Management Console User Guide

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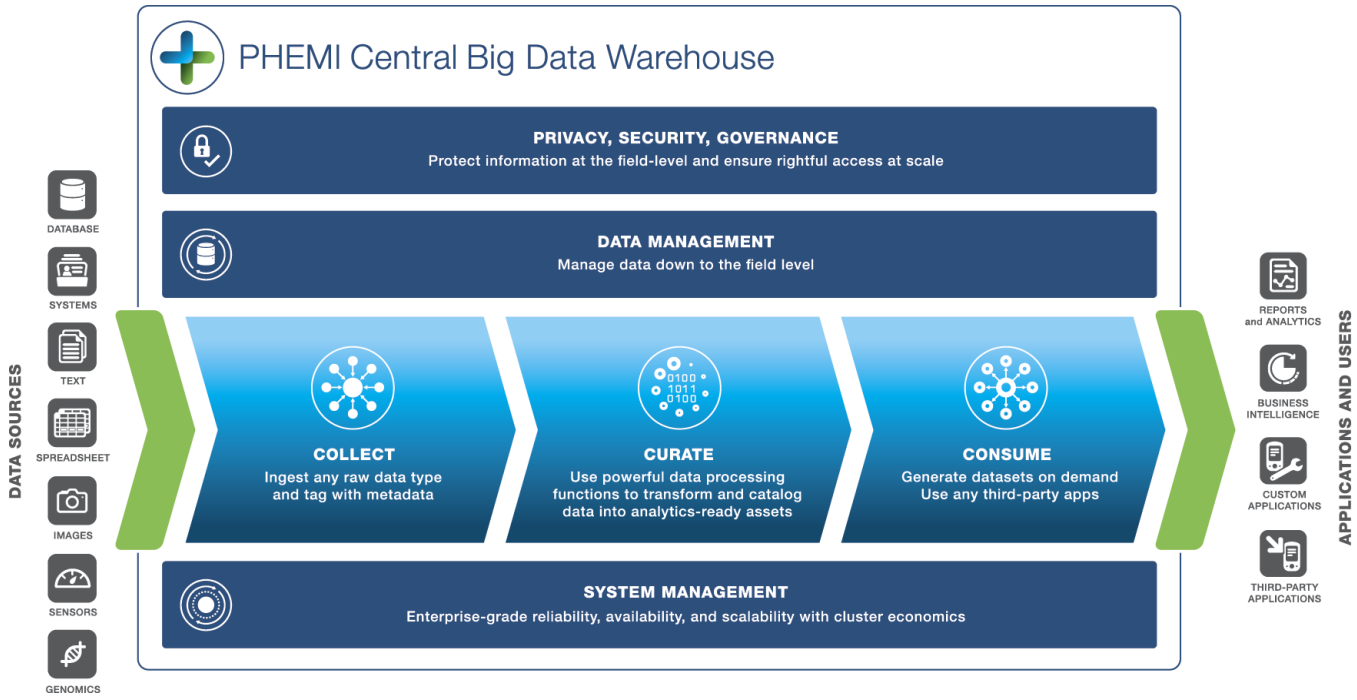
Introducing PHEMI Central

PHEMI Central is a big data warehouse that offers big data capability with fully integrated privacy, security, and governance and advanced data management functionality.

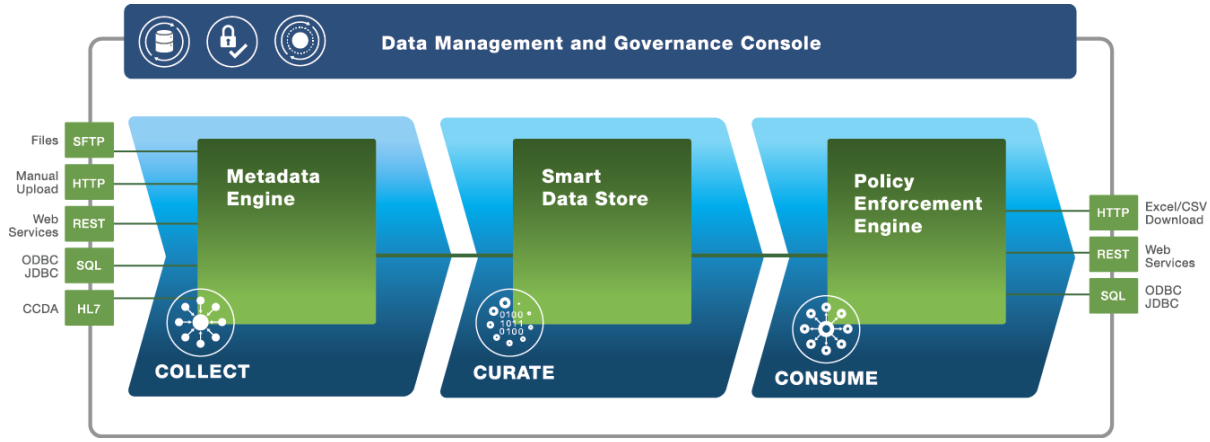
PHEMI Central allows organizations that need to protect and govern the use of their information to take advantage of big data technology to access, catalogue, and analyze their digital assets at speed and scale.



