Hedvig Pensieve User Guide

Table of Contents

List of Figures

Introduction to Pensieve

Hedvig's ***Pensieve Service*** monitors the metrics for a system – providing a system snapshot to help troubleshoot Hedvig Cluster issues.

The Pensieve Service collects, stores, and visualizes all pertinent time-series data for both application and system metrics within Hedvig Clusters. It also provides up-to-the minute alerts for time-sensitive information.

Why Pensieve?

The Pensieve Service enables engineers, developers, and administrators to understand and to visualize the correlation between different aspects of system operations and workloads – by providing assistance in the following areas:

- Analyzing fluctuations and improvements with software upgrades.
- Identifying system issues, such as node failures and disk failures.
- Making informed choices about cluster provisioning.

Pensieve Data Flows

Data Flow between Hedvig Clusters and Pensieve Service

The Pensieve Service can be a standalone setup, collecting metrics and information from multiple Hedvig Clusters.

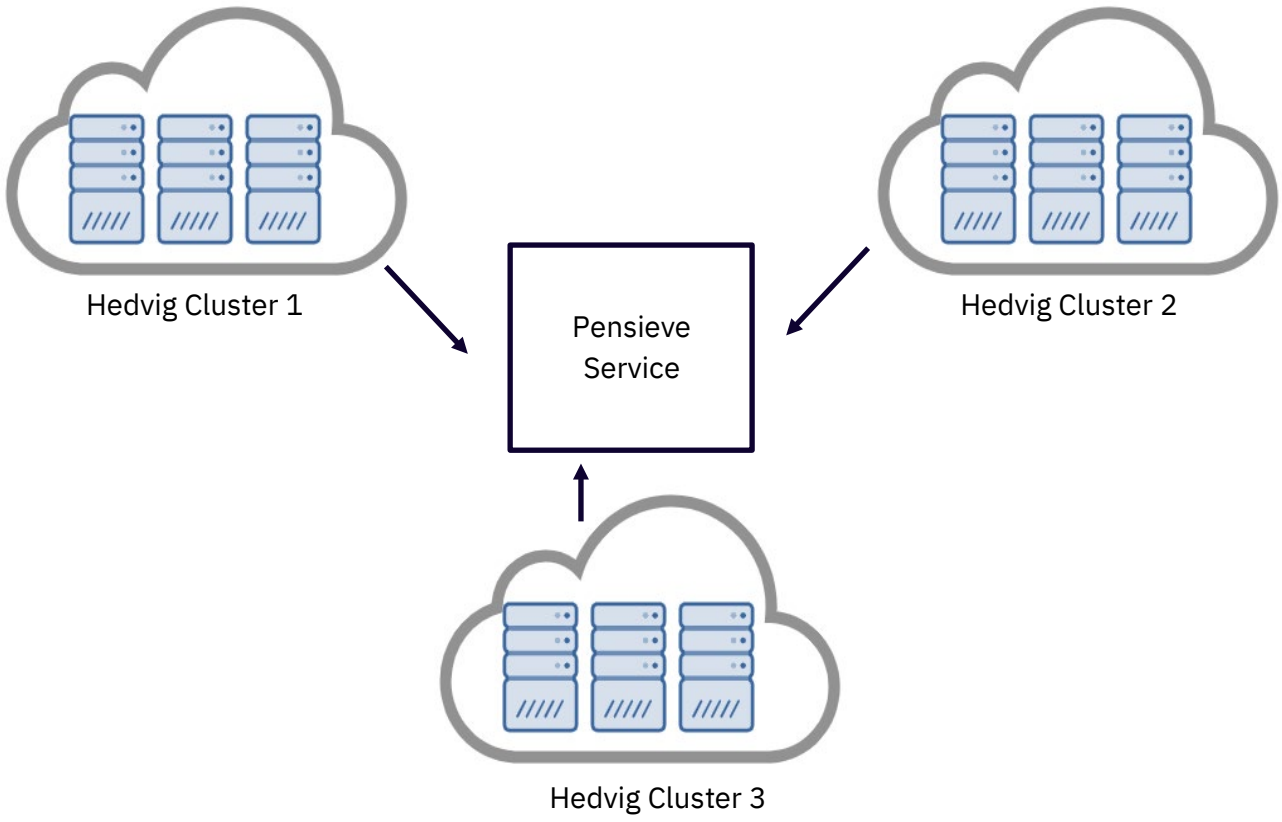


Figure 1: Data Flow between Hedvig Clusters and Pensieve Service

Data Flow from Hedvig Cluster Service to Pensieve Service

Hedvig Cluster services, such as metadata services and data services, can selectively and periodically pump metrics in JSON format to Pensieve.

The frequency and the metrics to be beamed can be configured individually for each process and for each cluster node.

The same procedure can be applied to a Hedvig Storage Proxy. The storage proxy can beam its metrics to the server and send them to Pensieve.

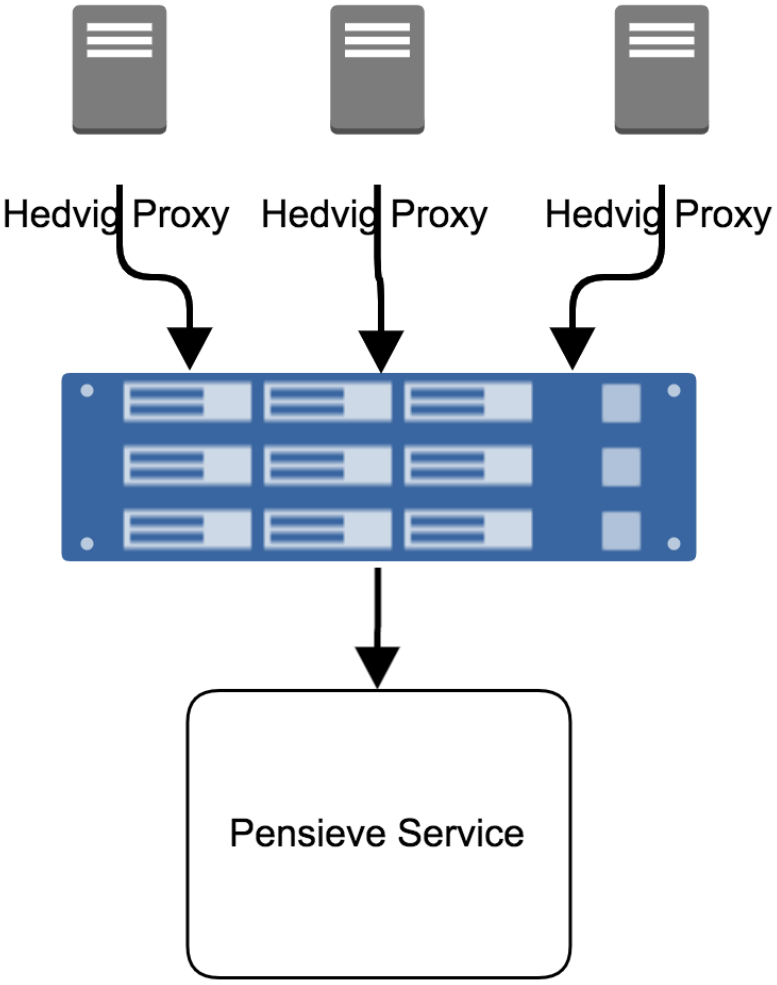


Figure 2: Data Flow from Hedvig Cluster Service to Pensieve Service

Pensieve Requirements and Sizing Guidelines

Pensieve Webservice Host Minimum Requirements

OS	CentOS 7
RAM	16 GB
CPU	4 cores
Hard Disk	100 GB

Pensieve Database Minimum Requirements

OS	CentOS 7.6 +
CPU	>= 2.3 GHz 12 cores (with SSE 4.2 and PCLMUL support required)
RAM	48 GB
HD	• 2 TB (serves approximately 5 clusters, with metrics updated every 5 minutes and data expiring after 1 year). • NVMe SSDs are highly recommended (no drive number requirement; if multiple drives, then a RAID 0 setup is recommended). • When using HDD, an additional separate commit log disk should be configured.
Network	10 Gbps +

Note: For more detail, see *Installing Pensieve*.

Pensieve Sizing Guidelines (Single Pensieve Database Node)

Pensieve sizing depends on three factors:

- metric ingestion rate
- metric number
- cluster size

Note: There is a calculator to make a sizing estimation for the Pensieve database setup. Contact Commvault for more information.

number of metrics	20	20	20
beam interval (min)	5	5	5
metrics retention (year)	1	1	1
number of server nodes	3	6	9
number of proxies	1	3	3
number of exports (virtual disks)	100	500	1000
disk requirement	120 GB	1.5 TB	4 TB

Installing Pensieve

This installation procedure handles both Pensieve web host and Pensieve database cluster installation.

1. Before running the `deploy_new_cluster` command, add the following parameters to the Hedvig Ansible Configuration file (.ansi).

   ```
   [all:vars]
   timeseries_name=<Customer Display Name>
   timeseries_webserver=<Webserver Hostname>:8080
   ```

   The `timeseries_name` could be the name of your company or entity. On the Pensieve end, the cluster is displayed as `<timeseries_name>:<cluster_name>`. For example, if Hedvig has a cluster named `test_cluster`, and `Hedvig` is entered as the `timeseries_name`, then Pensieve displays the cluster as `Hedvig:test_cluster`.

   The `timeseries_webserver` is the host running the Pensieve web service.

   For example:

   ```
   [all:vars]
   timeseries_name=Hedvigcst1
   timeseries_webserver=nb1.hedviginc.com:8080
   ```

2. Before installing the Pensieve database cluster nodes, make sure the following prerequisites have been met:

   - Processor with SSE 4.2 and PCLMUL support
   - Data disk with at least 1 TB for the data directory and formatted as XFS
   - Data directory created on all nodes, for example, `/mnt/pensieve/data`
   - Internet access

   Then, run the following commands:

   ```
   export HV_ROOTPASS=<root-password-of-timeseriesdb-nodes>

   hv_deploy --setup_pensievedb <timeseries DB nodes FQDN space
   separated> --cluster_name <hedvig cluster name>
   --pensievedb_data_dir <timeseries DB Data Directory>
   ```

   For example:

   ```
   export HV_ROOTPASS=hedvig

   hv_deploy --setup_pensievedb pensievedb1.hedviginc.com
   pensievedb2.hedviginc.com pensievedb3.hedviginc.com
   --cluster_name norbertthree --pensievedb_data_dir /mnt/pensieve/data
   ```

3. Install the Pensieve web service host, using the following commands:

```
export HV_ROOTPASS=<root-password-of-webserver-nodes>

hv_deploy --setup_pensieveweb <webserver nodes FQDN space separated>
--cluster_name <hedvig cluster name> --pensievedb_hosts <pensievedb
nodes FQDN comma separated> --pensievedb_root_password <pensievedb
nodes root password>
```

For example:

```
export HV_ROOTPASS=hedvig

hv_deploy --setup_pensieveweb nweb1.hedviginc.com nweb2.hedviginc.com
nweb3.hedviginc.com --cluster_name norbertthree --pensievedb_hosts
pensievedb1.hedviginc.com,pensievedb2.hedviginc.com,
pensievedb3.hedviginc.com --pensievedb_root_password hedvig
```

Using the Hedvig WebUI to Configure Metrics

To configure the metrics to send to Pensieve, go to the main Hedvig WebUI page for your cluster, and select **Metrics Configuration**, under the Settings (cog) icon.

