Managing Ceph Clusters with Ceph Dashboard
SUSE® Enterprise Storage is a powerful, self-healing system for cost-efficient object, block and file storage at scale. It’s based on open source Ceph, a community project designed to automate and simplify the deployment of storage and help organizations like yours meet the demands of an ongoing data explosion.

Ceph efficiently stores everything as objects and offers fault-tolerant object, block and file storage that maximizes disk usage and minimizes admin time. It runs on nearly any hardware, so you can choose what best meets your needs and avoid being locked into a single vendor.

Ceph clusters are good at managing themselves, but you might wonder how a single administrator can keep track of vast storage arrays that might contain several petabytes of data. SUSE Enterprise Storage comes with command-line tools that enable you to monitor pools, start and stop daemons and output status information. However, sometimes command-line tools aren’t enough, and you and your team want to manage, monitor and visualize your storage cluster with a unified GUI interface.

With SUSE Enterprise Storage, you get that GUI-based management tool with Ceph Dashboard, which builds on the pioneering work that SUSE began with the openATTIC project. Like openATTIC, Ceph Dashboard offers an intuitive web interface for viewing and administering any Ceph cluster. It uses system data and snappy Prometheus-based monitoring tools to quickly reveal real-time cluster information that enables you and your cluster administrators to zoom in on the details of any node, OSD, pool, iSCSI gateway and more.

Ceph Dashboard reflects any changes to the Ceph cluster, including changes made through other tools. That means you get the benefits of a graphical interface without being limited to a single configuration and management tool.

Ceph Dashboard is part of the upstream Ceph project, which SUSE engineers heavily contribute to in collaboration with the Ceph community.

**What Is Ceph Dashboard?**
The browser-based Ceph Dashboard interface provides a single point of contact for viewing and managing Ceph components and resources, such as:

- Overall cluster health
- Cluster logs and performance counters
- Hosts, monitors, pools, ODSs and object gateways

It also includes easy-to-use widgets that display graphs and metrics about the health and performance of the cluster.

In addition to in-depth views, Ceph Dashboard gives you tooling for easily managing iSCSI, RBD, CephFS and NFS resources and provides audit logs that show who does what.

Management of your storage cluster is enhanced with built-in support for multi-user and role management, single sign-on (SSO), SSL/TLS support, auditing and internationalization (I18N). The web interface itself is built on well-known and widely used open-source web development frameworks: Angular, JavaScript and Bootstrap. It uses the Python-based CherryPy web application server for the backend and REST API.

**Ceph Dashboard Architecture**
The WebUI implementation is based on Angular/TypeScript. The Ceph Dashboard module is implemented as a largely stateless web application that visualizes information and statistics about the Ceph cluster, using a web server hosted by ceph-mgr.

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The powerful Ceph Dashboard admin platform enables you to manage and monitor your Ceph clusters from the convenience of any browser.
Getting Started

Ceph Dashboard is installed by default in SUSE Enterprise Storage 6 and only requires that you deploy it on nodes that have a running Ceph Manager instance. A nice side effect of this is that it automatically provides high availability. As with earlier versions of Ceph, you define roles for components in the main configuration file for your cluster, which is automatically applied with Salt and DeepSea during installation. (See the SUSE Enterprise Storage 6 Deployment Guide for more information on the Salt-based DeepSea configuration management system.)

The configuration file, /srv/pillar/ceph/proposals/policy.cfg, contains roles for all your cluster nodes, including the admin, monitor, management, meta data and storage targets. For example, these two lines identify the admin node as the target for the Prometheus components, which help to power Ceph Dashboard:

```
# Monitoring
role-prometheus/cluster/salt*.sls
role-grafana/cluster/salt*.sls
```

Looking Around

Ceph Dashboard is a web service, so you can connect to it using any modern web browser, even on mobile devices. Just enter the URL of the Ceph Dashboard server in a web browser on the same network:

```
http://ceph-manager-node-IP-or-DNS-name
```

The first thing you see when you open Ceph Dashboard is a collection of graphs and widgets that show the health of your cluster. Ceph clusters such as SUSE Enterprise Storage are fault-tolerant and self-healing, but performance can sometimes vary as the cluster rebalances and redistributes workloads. The dashboard provides a practical perch to search for bottlenecks and drill down through performance metrics.

When you first log in to Ceph Dashboard, you will see the default view. It immediately shows the health of the cluster, the number of monitors and pools, the cluster’s total storage capacity, how much has been used and much more. When the system is fully healthy, you will see a green status. If not, you will see yellow warnings or red outages.