Data in PHEMI Central

Data in PHEMI Central follows a lifecycle of collect, curate, and consume.

Throughout the data lifecycle, data is managed according to the organization's governance policies.

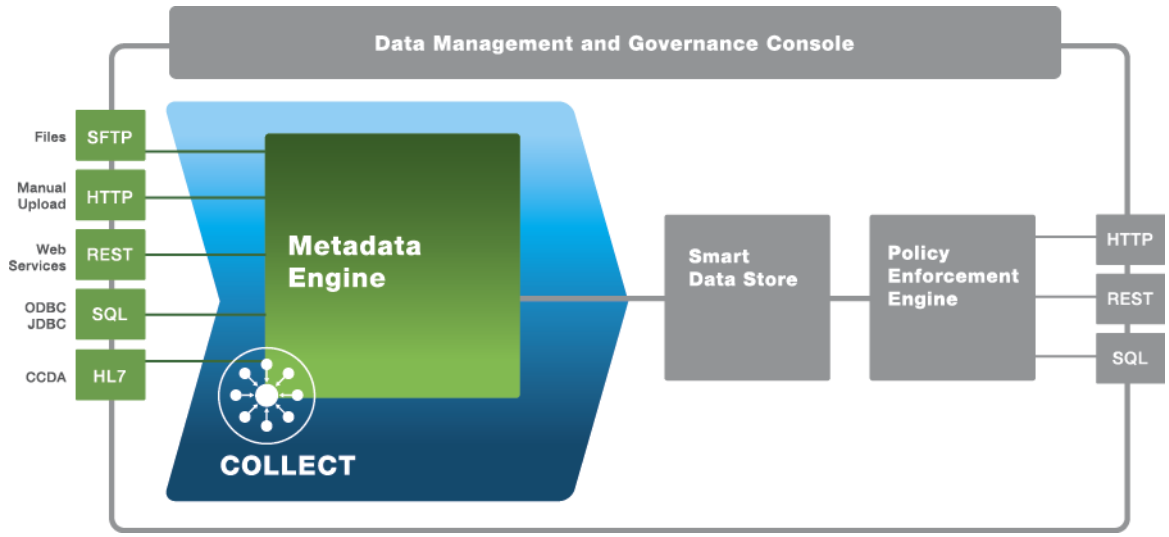


Collection

PHEMI Central can collect, or "ingest," any type of data.

Data collections can include any data type from small kilobyte messages to large terabyte files.

- **Database records**—Data extracted from information systems, databases, and so on.
- **Structured non-relational data**—Spreadsheets, GIS datasets, genomics, machine data, XML, JSON, HL7, and so on.
- **Semi-structured files**—ECGs, tabular documents, and so on.
- **Unstructured files and datasets**—Images, consult letters, eports, e-mails, customer feedback, social media, and so on.



Data can be ingested and aggregated from multiple disparate sources, bringing together and consolidating data silos. Data can be ingested into in a variety of ways:

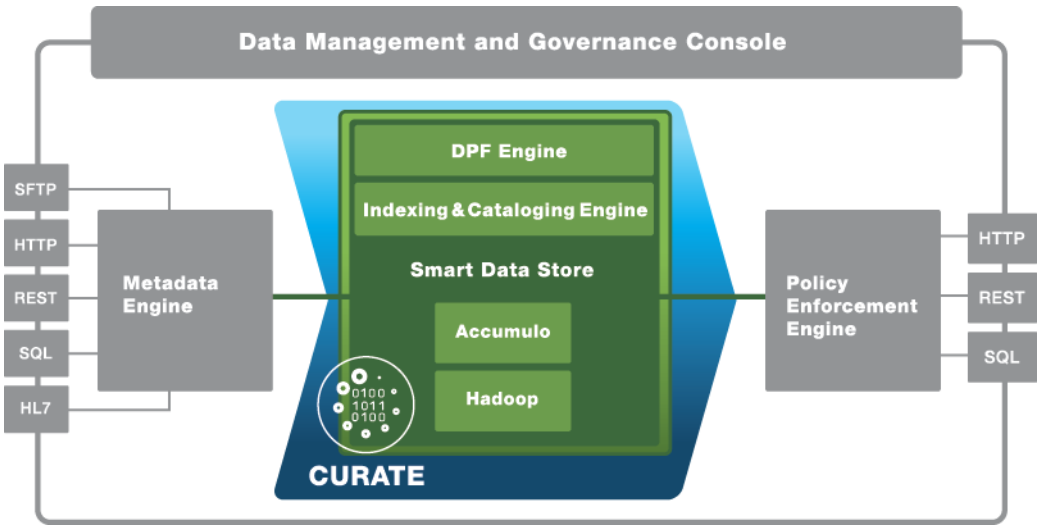
- **Stream**—Machine-to-machine data collections, such as telemetry and hospital bedside monitors, can stream data to PHEMI Central by means of the PHEMI RESTful API.
- **Push**—Data collections and extract, transform, and load (ETL) tools can publish to PHEMI Central using either JDBC or the PHEMI RESTful API.
- **Pull**—Custom connectors based on the PHEMI RESTful API can be deployed to allow PHEMI Central to fetch data from sources.
- **Manually Ingest**—Files can be manually uploaded to PHEMI Central from a standard browser window.
- **Store by Reference and Action**—PHEMI Central can reference remote data or a remote dataset through a URL, stored procedure, SQL query, external table, or the RESTful API. Applications can also be stored and executed, causing external tables or external data to be accessed and pre-processed.