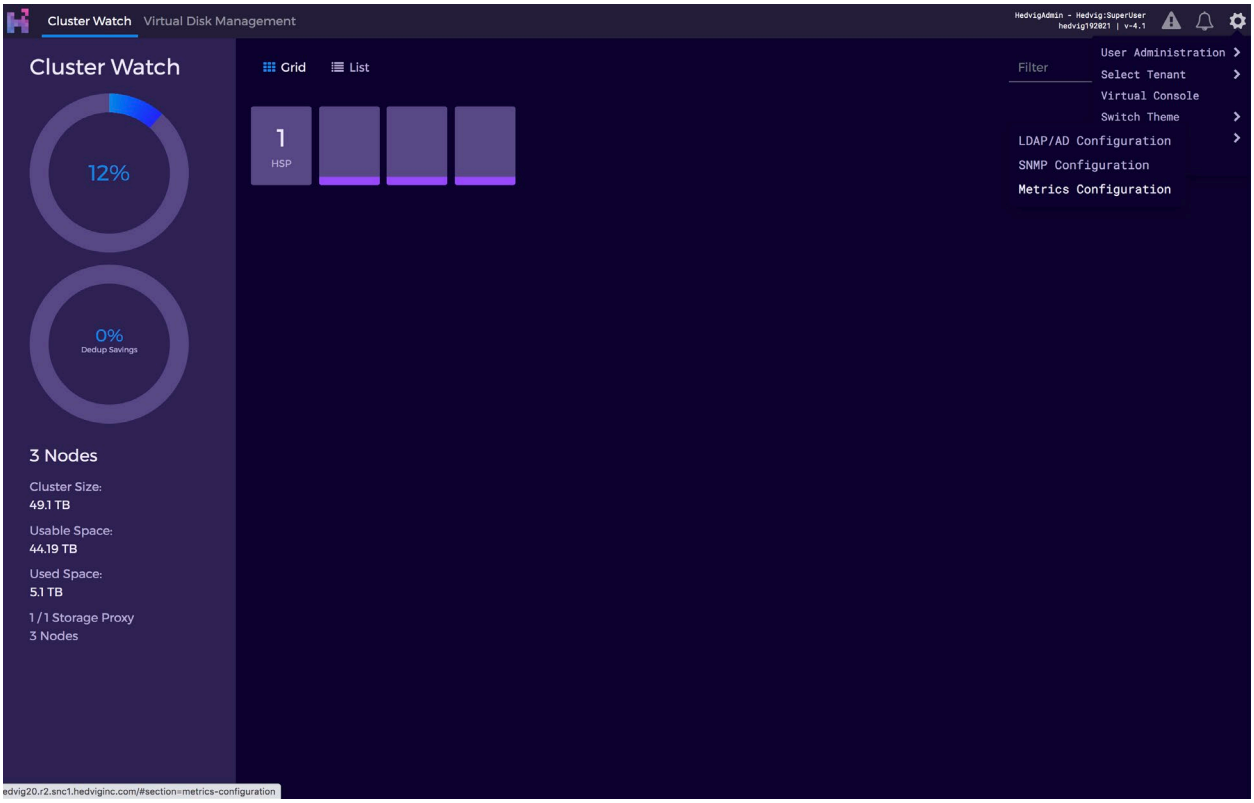


Figure 3: Main Hedvig WebUI Page - Selecting Metrics Configuration from Settings

The following sections provide more detail about configuring metrics for Pensieve:

- *Metrics Configuration Landing Page*
- *Adding New Metrics*
- *Deleting Metrics*
- *Editing the Config*

Metrics Configuration Landing Page

On the **Metrics Configuration** landing page, you can configure two things:

- Time Series service property attributes
- Metrics

The **Config** section provides the following information:

- the metrics collection interval, displayed in seconds
- the time period after which the metrics will expire, after being persisted on Pensieve
- the Pensieve web host to which the metrics are sent

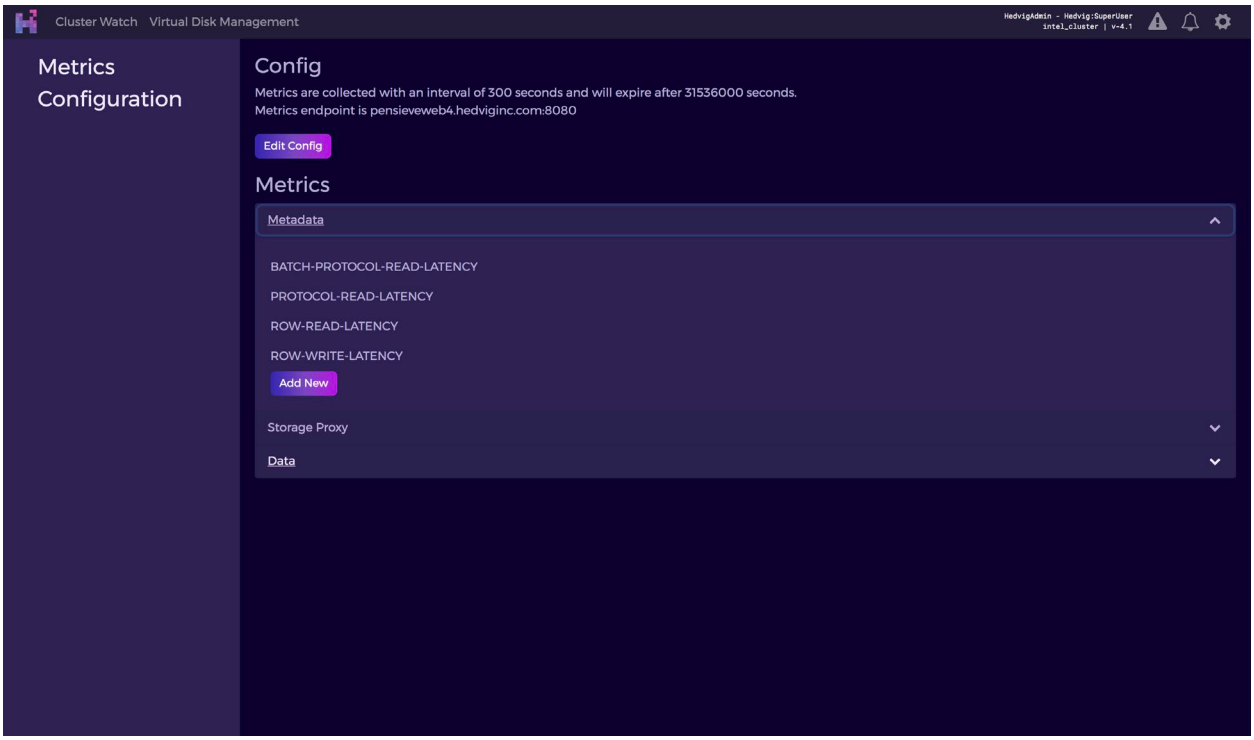


Figure 4: Metrics Configuration Landing Page

Adding New Metrics

To add new metrics to any service:

1. On the **Metrics Configuration** landing page, click the **Add New** button.

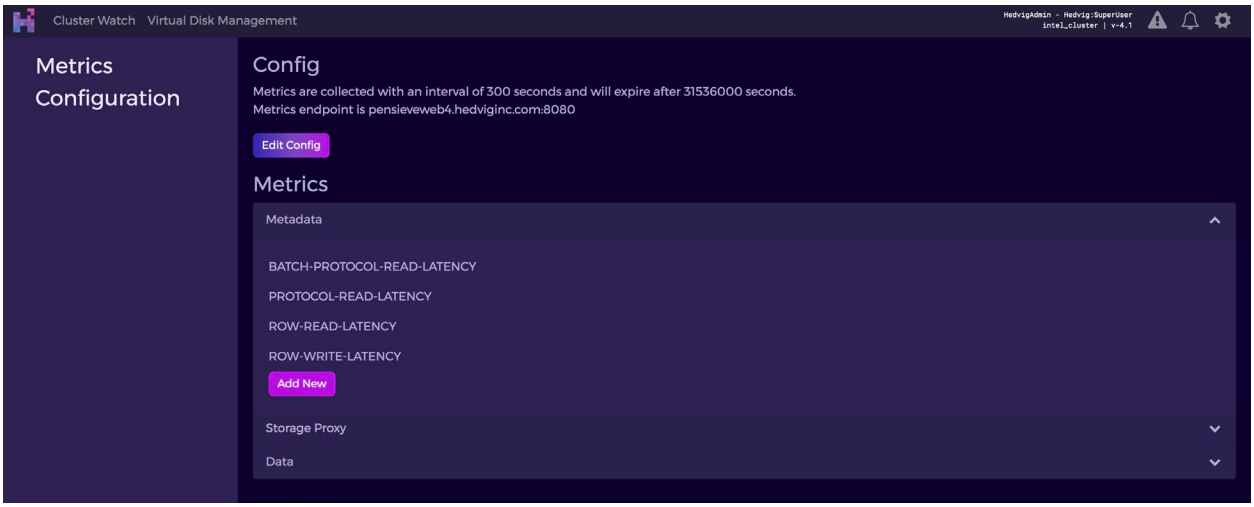


Figure 5: Metrics Configuration Landing Page - Add New Button

2. A pop-up window is displayed. Type in the metrics you would like to add, and click OK.

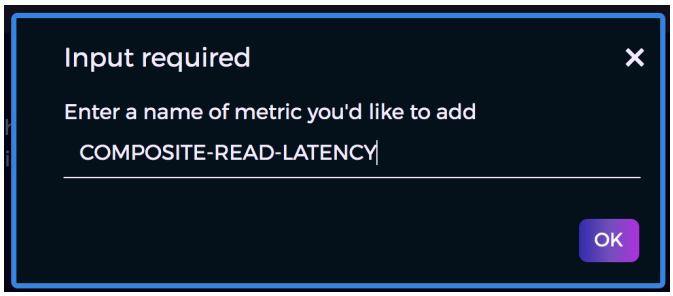


Figure 6: Adding Metrics Pop-up Window

The metrics are added to the modification list, with a "+" beside the metric name to indicate that this is an added metric.

3. Perform as many Add and Delete operations, as needed. Then, click **Save** to save your changes.

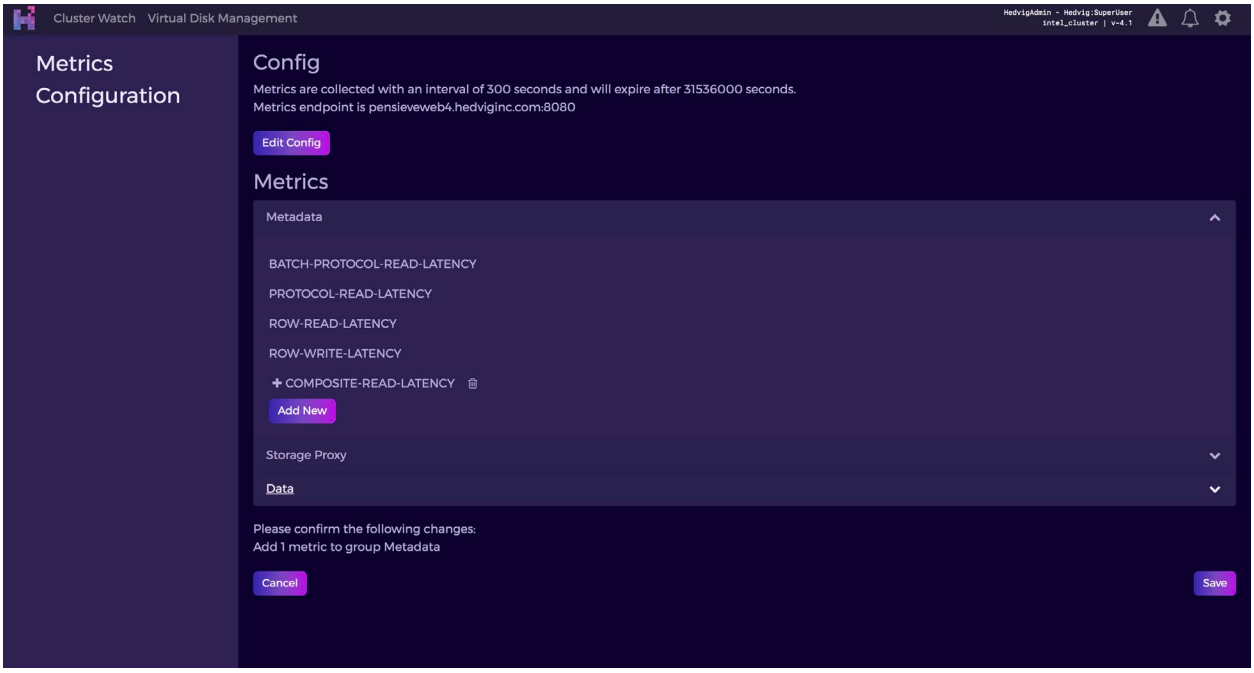


Figure 7: Metrics Configuration - Saving Changes

Deleting Metrics

To delete a specific metric, simply click the delete button, and then click **Save** to save the changes.