The main menu bar also includes a small heart, which changes color depending on the health of your cluster. Green means healthy. The rest of the menu bar is organized around key tasks. For example, you can view hosts, monitors, OSDs, cluster configuration, the CRUSH map, manager modules and logs under the Cluster drop-down. Pools can be viewed and managed from the Pools menu, and block images, mirroring and iSCSI gateways can be managed from the Block drop-down menu.

NFS file shares can be viewed and managed from the NFS menu. Under the Filesystems menu, you can view the performance of your CephFS (and other available) filesystems. The Object Gateway drop-menu enables you to manage daemons, users and buckets.

For example, click Cluster ➔ OSDs to view a table of OSDs running in the cluster, including information on their status, CRUSH weight and storage configuration. Select an OSD in the list to view performance data and a Prometheus-based graphical dashboard. Similar functionality is used throughout Ceph Dashboard.
Note, too, that the dashboard has an elaborate user/role management system, so it’s possible to add arbitrary users and roles via the dashboard UI or the command line.

Similarly, you can click on the Cluster → Hosts menu item to view the status of each node in your cluster and see at a glance how each is being utilized. The Figure shows a test cluster, so storage is running on Monitor and Management nodes (a scenario you wouldn’t use in production).

**Monitors**

Monitors maintain a master copy of the cluster map, a critical function for the cluster, so it’s important to be able to view their health and quorum status. The Ceph Dashboard offers a clean view that shows open sessions and whether any monitors are out. Click on any node in the view to drill down to detailed data.

**CRUSH Map**

The CRUSH map is the blueprint of your Ceph cluster, which uses the map to determine where to store data and how to retrieve it. The map is created by the storage administrator and evolves dynamically as Ceph recalibrates and adjusts to changing events and needs. Although Ceph maintains the CRUSH map automatically, Ceph administrators sometimes need to access CRUSH information in order to troubleshoot problems and determine how the cluster is making storage decisions.

Figure 2. The Ceph Dashboard view of the Object Storage Daemons (OSDs), with real-time metrics.

Figure 3. The Ceph Dashboard view of the cluster hosts, showing their services and real-time metrics.

Figure 4. Drill down into any monitor node to see performance and transactional information.
Pools
Click Pools in the main menu to view all the Ceph pools associated with the cluster. Select a pool in the list to configure and edit pool settings, such as the pool type, CRUSH ruleset, placement groups and applications.

Multiple Storage Access Protocols
Ceph’s system of gateways and interfaces enables the cluster to appear to remote systems that use its storage as:

- RADOS Block Devices (RBDs)
- NFS shares
- iSCSI targets
- Object Gateways (compatible with Amazon S3 and OpenStack Swift)

The Ceph Dashboard provides options for creating and managing these resources. For example, you can create iSCSI targets and NFS shares from within the tool and see real-time information about their performance. You can also create users and buckets directly from the dashboard.

Putting It All Together
The simple yet functional Ceph Dashboard user interface makes it easy for any administrator to manage vast amounts of data from a single vantage point, helping SUSE Enterprise Storage deliver the lowest cost-per-MB of any enterprise-ready Ceph storage solution. With a little knowledge of Ceph, you will soon learn to move easily among the Ceph Dashboard menu options to configure cluster settings, identify and troubleshoot problems and chase down performance bottlenecks.

The Ceph Dashboard provides a number of new features requested by modern enterprises:

Figure 5. View CRUSH Map details in the Ceph Dashboard.

Figure 6. The Ceph Dashboard view of the cluster Pools. Clicking an item reveals more details.

Figure 7. Create and manage Object Gateway daemons, users and buckets from the Ceph Dashboard.
Ceph Dashboard’s convenient, menu-driven management environment is a powerful reason why SUSE Enterprise Storage is a preferred Ceph platform for storage administrators who are accustomed to performing management tasks within a GUI environment.

Visit [www.suse.com/products/suse-enterprise-storage/](http://www.suse.com/products/suse-enterprise-storage/) to learn more, or contact the experts at SUSE to learn how you can deploy Ceph Dashboard to manage and monitor your SUSE Enterprise Storage cluster.

- Administrators can set up users and roles with specific privileges; this information is globally shared across all ceph-manager instances. New auditing support gives administrators a view of who did what, and whether changes were made from the dashboard or via the REST API.

- Administrators can offload Ceph Dashboard authentication to an external single sign-on (SSO) service that supports the SAML 2.0 protocol and has been tested against KeyCloak and Shibboleth. You still need to first create user accounts and associate them with the desired roles, but this enhancement makes it possible to disable users who shouldn’t have access to the dashboard and to enforce specific password management policies.

- The dashboard’s web interface has been translated into a variety of languages, following I18N standards, making it easier for non-native English speakers to manage and monitor Ceph.