During ingest, PHEMI Central tags each raw data object with metadata that describes the data. Metadata governing digital rights management, retention rules, data sharing agreements, and privacy policies is applied and enforced. Describing information with metadata means that users and applications can query and analyze data based the data's properties, instead of having to navigate complex directories or schemas to find information. PHEMI Central then places the tagged digital asset into the data store for curation.

Curation

PHEMI Central's Smart Data Store converts the raw data into analytics-ready digital assets.

PHEMI Central integrates the capabilities of the Hadoop/Accumulo ecosystem with powerful metadata framework, indexing and cataloging capabilities, and an innovative Data Processing Function framework to create a Smart Data Store that transforms your raw data into analytics-ready digital assets.



Schemaless Storage

PHEMI Central is a key-value store that's graph-based and schemaless.

In a traditional system, data is designed into a file system hierarchy or a database schema. So long as the schema or file system is deployed, data must comply with it. If the design does not scale or the requirements change, migration can be complex and costly.

Unlike schema-based data stores, data in PHEMI Central's store is distributed and based on key-value pairings. Data is stored in a binary format that is unaffected by any schema in source or destination systems. Schemaless storage can offer benefits in several situations:

- If the schema of the source or destination system changes
- If the characteristics of your data change
- If the requirements of a user or an application change
- If a new, disparate data collection needs to be brought online

Indexing and Cataloging

PHEMI Central automatically indexes and catalogs all ingested data. The tagged, cataloged, and indexed raw data object is the simplest type of digital asset.

User-defined DPFs enable deeper and more sophisticated indexing and cataloging, while second-order indexes and graph relationships allow data analysts to quickly find and build datasets across digital assets. Linking datasets with common keys makes it possible to build meaningful datasets across disparate data collections, turning the data lake into findable, searchable, easy-to-query and analytics-ready digital assets.

DPF Framework

A Data Processing Function (DPF) is an executable piece of code, written in any modern programming language, that transforms the original raw data into analytics-ready digital assets specifically targeted for your organization’s needs.

The DPF supplies the instructions for parsing the raw data (for example, a log message or medical report), extracting key content (for example, a log message or medical report) and performing data cleansing and enhanced indexing and cataloging. The DPF also structures data according to the organization’s needs. The result is data description at the element level embedding the rules and policies governing the data collection, as well as configured properties such as the data collection ownership, retention policy (time to live), and what visibility the element should have. For example, de-identification, encryption, and masking, along with other privacy restrictions.

Standard PHEMI DPFs libraries are included that index and describe structured data, such as spreadsheet files, database records, or XML/ JSON documents. User-defined DPFs can also be developed for advanced needs, such as analysing semi-structured data or performing natural language processing on free text. Or, DPFs can catalog and standardize data into ontologies such as SNOMED or LOINC, making it easier for data analysts to find the right information in the right format.

DPFs can also analyze streams of machine data to find patterns and exceptions, calculating aggregates and converting streaming data for trending and predictive analysis. For parsing unstructured documents such as scans or X-rays, the DPF can include specialized parsing functions, like Optical Character Recognition (OCR) or image parsing. As the organization's needs evolve and as knowledge advances, DPFs can be updated or redeveloped and re-executed on existing or historical data to extract new or different information.

PHEMI Central's DPF framework manages DPF deployment and execution across the entire system. A DPF code library is associated with a data collection by uploading it into PHEMI Central. The code is executed by the PHEMI Central DPF Engine. PHEMI Central manages DPF execution across all datasets and all data elements within the system.

Data Linking

The indexing, cataloging, and graph relationships PHEMI Central generates allow you to make connections, or links, among data items.