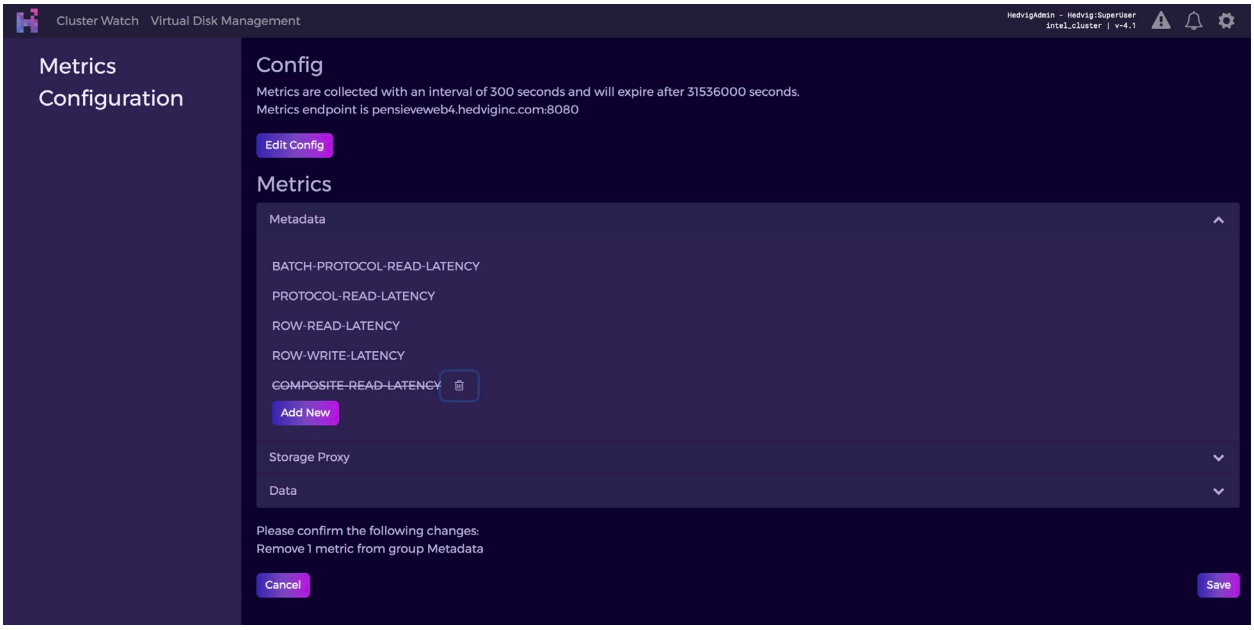


Figure 8: Metrics Configuration - Deleting Metrics

Editing the Config

You can change the following time series settings for the cluster:

- metrics sending interval
- expiration time
- Pensieve web host endpoint address

Click **Save** to apply your changes.

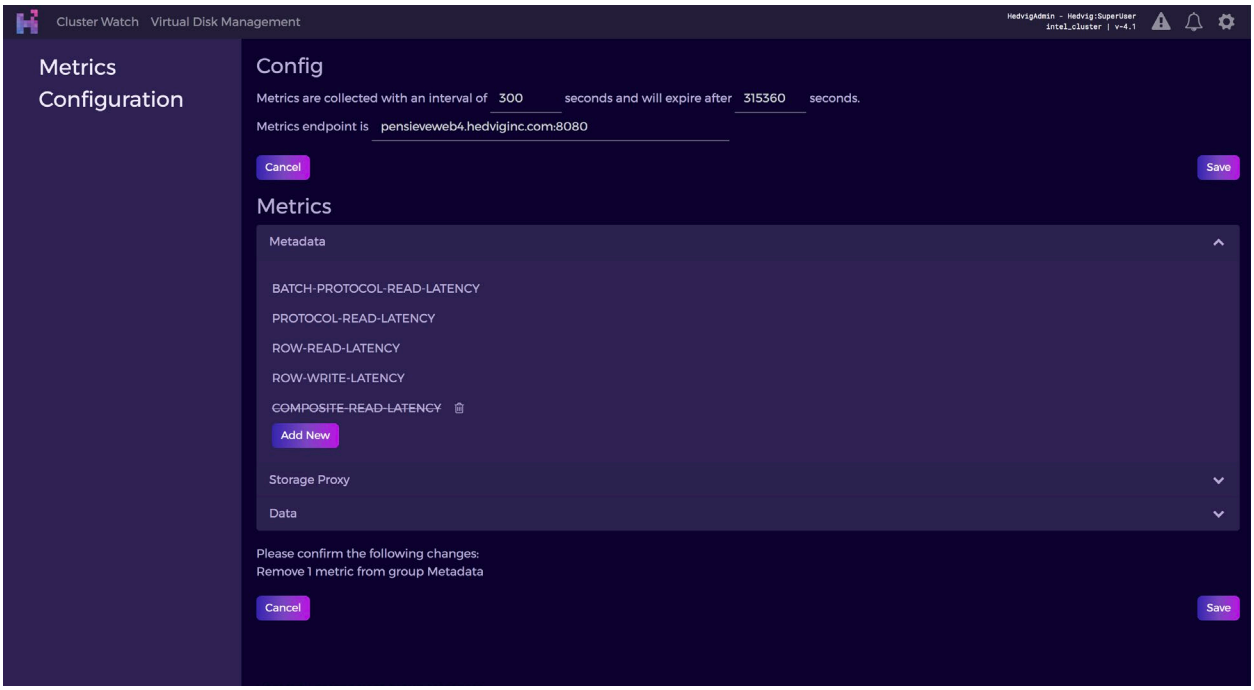


Figure 9: Metrics Configuration - Editing the Config

Viewing Metrics on the Pensieve Dashboard Page

To view the metrics on the Pensieve Dashboard Page, follow these steps.

1. Login to the Pensieve web host url, for example:

   http://pensieveweb4.hedviginc.com:8080/ui/index.html

   The default login credentials are:

   Username: admin Password: hedvig

2. You can view only one cluster at a time. Type in the desired cluster name, and login using the appropriate credentials.

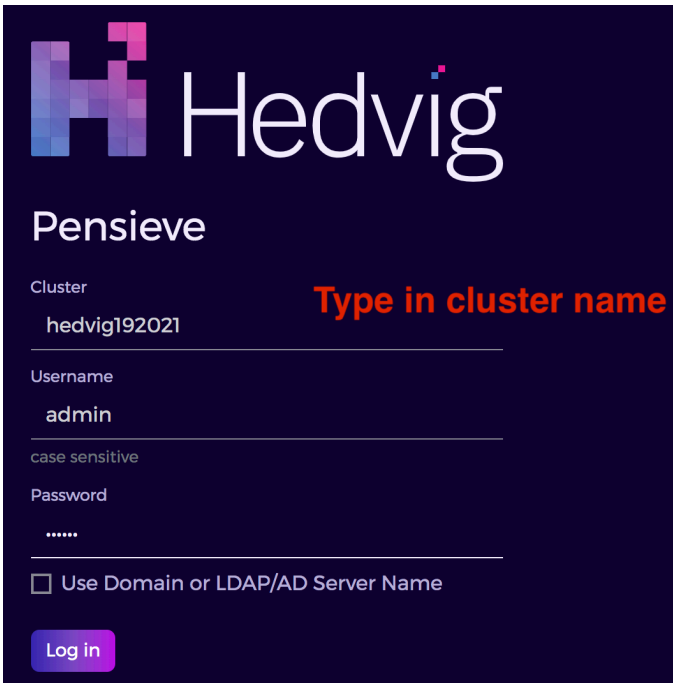


Figure 10: Logging into Pensieve

For LDAP users, check the box beside **Use Domain or LDAP/AD Server Name**, and type in the LDAP server on the line displayed.

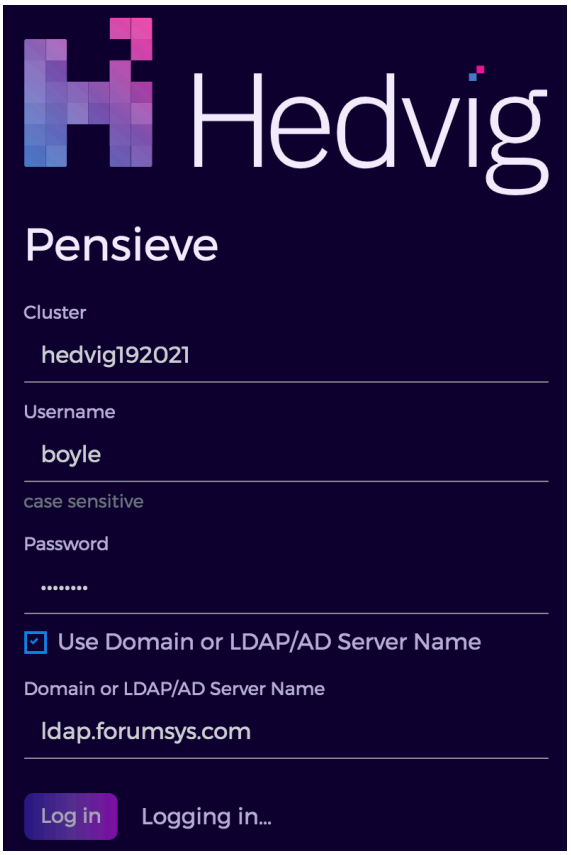


Figure 11: Logging into Pensieve - LDAP Users

If the cluster name you entered is correct, you will see only this cluster's information.

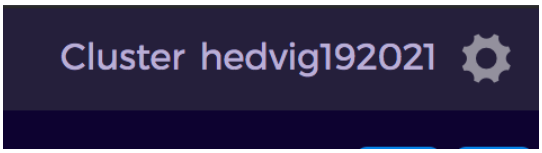


Figure 12: Logging into Pensieve - Verifying Correct Cluster Name

3. On the Pensieve Dashboard page, after you select a cluster at the top right, the following four major sections are displayed:

   - **Cluster Information**, which displays the number of Metadata Services, the number of Data Services, and the number of Hedvig Storage Proxies (HSPs) that are talking to Pensieve
   - **Cluster Fill Level**, which displays the usage of the cluster
   - **VDisks Overview**, which displays the number of virtual disks (vdisks) in each category
   - **IOPS/Throughput/Latency/Process Stats**, which displays cluster-wide IO activities information

