- None

collectd-cpusleep

collectd-csv

- collectd::plugin::csv::datadir
- collectd::plugin::csv::storerates
- collectd::plugin::csv::interval

collectd-df

- collectd::plugin::df::devices
- collectd::plugin::df::fstypes
- collectd::plugin::df::ignoreselected
- collectd::plugin::df::mountpoints
- collectd::plugin::df::reportbydevice
- collectd::plugin::df::reportinodes
- collectd::plugin::df::reportreserved
- collectd::plugin::df::valuesabsolute
- collectd::plugin::df::valuespercentage
- collectd::plugin::df::interval

collectd-disk

- collectd::plugin::disk::disks
- collectd::plugin::disk::ignoreselected
- collectd::plugin::disk::udevnameattr

- collectd::plugin::disk::interval

collectd-entropy

- collectd::plugin::entropy::interval

collectd-ethstat

- collectd::plugin::ethstat::interfaces
- collectd::plugin::ethstat::maps
- collectd::plugin::ethstat::mappedonly
- collectd::plugin::ethstat::interval

collectd-exec

- collectd::plugin::exec::commands
- collectd::plugin::exec::commands_defaults
- collectd::plugin::exec::globals
- collectd::plugin::exec::interval

collectd-fhcount

- collectd::plugin::fhcount::valuesabsolute
- collectd::plugin::fhcount::valuespercentage
- collectd::plugin::fhcount::interval

collectd-filecount

- collectd::plugin::filecount::directories
- collectd::plugin::filecount::interval

collectd-fscache

- None

collectd-hddtemp

- collectd::plugin::hddtemp::host
- collectd::plugin::hddtemp::port
- collectd::plugin::hddtemp::interval

collectd-hugepages

- collectd::plugin::hugepages::report_per_node_hp

- collectd::plugin::hugepages::report_root_hp
- collectd::plugin::hugepages::values_pages
- collectd::plugin::hugepages::values_bytes
- collectd::plugin::hugepages::values_percentage
- collectd::plugin::hugepages::interval

collectd-intel_rdt

collectd-interface

- collectd::plugin::interface::interfaces
- collectd::plugin::interface::ignoreselected
- collectd::plugin::interface::reportinactive
- Collectd::plugin::interface::interval

collectd-ipc

- None

collectd-ipmi

- collectd::plugin::ipmi::ignore_selected
- collectd::plugin::ipmi::notify_sensor_add
- collectd::plugin::ipmi::notify_sensor_remove
- collectd::plugin::ipmi::notify_sensor_not_present
- collectd::plugin::ipmi::sensors
- collectd::plugin::ipmi::interval

collectd-irq

- collectd::plugin::irq::irqs
- collectd::plugin::irq::ignoreselected
- collectd::plugin::irq::interval

collectd-load

- collectd::plugin::load::report_relative
- collectd::plugin::load::interval

collectd-logfile

- collectd::plugin::logfile::log_level

- collectd::plugin::logfile::log_file
- collectd::plugin::logfile::log_timestamp
- collectd::plugin::logfile::print_severity
- collectd::plugin::logfile::interval

collectd-madwifi

collectd-mbmon

collectd-md

collectd-memcached

- collectd::plugin::memcached::instances
- collectd::plugin::memcached::interval

collectd-memory

- collectd::plugin::memory::valuesabsolute
- collectd::plugin::memory::valuespercentage
- collectd::plugin::memory::interval collectd-multimeter

collectd-multimeter

collectd-mysql

- collectd::plugin::mysql::interval

collectd-netlink

- collectd::plugin::netlink::interfaces
- collectd::plugin::netlink::verboseinterfaces
- collectd::plugin::netlink::qdiscs
- collectd::plugin::netlink::classes
- collectd::plugin::netlink::filters
- collectd::plugin::netlink::ignoreselected
- collectd::plugin::netlink::interval

collectd-network

- collectd::plugin::network::timetolive
- collectd::plugin::network::maxpacketsize

- collectd::plugin::network::forward
- collectd::plugin::network::reportstats
- collectd::plugin::network::listeners
- collectd::plugin::network::servers
- collectd::plugin::network::interval

collectd-nfs

- collectd::plugin::nfs::interval

collectd-ntpd

- collectd::plugin::ntpd::host
- collectd::plugin::ntpd::port
- collectd::plugin::ntpd::reverselookups
- collectd::plugin::ntpd::includeunitid
- collectd::plugin::ntpd::interval

collectd-numa

- None

collectd-olsrd

collectd-openvpn

- collectd::plugin::openvpn::statusfile
- collectd::plugin::openvpn::improvednamingschema
- collectd::plugin::openvpn::collectcompression
- collectd::plugin::openvpn::collectindividualusers
- collectd::plugin::openvpn::collectusercount
- collectd::plugin::openvpn::interval

collectd-ovs_events

- collectd::plugin::ovs_events::address
- collectd::plugin::ovs_events::dispatch
- collectd::plugin::ovs_events::interfaces
- collectd::plugin::ovs_events::send_notification