Data linking allows you to connect disparate data and data that might have been isolated in silos. For example, imagine you ingest a patient history from a family doctor, a scan of prescription information from a pharmacy, Medical Resonance Images (MRIs) from a hospital, and X-ray images from a medical laboratory. If data elements are tagged with appropriate metadata, you can link all this disparate data for use in various ways.

Graph-based data linking means that you can query and analyze a more complete picture of your data so that you can see, at scale and efficiently, relationships between objects in the system.

Data Dictionary

A data dictionary cleanses data by identifying and saving a common interpretation of these types or fields.

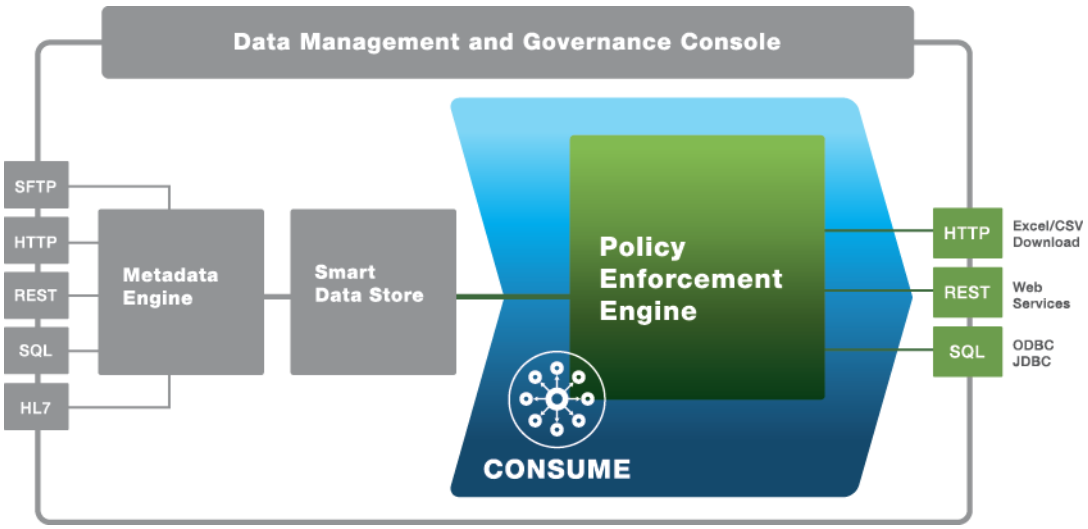
Disparate data collections may have fields that occur in common but are named differently or use different format conventions. For example, one data collection might have a field called "Sex" with values "M" and "F," while another might have a field called "Gender" with values "Male" and "Female." Similarly, different medical imaging systems use different terminology and conventions for the same concepts and measurements.

You can develop a DPF for your data that acts as a data dictionary, to standardize and cleanse data. Cleansing data with a data dictionary greatly simplifies query and analysis.

Consumption

The data elements stored in PHEMI Central is accessed by querying the system. Queries can be made in a number of ways.

- You can locate and download the original data object using the PHEMI Central Management and Governance Console Object Browser.
- You can query a data collection or dataset using the PHEMI RESTful API.
- You can download data from a dataset into Excel, CSV, or TSV format.
- You can export a dataset to a portal, tool, or application, using the RESTful API or a JDBC/ODBC connector.
- You can export a dataset to SAP HANA using the SAP Smart Data Access connector.