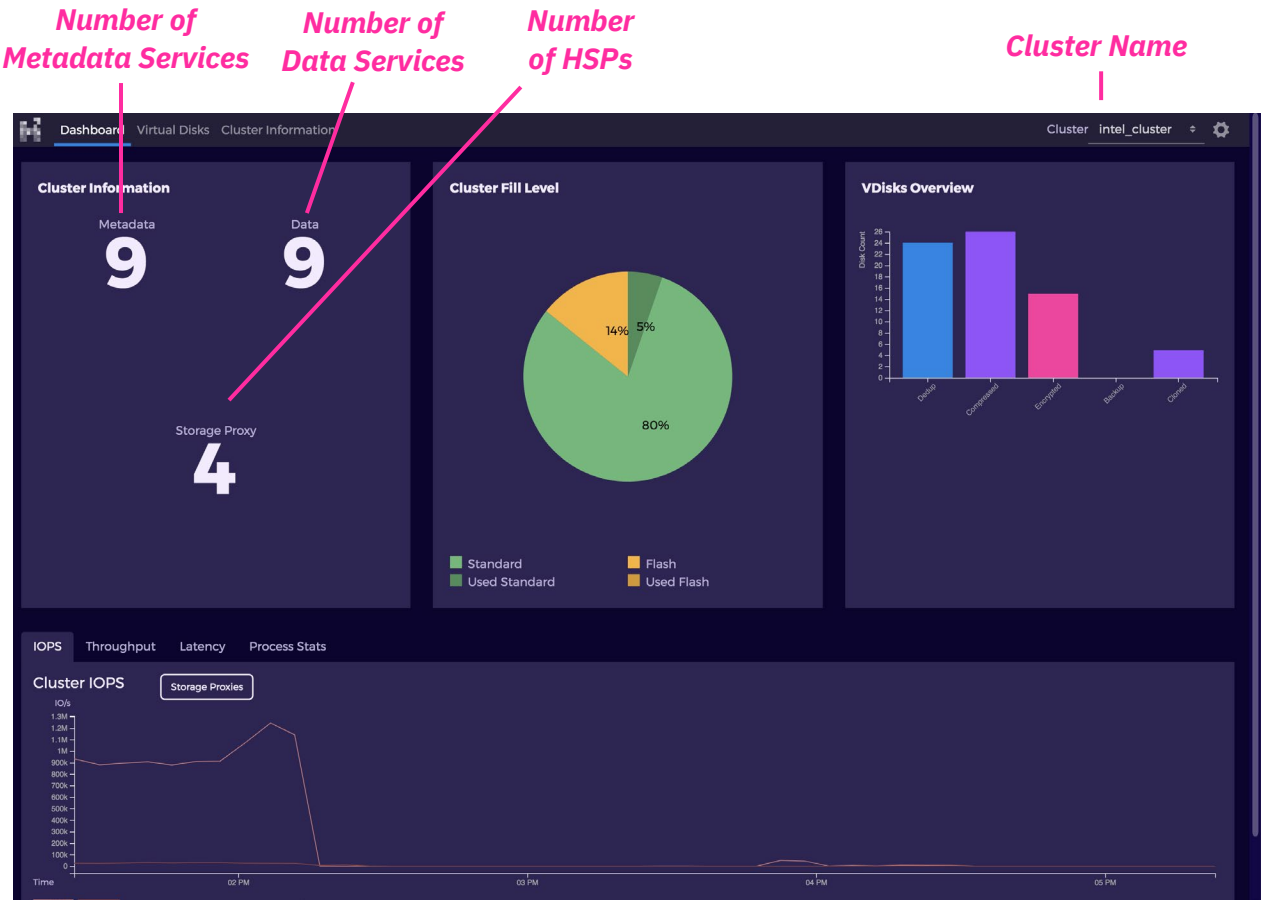


Figure 13: Pensieve Dashboard Page

Cluster Information

If you click **Cluster Information** at the top left of the Dashboard, or select the **Cluster Information** tab, you are directed to the following page, which displays:

- the nodes talking to Pensieve
- the process type
- the last time the node sent an update to Pensieve

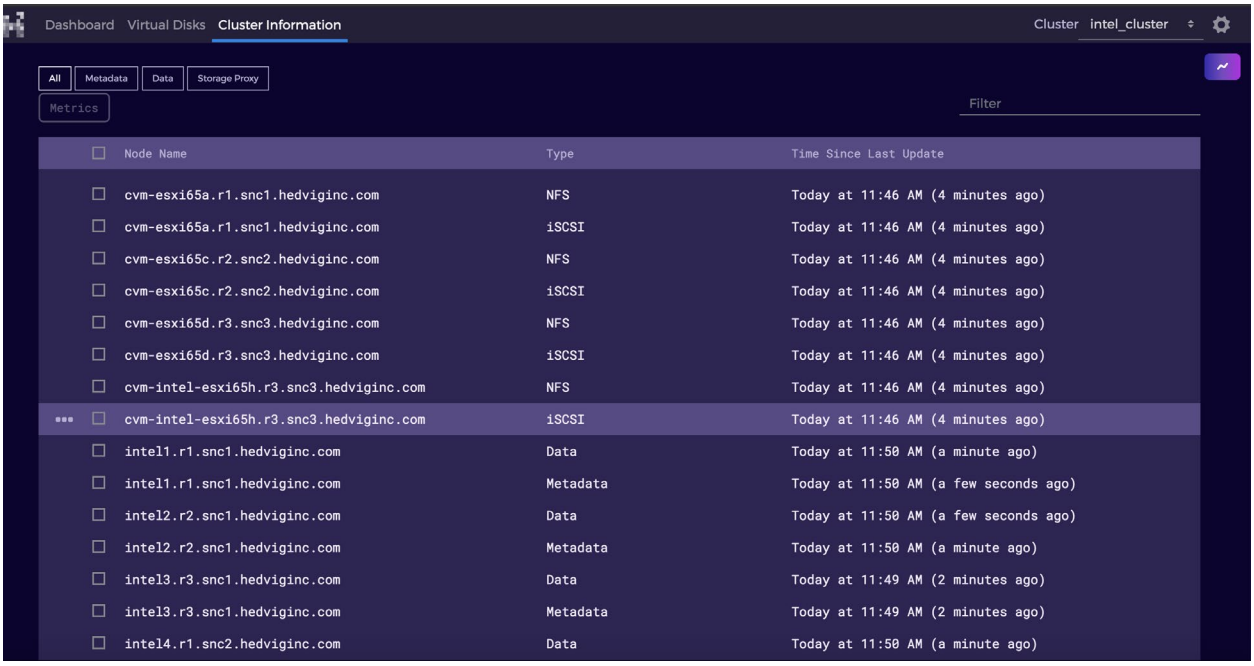


Figure 14: Cluster Information Page

1. To check node-specific metrics, click the **...** button next to the node, and select **Metrics**.

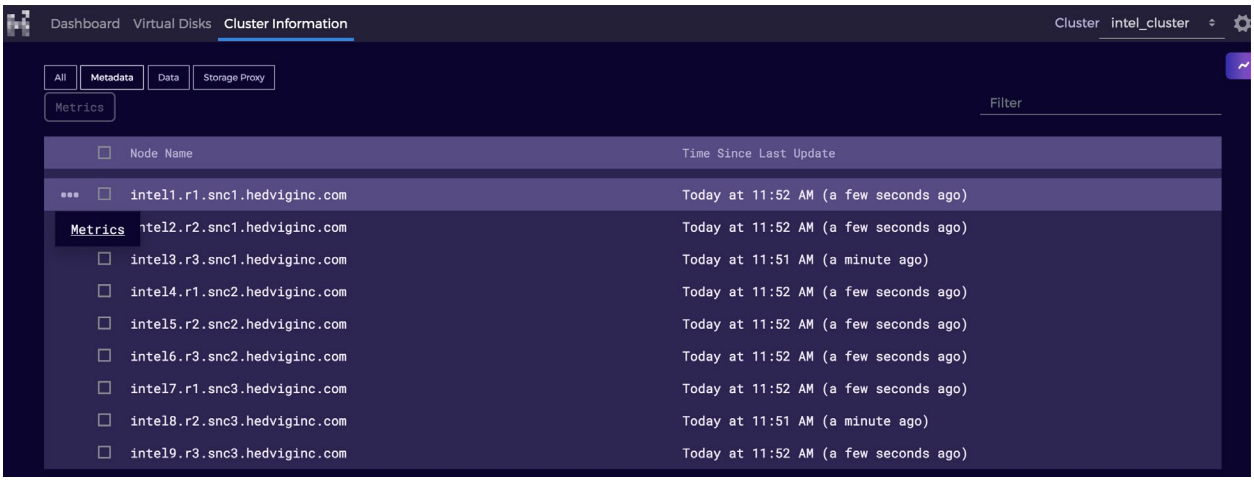


Figure 15: Cluster Information - Selecting Metrics for a Specific Node

2. In the **Pick metrics** dialog, select a **Group** on the left, and pick from the metric **Names** on the right. Then, select the **Metric Type** (**Average**, **Maximum Value**, **90th percentile**, **99th percentile**, **Number of Updates**) to generate a chart.

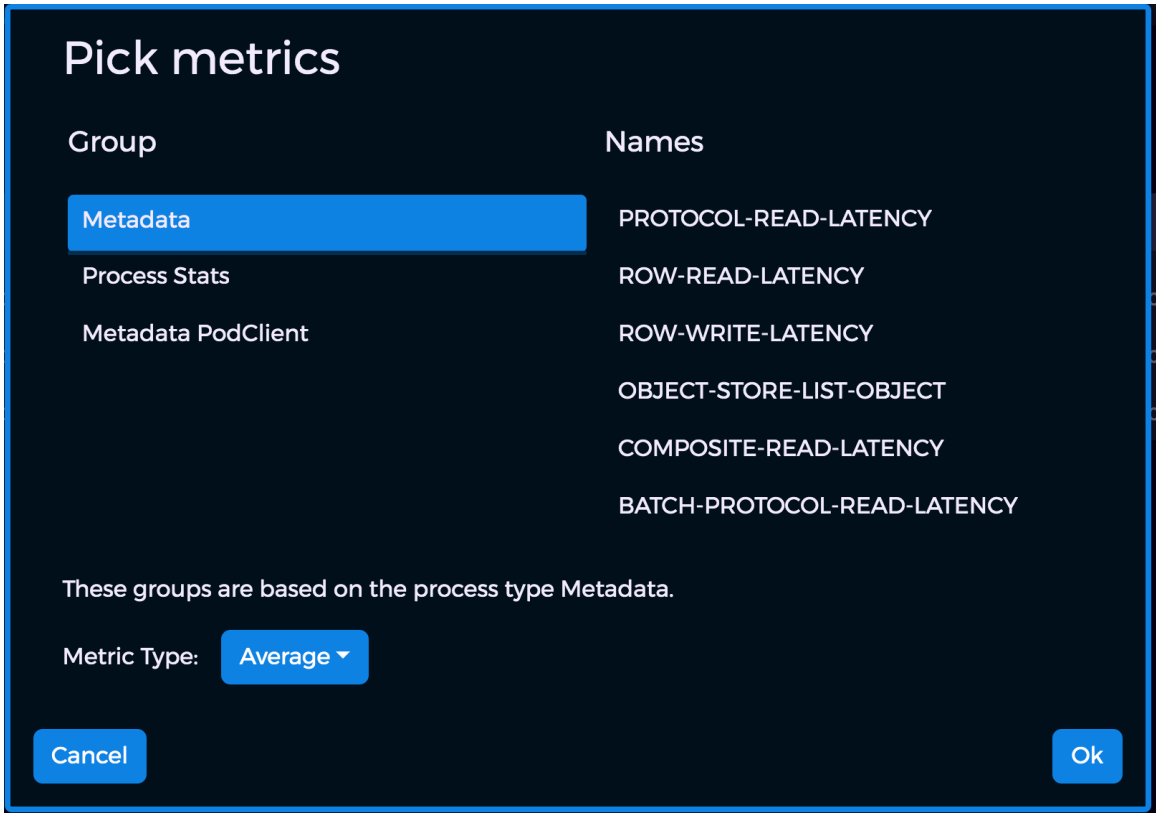


Figure 16: Pick metrics dialog

3. The resulting chart is shown for the default time range.

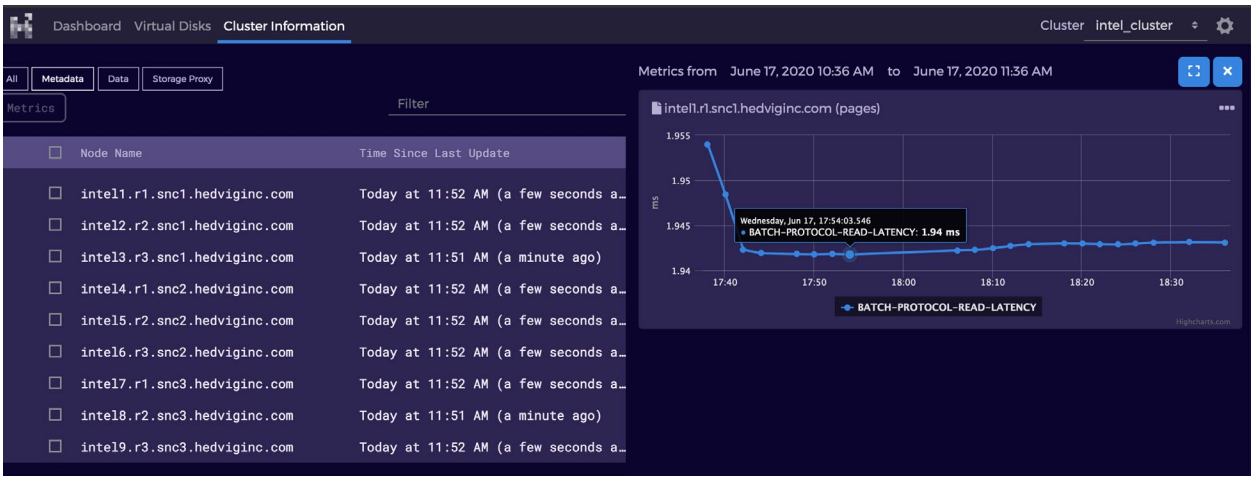


Figure 17: Cluster Information - Node-specific Metrics - Default Time Range

4. To change the time range, select different times in **from** and **to** fields.

   In the following figure, the **from** time range has been selected, which lets you select a different starting point for your chart.

