



# Publishing Metrics

## Intel® Platform Service Assurance

**This feature brief focuses specifically on Gnocchi, its relationship with collectd, and how these capabilities can be combined to collect metrics and react to events in your network.**



### Abstract

A fundamental component of platform service assurance is telemetry. OpenStack\* telemetry involves the reliable collection of data related to the utilization of the physical and virtual resources in a deployment, the persistence of that data for subsequent retrieval and analysis, and the triggering of actions when defined criteria are met. Several initiatives are in flight to address these objectives, including collectd (a systems statistics collection mechanism), Ceilometer (the OpenStack telemetry service), Gnocchi (a time-series database and resource indexing service), and Aodh (an alarming service).

### Feature Description

Gnocchi is a time-series database as a service (TDBaaS) that can handle a lot of metrics. The term “time-series” refers to the type of data the database can handle, namely arrays of numbers indexed by time (a datetime or a datetime range). Gnocchi uses high-performance data structures for storing large quantities of metrics in an aggregated manner. The term “database as a service” reflects the fact that Gnocchi is one of the few database implementations offering an API to query the database directly.

Gnocchi is ideally suited as a back end to OpenStack Ceilometer. Previous storage solutions for Ceilometer, for example MongoDB, were not easily scalable and significant delays were incurred when calculating aggregate values on data sets with millions of entries.

Gnocchi is designed with the OpenStack toolset and OpenStack services in mind from the start. Interaction with Gnocchi is through an API. The HTTP REST API and the asynchronous processing daemons are stateless and scalable, allowing additional workers to be added easily to help manage increased workload.

In summary, Gnocchi is capable of handling time-series data at a very large scale and has the ability to do pre-computed aggregation saving significant computation time (see Ref. 2 for details).

- Enabling or disabling the collection of overall huge page metrics
- Reporting usage values as the number of pages (default), the number of bytes, or a percentage value

### Collectd Generates Lots of Metrics

Collectd is a mature systems statistics collection mechanism that is widely available in most Linux distributions. It uses a plug-in architecture where plug-ins can be enabled or disabled independently to monitor only the metrics of interest. Plugins fall into many categories. Two main categories are:

- Read plugins, which gather system statistics
- Write plugins, which send the statistics in a format that is necessary for consumption

Collectd also supports thresholding and notifications (see Ref. 3 for details).

At the time of writing, there are over 90 plugins available for collectd. Some examples are plug-ins for CPU information, loading information, ping responsiveness, interface statistics, memory and disk usage, Intelligent Platform Management Interface (IPMI) information, Intel® Resource Director Technology

(RDT) data, Open vSwitch\* interface statistics, Data Plane Development Kit (DPDK) status and interface statistics, hugepage usage, process information, libvirt information, and so on. Each plugin can provide multiple metrics from multiple resources. For example, the CPU plugin provides eight different metrics about CPU utilization for each individual CPU. See Ref. 4 for a list of the supported collectd plugins.

## Examples of Projects Already Using collectd Metrics and Events

Several OpenStack projects already use collectd metrics and events. For example:

- OPNFV Doctor – A fault maintenance and management project that detects faults and can initiate failover to support continuity of service.
- OPNFV Watcher – A resource optimization service for virtual machine (VM) deployment to rebalance the environment over time.

OpenStack Vitrage – A root cause analysis (RCA) service for organizing, analyzing and expanding OpenStack alarms and events, giving insights into the root cause of problems and deducing their existence before they are directly detected.

- Aodh – Consumes events from collectd and emits an alarm when a pre-defined event pattern occurs.

The use of collectd in these programs validates collectd as an approved metrics collection mechanism.

## OPNFV Barometer New Features

The ability to monitor the Network Function Virtualization Infrastructure (NFVI), where VNFs are in operation, is a key part of platform service assurance in an NFV environment. The OPNFV Barometer project involves the gathering and management of metrics and events related to capacity planning, trending, and the operational status of the NFVI (see Ref. 5). The Barometer project integrates many collectd plug-ins for monitoring the NFVI into the OPNFV Platform.

## Using collectd and Gnocchi Together

There are two plug-ins that support the interoperability of collectd and Gnocchi:

- Collectd-gnocchi – A collectd output plug-in that is used to send metrics to Gnocchi (See Ref. 6)
- Collectd-aodh-plugin – A collectd plug-in to raise alarms in Aodh (See Ref. 7)

In an environment where collectd and Gnocchi operate together, events are handled as follows. Collectd has two ways of generating events. The first is to create a notification plug-in, which can be used to monitor the state of a system (the DPDK events plug-in is an example). The second is to use a thresholding plug-in, which enables the setting of thresholds and the raising of alarms based on arbitrary collectd metrics. Threshold events generated by collectd can be sent directly to Aodh. For all other types of events, Gnocchi can be used to consume collectd metrics directly and raise alarms in Aodh.

The combination of collectd and Gnocchi provide the necessary tools to develop monitoring solutions for billing, rating, prediction, auto-scaling, fault management, capacity planning, and much more.

## Feature Data Sets

Data sets are provided by collectd plug-ins.

## Configuration

The collectd plugin for Gnocchi must be installed. For alarms generation to Aodh, the collectd plugin for Aodh must also be installed. See the “Using collectd and Gnocchi Together” section earlier.

## Telemetry Collection Framework Support

The metrics publishing feature applies to the collectd telemetry collection framework only.

## Feature Dependencies

The publishing metrics feature depends on having the following features running on the platform:

- Gnocchi must be configured on the platform (see Ref. 2 for details)
- collectd must be configured on the platform (see Ref. 3 for details)

## Where to Get More Information

For more information, visit <https://networkbuilders.intel.com/network-technologies/serviceassurance>

### REFERENCES

TITLE	LINK
Ref. 1: Gnocchi and Collectd for faster fault detection and maintenance	<a href="https://www.openstack.org/assets/presentation-media/Gnocchi-and-collectd.pdf">https://www.openstack.org/assets/presentation-media/Gnocchi-and-collectd.pdf</a>
Ref. 2: Gnocchi	<a href="https://wiki.openstack.org/wiki/Gnocchiserviceassurance">https://wiki.openstack.org/wiki/Gnocchiserviceassurance</a>
Ref. 3: Collectd	<a href="https://collectd.org/">https://collectd.org/</a>
Ref. 4: Collectd Plug-in List	<a href="https://collectd.org/wiki/index.php/Table_of_Plugins">https://collectd.org/wiki/index.php/Table_of_Plugins</a>
Ref. 5: OPNFV Barometer Project	<a href="https://wiki.opnfv.org/display/fastpath/Barometer+Home">https://wiki.opnfv.org/display/fastpath/Barometer+Home</a>
Ref. 6: Collectd-Gnocchi Plug-in	<a href="https://pypi.python.org/pypi/collectd-gnocchi">https://pypi.python.org/pypi/collectd-gnocchi</a>
Ref. 7: Collectd-Aodh Plug-in	<a href="https://github.com/openstack/collectd-ceilometer-plugin/blob/master/etc/collectd.conf.d/collectd-aodh-plugin.conf">https://github.com/openstack/collectd-ceilometer-plugin/blob/master/etc/collectd.conf.d/collectd-aodh-plugin.conf</a>



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