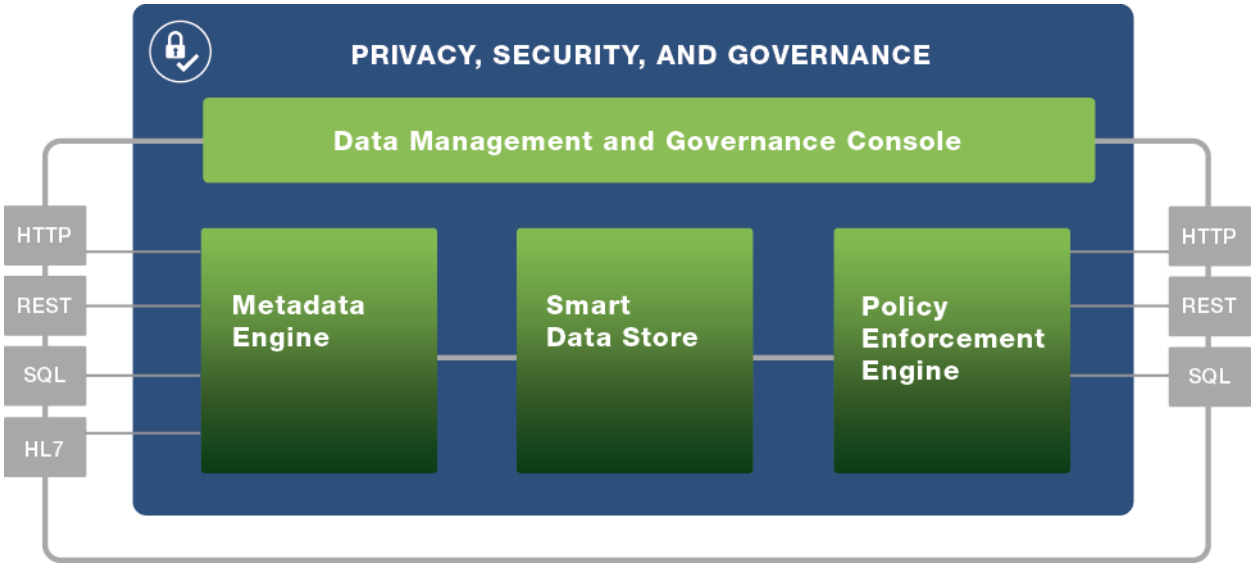


In all cases, PHEMI Central's Policy Enforcement Engine strictly enforces your organization's privacy and security policies to enforce rightful access to data.

Privacy, Security, and Governance

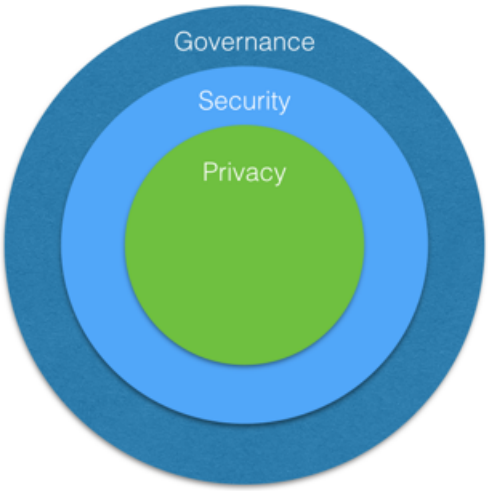
The intention of privacy, security, and governance is to protect information and ensure rightful access.

PHEMI Central is designed from the ground up to be able to manage crucial aspects of privacy and security, and to be able to accurately reflect your organization's governance policies.



Privacy, security, and governance are not all the same thing.

- Privacy is restricting information access to those who have the right to access it.
- Security is the means by which you maintain privacy and protect information assets.
- Governance is the set of processes, roles, policies, controls, and metrics that an organization develops and implements around information to manage its privacy and security.



Privacy

Privacy is restricting information access to those who have the right to access it.

PHEMI Central's Privacy by Design framework was designed from the ground up to define, manage, and enforce data sharing agreements and privacy policies. This framework includes the following mechanisms:

- **Attribute-based access control (ABAC)**—Users are tagged with attributes that describe their authorizations to access data. Data is tagged with attributes that describe what its visibility should be. These two attributes are used in access policies that are applied to data collections and datasets to enforce rightful access privileges. For example, a data analyst with CONFIDENTIAL authorization might be able to export fully identified data, an analyst with RESEARCHER authorization might only have access to de-identified data.

  Attribute based access control reduces complexity and reduces the risk of data breach. An attributed-based approach to privacy is also especially helpful when not all uses or access requirements for data are understood up-front, or when new types of data are frequently introduced into the system (both common scenarios in health care, for example).
- **Selective data tagging**—The attribute-based access configured in the system can be enriched and extpanded with context-specific protections by using the Data Processing Function framework to extract and re-tag information. For example, scans of patient reports can be recognized and extracted by a DPF and fields selectively marked as PII (personally identifying information, as in a Social Security or Social Insurance Number) or NON_IDENTIFYING (as in a blood glucose measurement).
- **Automatic anonymization and de-identification**—PHEMI Central can be set to automatically invoke a Data Processing Function that can de-identify, encrypt, redact, or mask any data element. A DPF can even include sophisticated data dependency algorithms to reduce the risk of re-identification.

  A PHEMI Administrator can also construct datasets that strip out identifying data elements. Centralizing anonymization and de-identification helps reduce data sprawl and reduces the risk of data consistency errors.
- **End to end access policy enforcement**—Every query for data to PHEMI Central is mediated by the PHEMI Policy Enforcement Engine, which compares the access request aginst the privacy protections that have been placed on the data. At no time can users, applications, or external systems bypass the Policy Enforcement Engine to access data directly.

Security

Security is the means by which you maintain privacy and protect information assets.

PHEMI Central includes a number of security mechanisms:

- **Role Based Access Control (RBAC)**—User roles determine what operations a user can perform. For example, only users with a role of PHEMI Administrator can configure the system and construct datasets, while only users with a role of Data Analyst can query data and execute or export a dataset.