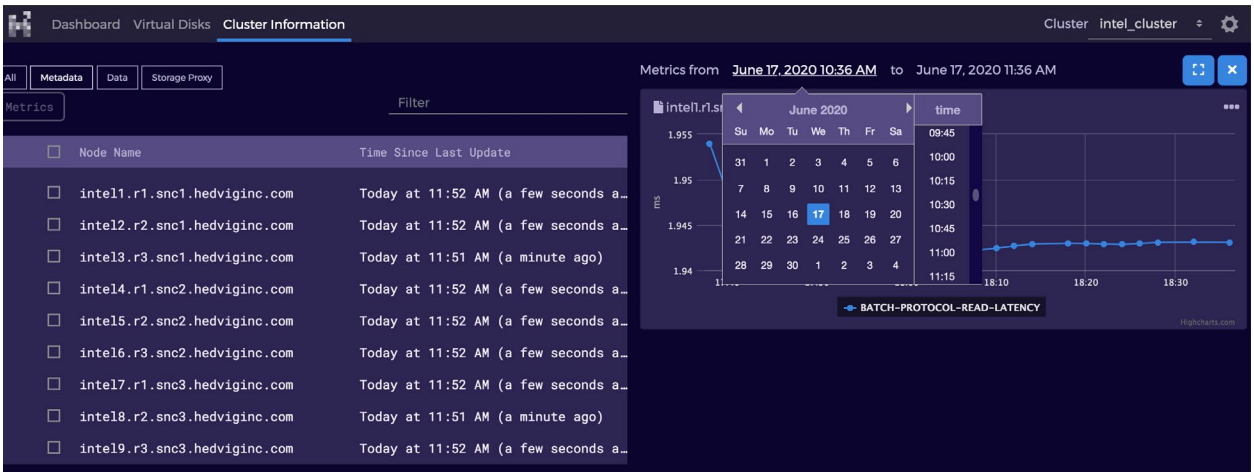


Figure 18: Cluster Information - Node-specific Metrics - Changing the Time Range

Fill Levels Page

If you click **Cluster Fill Level** in the middle of the Dashboard, the **Fill Levels** page shows the storage pools for each node. Each box shows the node usage percentage and the storage pool usage percentage.

When you hover over each storage pool, you can see detailed information, as follows:

- the storage pool identifier
- the number of containers that are attached to the storage pool
- the disks for the storage pool
- any disk failures in the storage pool

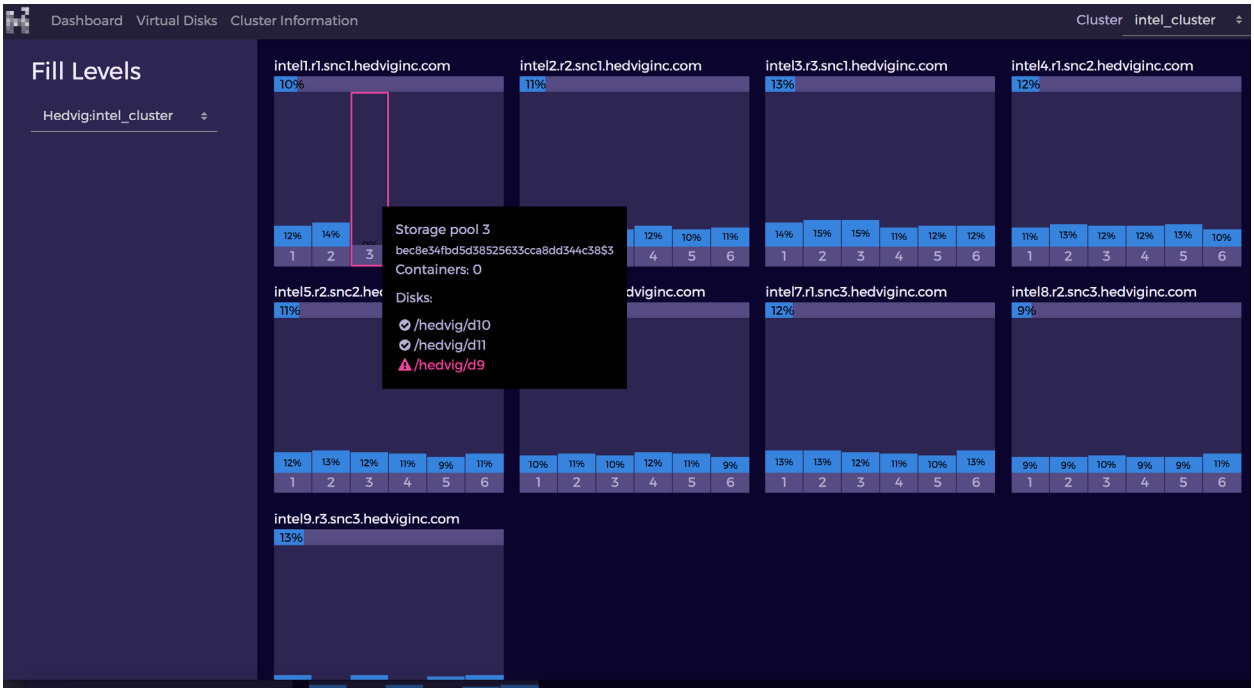


Figure 19: Fill Levels Page

IOPS Tab

The IOPS tab displays aggregate Cluster IOPS.

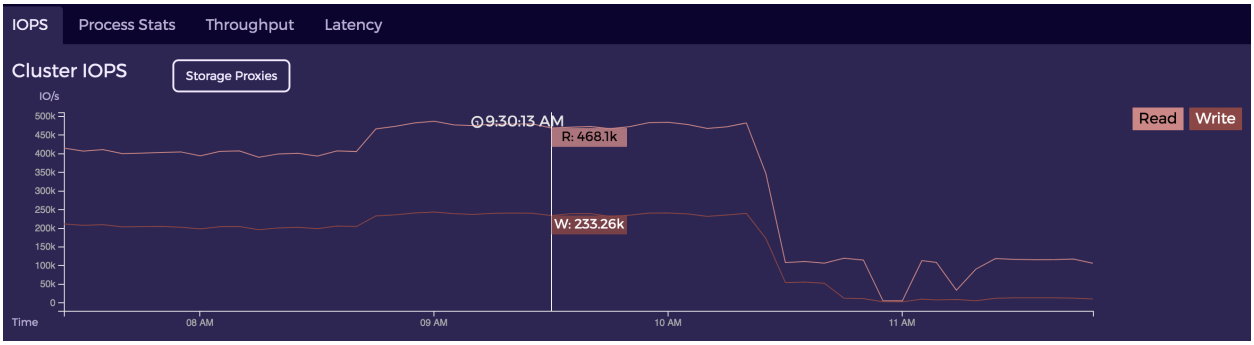


Figure 20: IOPS Tab

Process Stats Tab

The Process Stats tab displays CPU and Memory usage of server nodes and storage proxies (CVMs).

Figure 21: Process Stats Tab

Latency Tab

The Latency tab displays Cluster Latencies for the storage proxies.

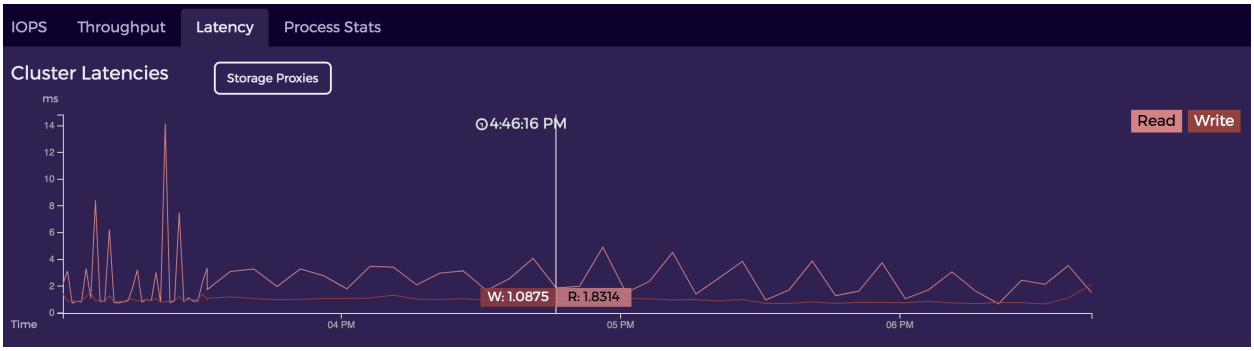


Figure 22: Latency Tab

Throughput Tab

The Throughput tab displays aggregate Cluster Throughput.