- collectd::plugin::ovs_events::$port
- collectd::plugin::ovs_events::socket

collectd-ovs_stats

- collectd::plugin::ovs_stats::address
- collectd::plugin::ovs_stats::bridges
- collectd::plugin::ovs_stats::port
- collectd::plugin::ovs_stats::socket

collectd-ping

- collectd::plugin::ping::hosts
- collectd::plugin::ping::timeout
- collectd::plugin::ping::ttl
- collectd::plugin::ping::source_address
- collectd::plugin::ping::device
- collectd::plugin::ping::max_missed
- collectd::plugin::ping::size
- collectd::plugin::ping::interval

collectd-powerdns

- collectd::plugin::powerdns::interval
- collectd::plugin::powerdns::servers
- collectd::plugin::powerdns::recursors
- collectd::plugin::powerdns::local_socket
- collectd::plugin::powerdns::interval

collectd-processes

- collectd::plugin::processes::processes
- collectd::plugin::processes::process_matches
- collectd::plugin::processes::collect_context_switch
- collectd::plugin::processes::collect_file_descriptor
- collectd::plugin::processes::collect_memory_maps
- collectd::plugin::powerdns::interval

collectd-protocols

- collectd::plugin::protocols::ignoreselected
- collectd::plugin::protocols::values

collectd-python

collectd-serial

collectd-smart

- collectd::plugin::smart::disks
- collectd::plugin::smart::ignoreselected
- collectd::plugin::smart::interval

collectd-snmp_agent

collectd-statsd

- collectd::plugin::statsd::host
- collectd::plugin::statsd::port
- collectd::plugin::statsd::deletecounters
- collectd::plugin::statsd::deletetimers
- collectd::plugin::statsd::deletegauges
- collectd::plugin::statsd::deletesets
- collectd::plugin::statsd::countersum
- collectd::plugin::statsd::timerpercentile
- collectd::plugin::statsd::timerlower
- collectd::plugin::statsd::timerupper
- collectd::plugin::statsd::timersum
- collectd::plugin::statsd::timercount
- collectd::plugin::statsd::interval

collectd-swap

- collectd::plugin::swap::reportbydevice
- collectd::plugin::swap::reportbytes
- collectd::plugin::swap::valuesabsolute

- collectd::plugin::swap::valuespercentage
- collectd::plugin::swap::reportio
- collectd::plugin::swap::interval

collectd-syslog

- collectd::plugin::syslog::log_level
- collectd::plugin::syslog::notify_level
- collectd::plugin::syslog::interval

collectd-table

- collectd::plugin::table::tables
- collectd::plugin::table::interval

collectd-tail

- collectd::plugin::tail::files
- collectd::plugin::tail::interval

collectd-tail_csv

- collectd::plugin::tail_csv::metrics
- collectd::plugin::tail_csv::files

collectd-tcpconns

- collectd::plugin::tcpconns::localports
- collectd::plugin::tcpconns::remoteports
- collectd::plugin::tcpconns::listening
- collectd::plugin::tcpconns::allportssummary
- collectd::plugin::tcpconns::interval

collectd-ted

collectd-thermal

- collectd::plugin::thermal::devices
- collectd::plugin::thermal::ignoreselected
- collectd::plugin::thermal::interval

collectd-threshold

- collectd::plugin::threshold::types
- collectd::plugin::threshold::plugins
- collectd::plugin::threshold::hosts
- collectd::plugin::threshold::interval

collectd-turbostat

- collectd::plugin::turbostat::core_c_states
- collectd::plugin::turbostat::package_c_states
- collectd::plugin::turbostat::system_management_interrupt
- collectd::plugin::turbostat::digital_temperature_sensor
- collectd::plugin::turbostat::tcc_activation_temp
- collectd::plugin::turbostat::running_average_power_limit
- collectd::plugin::turbostat::logical_core_names

collectd-unixsock

collectd-uptime

- collectd::plugin::uptime::interval

collectd-users

- collectd::plugin::users::interval

collectd-uuid

- collectd::plugin::uuid::uuid_file
- collectd::plugin::uuid::interval

collectd-virt

- collectd::plugin::virt::connection
- collectd::plugin::virt::refresh_interval
- collectd::plugin::virt::domain
- collectd::plugin::virt::block_device
- collectd::plugin::virt::interface_device
- collectd::plugin::virt::ignore_selected
- collectd::plugin::virt::hostname_format

- collectd::plugin::virt::interface_format
- collectd::plugin::virt::extra_stats
- collectd::plugin::virt::interval

collectd-vmem

- collectd::plugin::vmem::verbose
- collectd::plugin::vmem::interval

collectd-vserver

collectd-wireless

collectd-write_graphite

- collectd::plugin::write_graphite::carbons
- collectd::plugin::write_graphite::carbon_defaults
- collectd::plugin::write_graphite::globals

collectd-write_kafka

- collectd::plugin::write_kafka::kafka_host
- collectd::plugin::write_kafka::kafka_port
- collectd::plugin::write_kafka::kafka_hosts
- collectd::plugin::write_kafka::topics

collectd-write_log

- collectd::plugin::write_log::format

collectd-zfs_arc

- None