- **Configurable Password Policy**—PHEMI Central allows you to configure the password policy that defines how strong user passwords have to be and how they must be changed.
- **Audit Log**—PHEMI Central maintains complete a audit log of system and user operations. The log includes all create, modify, and delete operations, plus a record of all queries for made to the system. The audit log file is completely tamperproof for all users.
- **Encryption in motion**—PHEMI Central assumes your system is deployed on a trusted network. However, you can encrypt links from data sources and to consuming applications and analytics tools using either Secure Sockets Layer (SSL) or Transport Layer Security (TLS).

Governance

Governance is the set of processes, roles, policies, controls, and metrics that an organization develops and implements around information to manage its security and privacy.

Information governance is about controlling and protecting an organization's data. The data may be sensitive, or perhaps it is important that the data be absolutely accurate, or perhaps the organization must achieve legislative and compliance targets. Data governance includes the process and policies around the protection, curation, and access to data and encompasses all of privacy protection, data security, lifecycle management, and data audit.

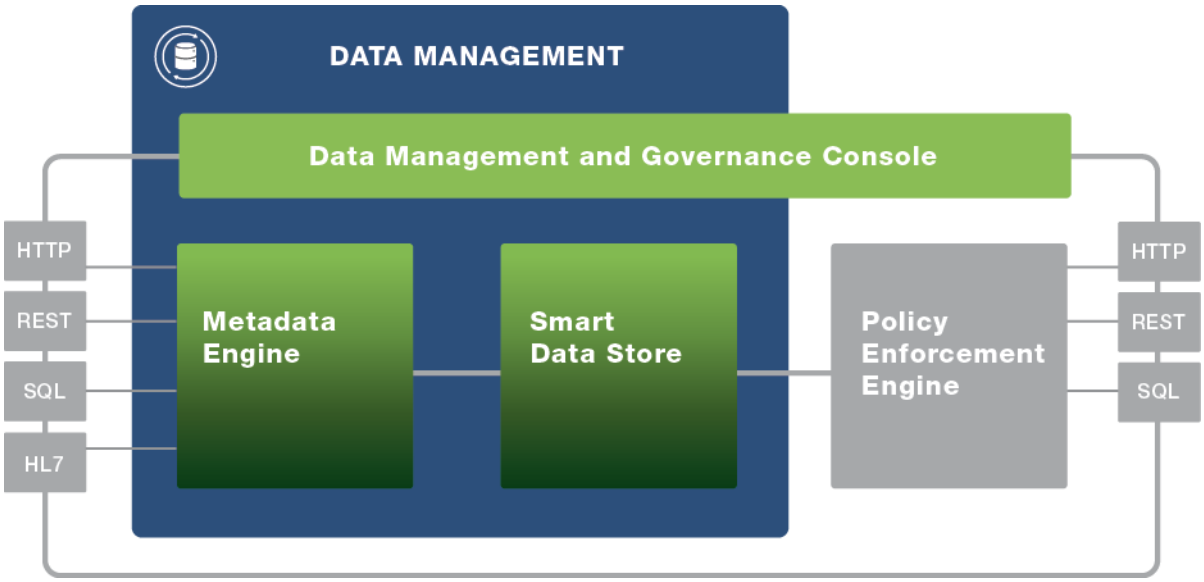
A governance policy is a coordinated approach to protecting data and assigning privileges to users. To control and protect your data, your organization should have a clearly defined policy governing data. The governance policy will drive how the PHEMI Administrator configured PHEMI Central.

How do I define a governance policy?

Data Management

Proper management of data through its lifecycle is critical as volumes grow and variety increases.

PHEMI Central includes advanced data management features such as version control, rollback, and retention rules. A sophisticated metadata framework allows information to be managed at the field level throughout its lifecycle. This family of features brings the data management capabilities of enterprise-grade traditional data warehouses to big data.



Metadata Framework

The power and sophistication of PHEMI Central's data management capability arises from its powerful metadata framework, which extends across the system.

Metadata is applied on ingestion and enriched by cataloging, indexing, and invoking Data Processing Functions. The result is data description at the element level that embeds the rules and policies governing the element, as well

as configured properties such as the data collection ownership, retention time (time to live), and what visibility the element should have. This means that de-identification, encryption, and masking, and other privacy restrictions can be enforced per data item, at the cell level.

PHEMI Central's metadata framework, with its flexible distributed key-value store, means that system designers do not have to worry how to structure the system.PHEMI Central structures data automatically, on the fly. Data scales to large volumes while still providing fast access, and changes to requirements do not necessitate changes to design of the data store. Users and integrated applications benefit from the metadata because they can use simple queries based on the properties of the data, rather than having to navigate complex directories or schemas to find the data they seek.

Lifecycle Management

PHEMI Central uses organization-specific retention rules to manage digital assets throughout their entire life cycle, from data creation through curation, usage, and end of life.