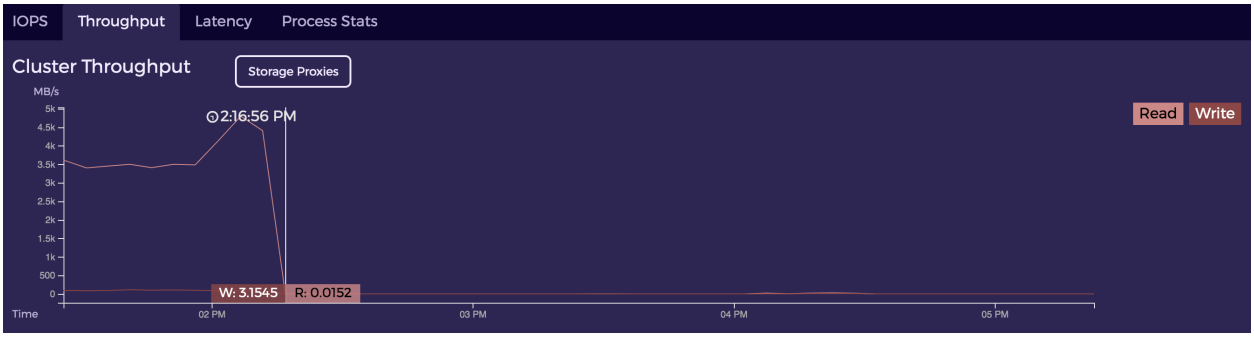


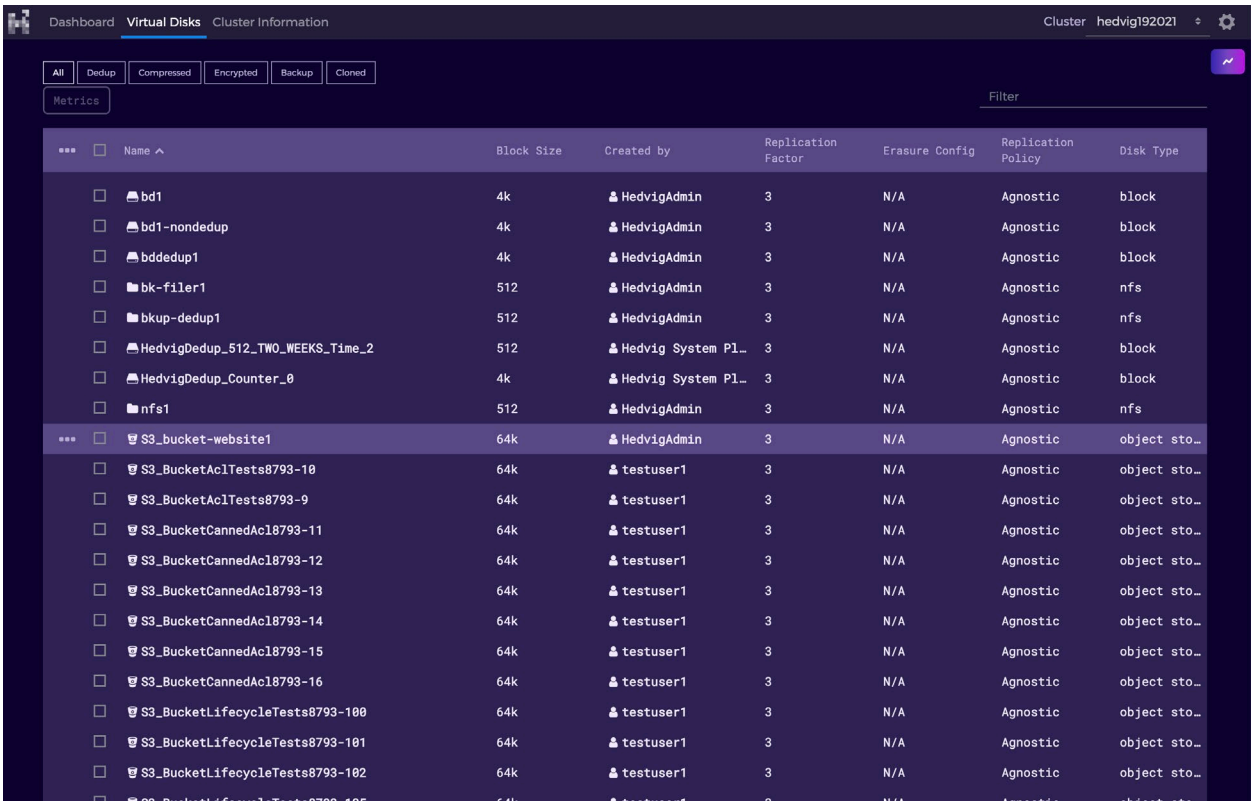
Figure 23: Throughput Tab

Virtual Disks Information

If you click **VDisks Overview** at the top right of the Dashboard, or select the **Virtual Disks** tab, you are directed to the following page, which displays all of the vdisks currently on your cluster.

Pick a tab at the top left to see all vdisks that are **Dedup** enabled, **Compressed**, **Encrypted**, of **Backup** type, or **Cloned**.

Use the **Filter** at the top right to filter certain vdisks.



Name	Block Size	Created by	Replication Factor	Erasure Config	Replication Policy	Disk Type
bd1	4k	HedvigAdmin	3	N/A	Agnostic	block
bd1-nondedup	4k	HedvigAdmin	3	N/A	Agnostic	block
bddedup1	4k	HedvigAdmin	3	N/A	Agnostic	block
bk-filer1	512	HedvigAdmin	3	N/A	Agnostic	nfs
bkup-dedup1	512	HedvigAdmin	3	N/A	Agnostic	nfs
HedvigDedup_512_TWO_WEEKS_Time_2	512	Hedvig System Pl…	3	N/A	Agnostic	block
HedvigDedup_Counter_0	4k	Hedvig System Pl…	3	N/A	Agnostic	block
nfs1	512	HedvigAdmin	3	N/A	Agnostic	nfs
S3_bucket-website1	64k	HedvigAdmin	3	N/A	Agnostic	object sto…
S3_BucketAclTests8793-10	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketAclTests8793-9	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-11	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-12	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-13	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-14	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-15	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketCannedAcl8793-16	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketLifecycleTests8793-100	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketLifecycleTests8793-101	64k	testuser1	3	N/A	Agnostic	object sto…
S3_BucketLifecycleTests8793-102	64k	testuser1	3	N/A	Agnostic	object sto…

Figure 24: Virtual Disks Page

If you click the ... to the left of a vdisk, you can select **Details**, **Metrics** collected at the granularity of this vdisk, or **NFS Datastore** to see the child vdisks for an NFS Master Vdisk.

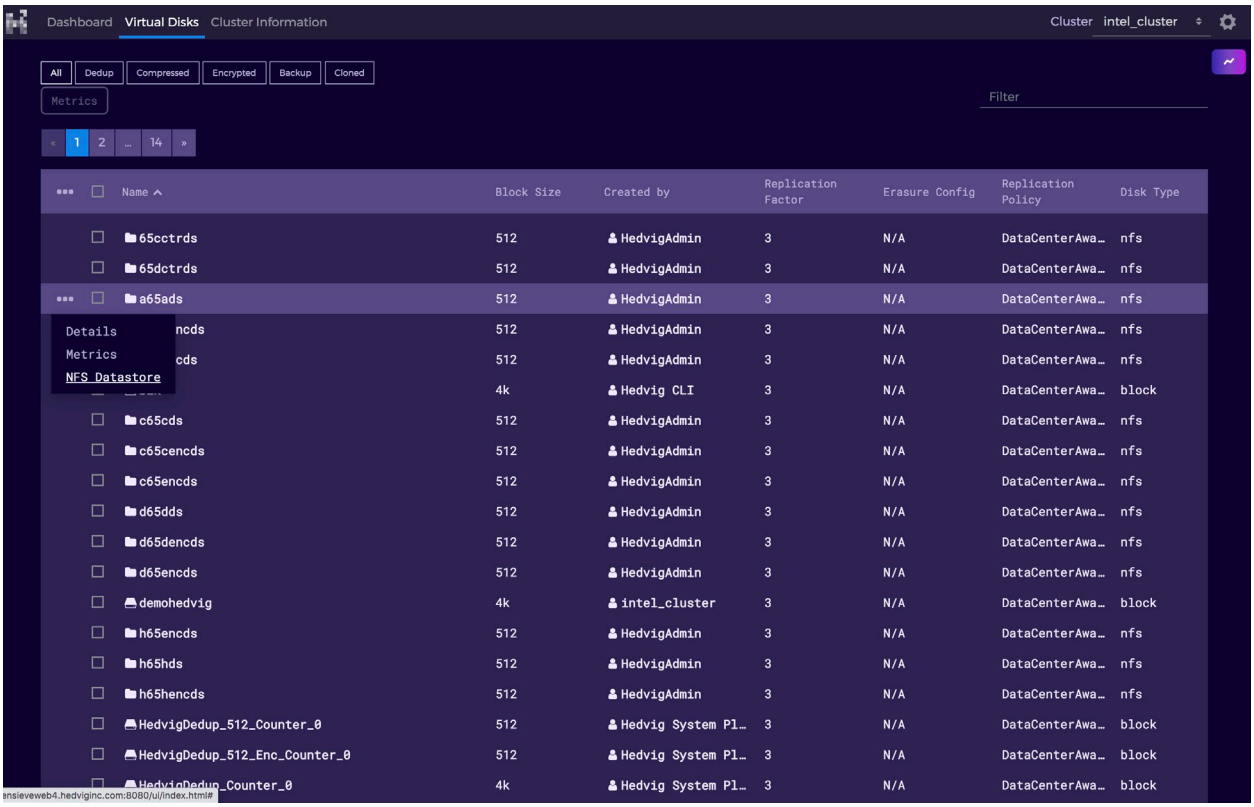


Figure 25: Virtual Disks Page - Dropdown Menu for Additional Vdisk Information

NFS Datastore

When you select **NFS Datastore**, the **NFS Datastore** dialog displays the child vdisk information.

Figure 26: NFS Datastore Dialog

Metrics

When you select **Metrics**, the **Pick metric** dialog lets you select:

- the category (**Server** side or **Proxy** side) for the metrics
- the metric name
- the **Metric Type** (**Average**, **Maximum Value**, **90th percentile**, **99th percentile**, **Number of Updates**)

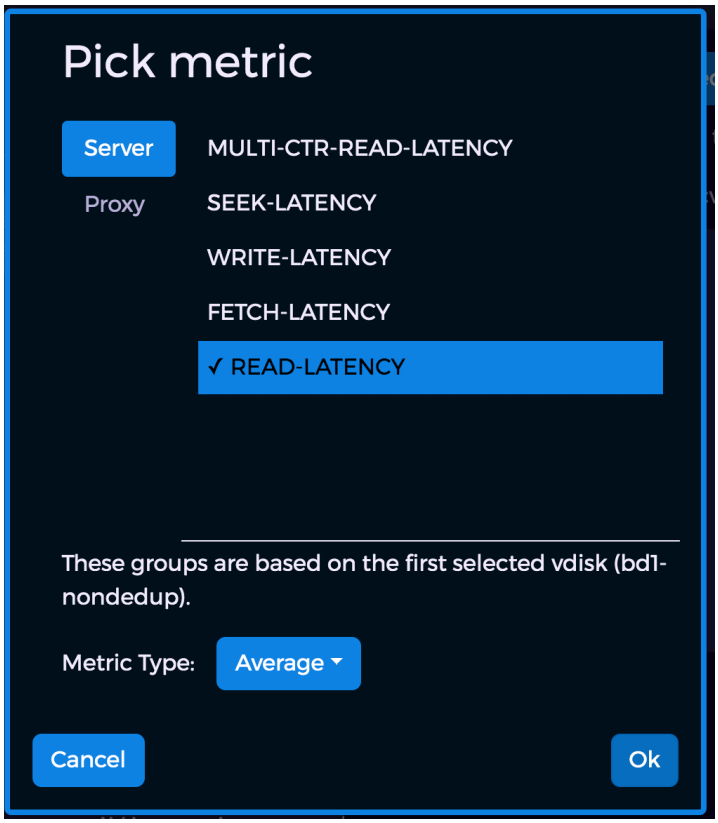


Figure 27: Pick metric Dialog

The generated chart is displayed, in which you can select:

- the node name
- the time range
- another metric or another vdisk to generate more charts to compare side-by-side