Retention rules are captured in the Management and Governance Console, and from the rentention rules together with the ingestion timestamp, the system calculates a time to live for every data element. Retention rules also prevent users from deleting data during the configured retention period and helps automatically de-identify, delete, or otherwise process information when the retention period does expire.

Data Immutability

PHEMI Central stores all data in a write-only data system that is never modified.

Data is only deleted when its precalculated time to live expires, as derived from the organization's retention policy. This approach provides assurance of data integrity for audit and compliance requirements.

Version Control

PHEMI Central has robust version control and rollback capabilities to ensure data is never lost, corrupted, or overwritten.

The system keeps a history of data revisions and allows administrators to trace changes over time, including the ability to audit who made changes and when, plus the ability to roll back changes if necessary. This design provides a complete history for audit and compliance requirements.

Submitting Data to PHEMI Central

Data can be submitted to PHEMI Central using the PHEMI RESTful API, by manually ingesting it, by using FTP or SSH batch ingestion, or by using extract, transform, and load (ETL) tools.

Using the RESTful API

If the data source is able to publish data, the system can be programmed to publish to PHEMI Central using the PHEMI RESTful API.

In REST-based ingestion, the client (that is, the data source or submitting system) sends an HTTP or HTTPS POST request. The POST request contains valid user credentials in JSON format in the payload body.

When the credentials are authenticated, PHEMI Central returns the session ID and URI for the session, as well as a session cookie. Once the session is established, the client can POST data to the appropriate data collection by referencing the data collection ID .

PHEMI Central listens for REST queries on port 80 (for HTTP) and port 443 (for HTTPS).

REST-based ingestion is useful in situations where a system submits smaller pieces of data very frequently. Since PHEMI Central always listens on the port, the client system can be set up with a scheduled task to submit the data as often as needed.

Using Manual Ingest

You can use the Management and Governance Console to manually ingest data objects into PHEMI Central.

Manual upload is a good method when you have very large amounts of data such that HTTP/REST is not suitable (for example, gigabytes or terabytes of data), and/or data that needs to be ingested relatively infrequently.

How do I manually ingest files?

Using Bulk Ingest

Batch ingest of data is extremely fast. Configure a secure FTP or an SSH connection to allow a system to write data to a temporary landing space within PHEMI Central. PHEMI Professional Services will help you get this set up.

You can trigger the bulk ingest process remotely or you can use a scheduled task such as a cron job. Triggering the process launches a MapReduce job that inserts the bulk data into PHEMI Central at a very fast rate. The temporary files are then purged from the system.

Using ETL Tools

Some data collections (for example, some databases) are not able to submit data directly to PHEMI Central. For such systems, extract, transform, and load (ETL) tools can be used to extract data from the source system and then use either REST-based ingest or bulk ingest, depending on the requirements.

Administrator Quick Start

This section shows you the workflow for a first configuration of the PHEMI Central Management and Governance Console.

Before You Configure

Before you start configuring PHEMI Central, the system must be installed and you should have your organization's governance policy clearly defined.

System Installation

PHEMI Central may be shipped as an appliance, deployed on Amazon Web Services (AWS), or deployed on your organization's VMware environment. Regardless of the deployment type, PHEMI Professional Services will install and set up your base system of cluster nodes and your management node, and will install the PHEMI Central software on the cluster. Installation may include populating your system with some of your organization's pre-existing data.

PHEMI Professional Services will create the first PHEMI Administrator account for you on PHEMI Central and will provide you with the user name and password for the account, together with the URL of the PHEMI Central Management and Governance Console. At that point, you can log on to the Management and Governance Console.

Define a Governance Policy

Make sure your organization's governance policy is defined before you begin configuration.

Your governance policies will drive how you configure PHEMI Central PHEMI Central. Therefore, before configuring PHEMI Central PHEMI Central, you should make sure you have your organization's governance policy available to you. If you are uncertain as to the appropriate data visibilities, user authorizations, or access policies to define for your organization, consult with your Information Officer, Privacy Officer, or with someone in a comparable role.

To define your organization's governance policy:

1. Identify the different sensitivity levels of the data you will be storing in PHEMI Central PHEMI Central.

   You'll configure these as data visibilities. Data visibilities are attributes used to tag ingested data for purposes of privacy and access control. Examples of data visibilities are "CONFIDENTIAL," "SECRET," and "PII" (Personally Identifiable Information).
2. Identify what authorizations your organization assigns to different users to allow them to access data.

   Your user authorizations should reflect the actual permissions your personnel are granted to interact with data with different visibility.
3. Specify the allowed combinations of user authorizations and data visibilities.

   For example, a user with C_LEVEL authorization (perhaps a CEO, CIO, COO, or CTO) might be permitted to access CONFIDENTIAL data, a user with RESEARCH authorization might only be permitted to access only DE-IDENTIFIED data, and a user with DOCTOR authorization might be allowed to see data of all sensitivity.