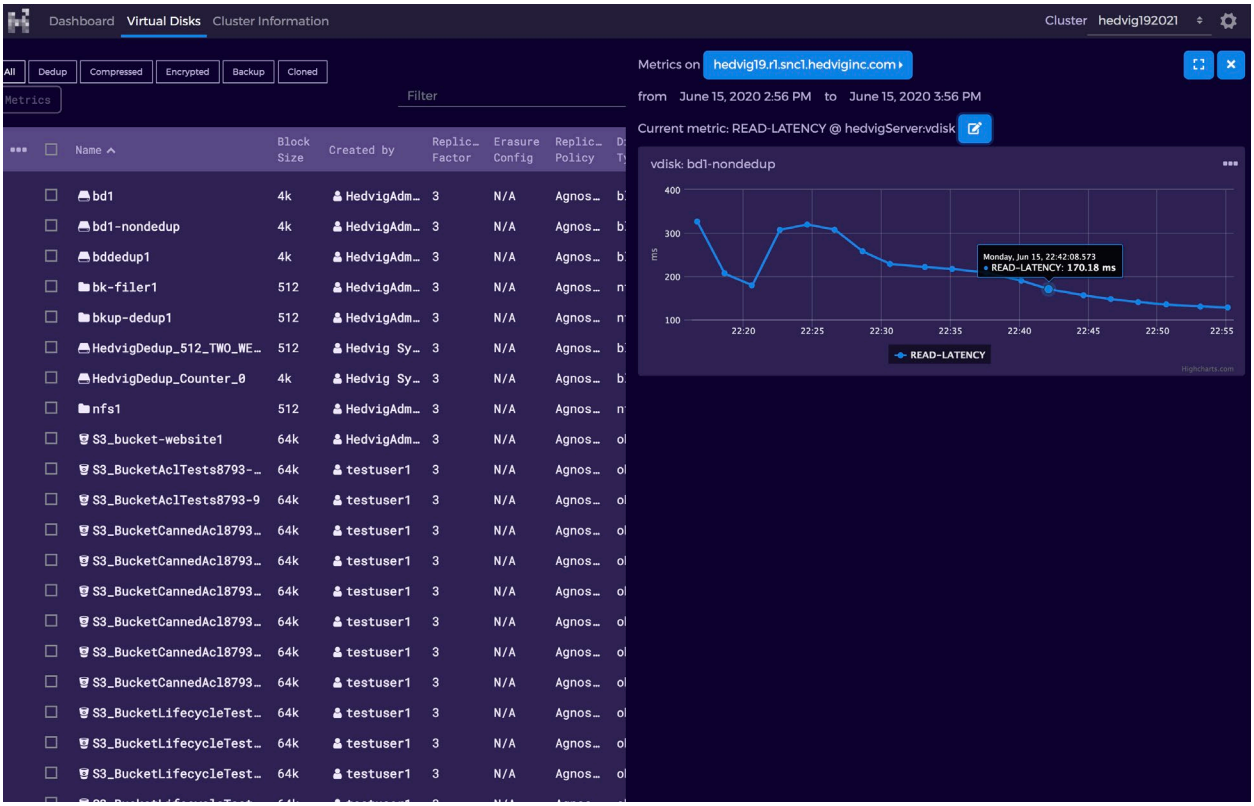


Figure 28: Virtual Disks Page - Generated Metrics Chart

User Management, Editing Profiles and LDAP/AD Configuration

User Management

1. To manage users, select **User Management**, under the Settings (cog) icon.

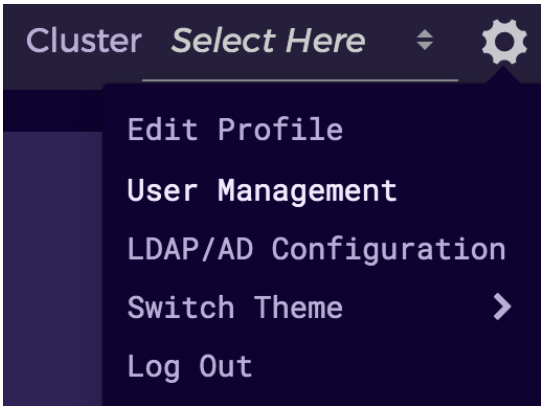


Figure 29: Selecting User Management from Settings

The **User Management** dialog is displayed.

Figure 30: User Management Dialog

2. To add a user, click the **Add User** button, and complete the **Add User** dialog.

   Note: You must be a SuperUser to manage and modify the user list.

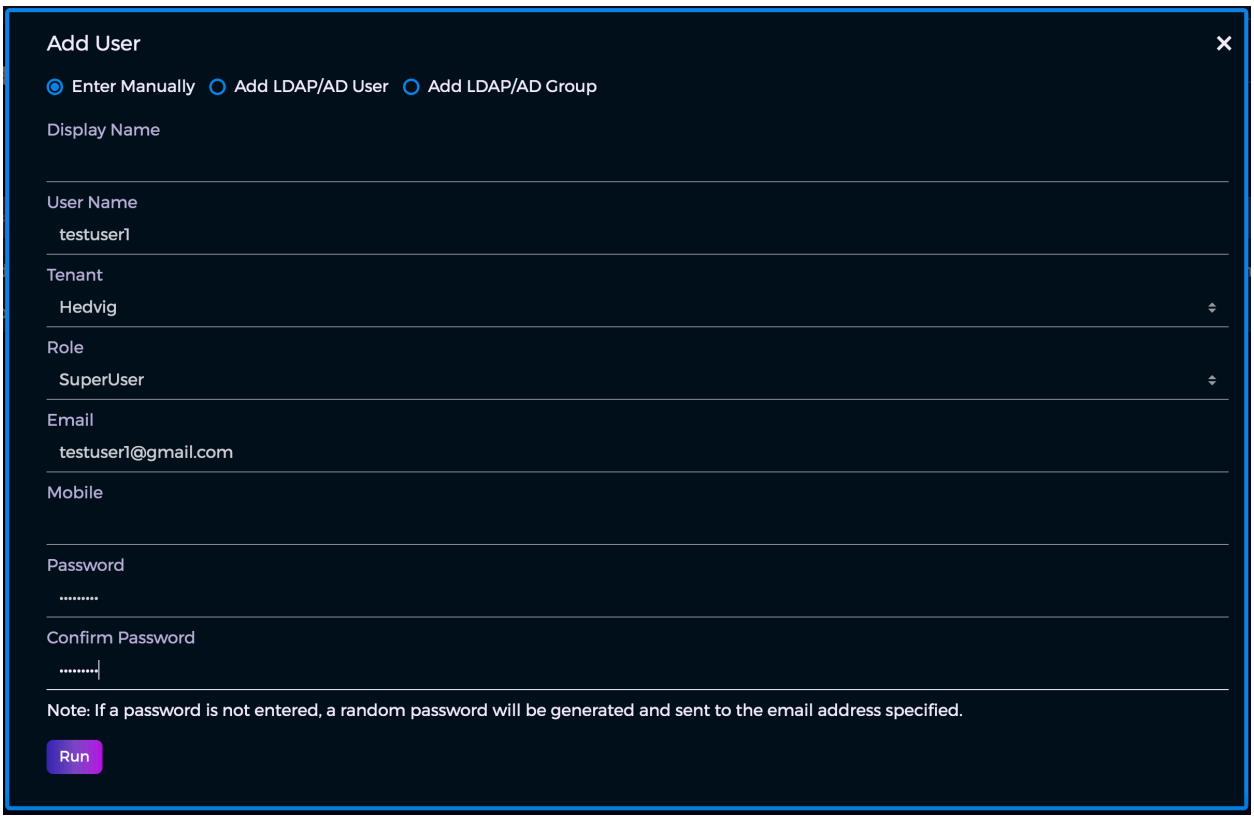


Figure 31: Add User Dialog

Editing Profiles

1. To edit your user profile, select **Edit Profile**, under the Settings (cog) icon.

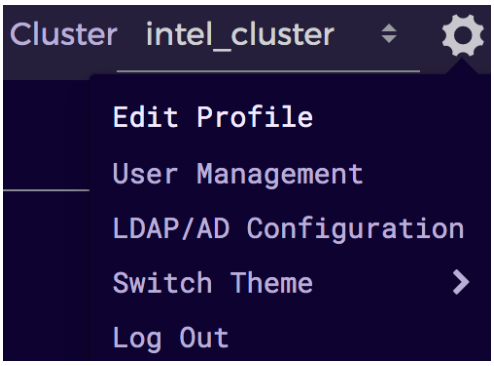


Figure 32: Selecting Edit Profile from Settings

2. In the **Edit Profile** dialog, you can change your profile settings, such as password, email, phone number, and more.

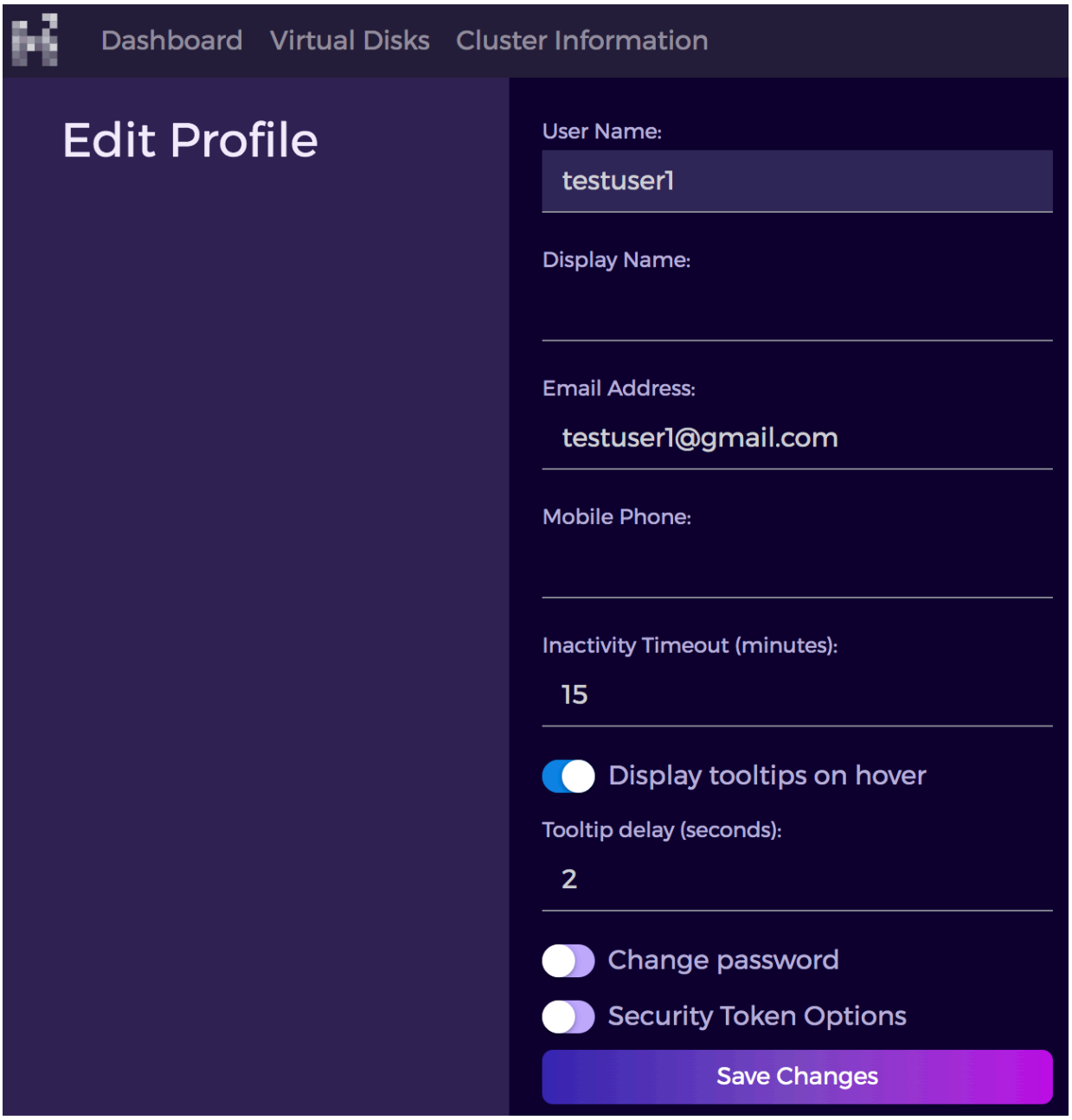


Figure 33: Edit Profile Dialog

LDAP/AD Configuration

If you are a SuperUser, you can configure Pensieve's LDAP/AD configuration.

1. Select **LDAP/AD Configuration**, under the Settings (cog) icon.

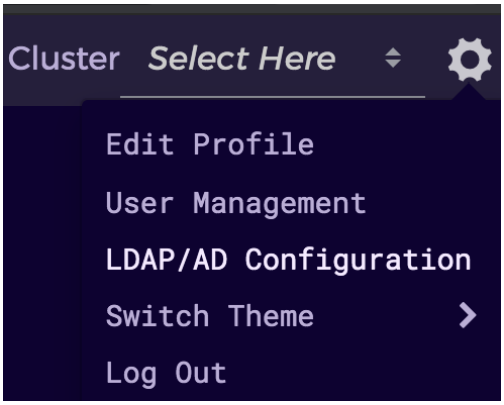


Figure 34: Selecting LDAP/AD Configuration from Settings

2. Complete the **LDAP/AD Configuration** dialog.

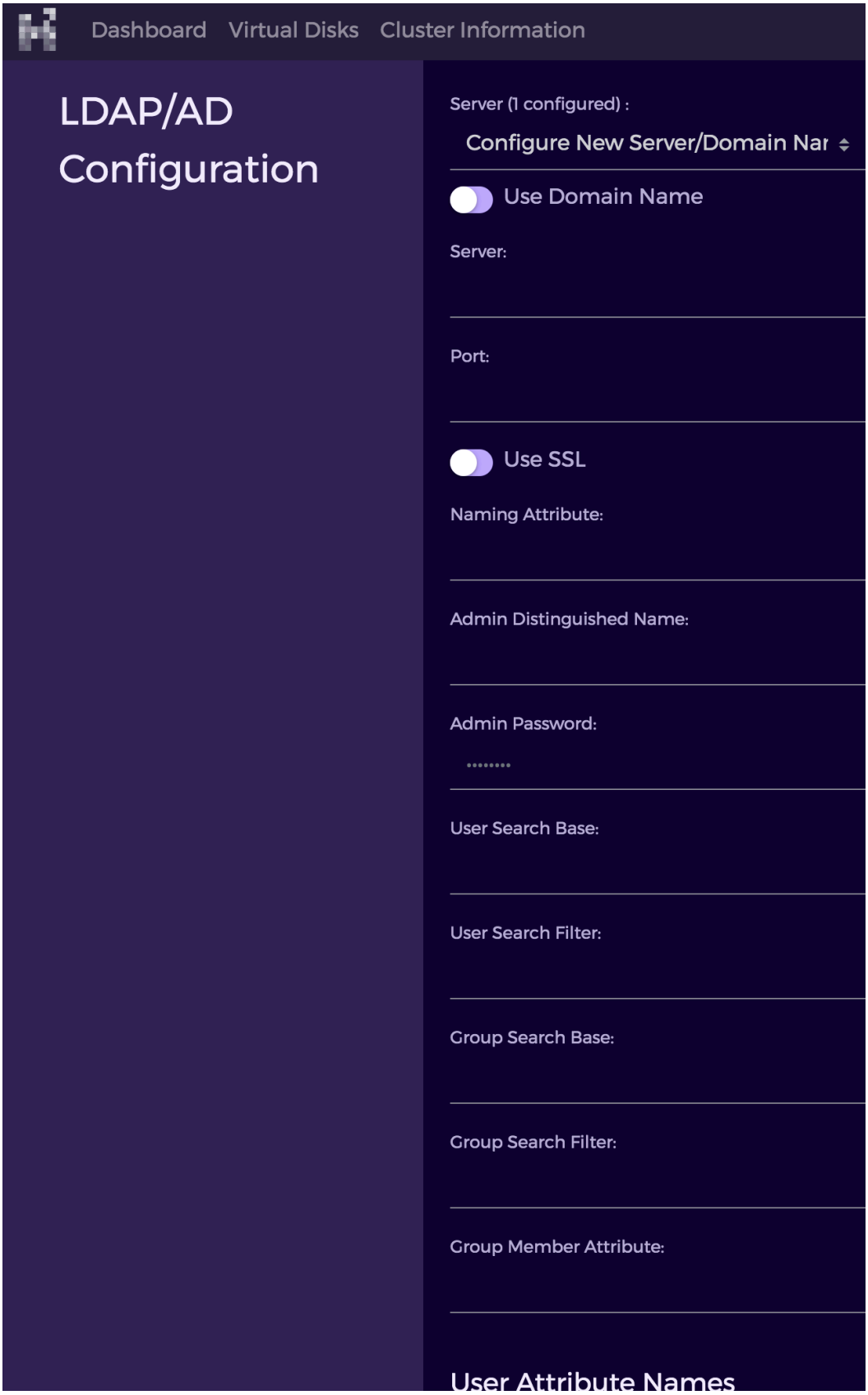


Figure 35: LDAP/AD Configuration Dialog

3. To enable LDAP/AD users for login, you must add group mapping for them.

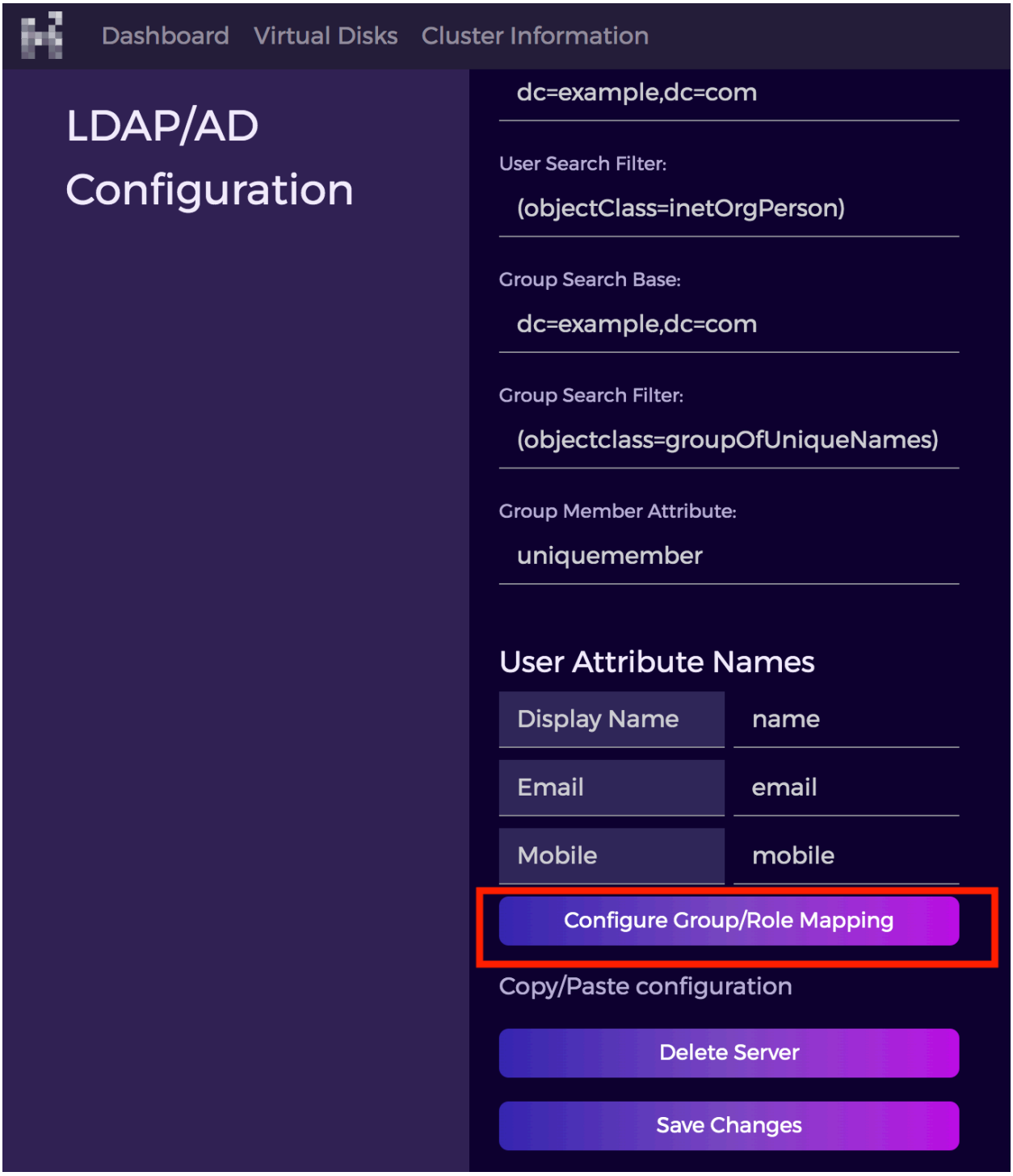


Figure 36: LDAP/AD Configuration - Configure Group/Role Mapping

4. In the **Group/Role Mapping** dialog, each group's users are mapped to a specific role.

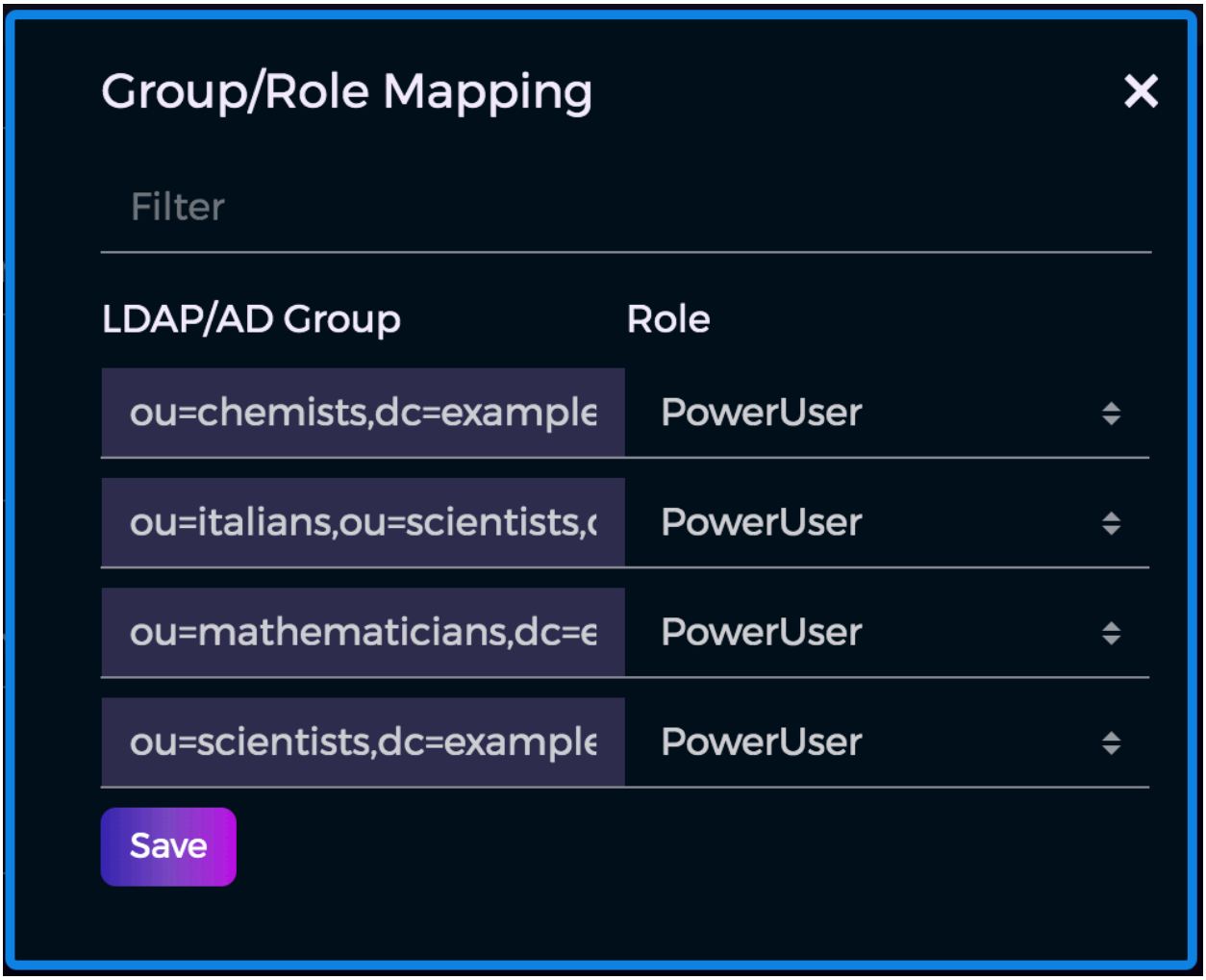


Figure 37: Group/Role Mapping Dialog