Initial Configuration Workflow

Since some configuration tasks must be completed before others can be performed, the PHEMI Administrator can use the workflow in this section to configure PHEMI Central.

In these first steps, order matters. You cannot create users until you have defined user authorizations. Likewise, you cannot create access policies without defining both user authorizations and data visibilities.

1. *Log on to the PHEMI Central Management and Governance Console*.
2. *Define user authorizations.*
3. *Create users.* Create at least one user with a role of PHEMI Administrator, at least one user with a role of Privacy Officer, and at least one user with a role of Data Analyst.
4. *Define data visibilities.*

Data categories must be added before you can define data collections. Access policies are optional for data collection configuration, but if you are using access policies, you must configure the policies before configuring the data collections.

If you are using a Data Processing Function (DPF) to generate derived data from raw data, you must prepare the DPF code archive before configuring the data collection and upload the DPF archive during data collection configuration.

5. *Add data categories.*
6. *Create access policies.*
7. *Set up your data collections.*

It is the Data Analyst, not the PHEMI Administrator, who executes and exports datasets. However, constructing datasets from available data elements and configuring dataset export destinations is part of system configuration, and these tasks are performed by the PHEMI Administrator.

8. *Build datasets.*
9. *Configure dataset destinations.*

Introducing the Management and Governance Console

The Management and Governance Console is a web-based interface for configuring and monitoring PHEMI Central.

Note: Use either Apple Safari, Mozilla Firefox, or Google Chrome to access the PHEMI Central Management and Governance Console. Microsoft Internet Explorer is not supported.

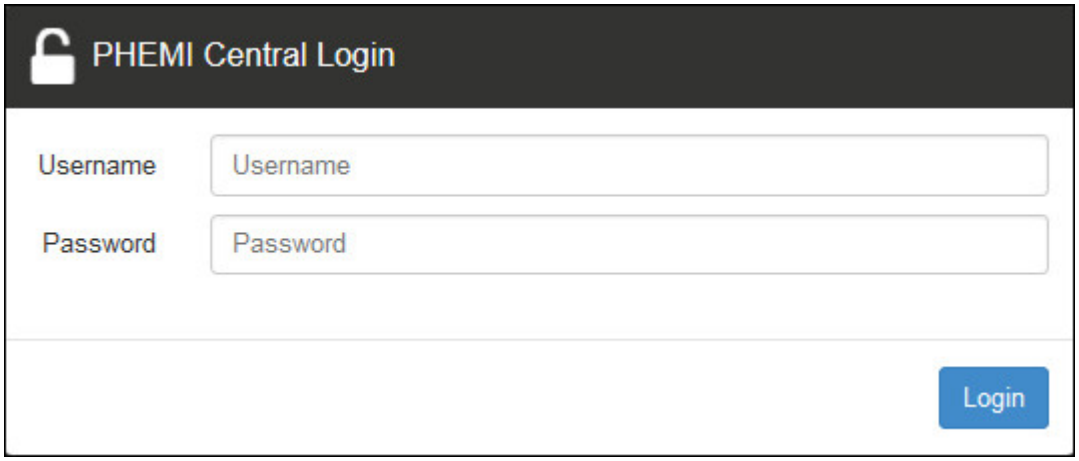
Logging On and Off

The URL for the PHEMI Central Management and Governance Console is configured during physical installation of PHEMI Central. PHEMI Professional Services will provide you with the URL.

To log on to the PHEMI Central Management and Governance Console:

1. In the address bar of the browser, enter the URL configured for the PHEMI Central Management and Governance Console.

   The PHEMI Central login screen appears.



2. Enter your user name and password. Click **Login**.
   The PHEMI Central Management and Governance Console launches.The Management and Governance Console initially opens on the **Data Collections** page. Subsequently, the system remembers the last page you viewed and opens on that page.
3. Logging off the Management and Governance Console is described *here*.

Quick Tour of the Management and Governance Console

The PHEMI Central Management and Governance Console consists of a set of main pages. Each main page includes screens where you can perform a set of related functions.

Note that your user role determines what part of the PHEMI Central Management and Governance Console you can access, and therefore what icons appear in the left navigation bar. Different roles have access to different parts of the Management and Governance Console.

Note also that Privacy Officers do not have any functional capabilities in the Management and Governance Console. However, Privacy Officers are considered to have some ownership responsibility for data, and are therefore named as one of the "owners" of a data collection. For this reason, you must configure at least one Privacy Officer in order to be able to define a data collection.

Table 1:

Main Page:	**What you can do there:**	**You must be a:**
Data Collections	Manage data collections; manually ingest files.	PHEMI Administrator
Datasets	Build datasets; execute datasets; export datasets.	PHEMI Administrator to define datasets. Data Analyst to execute and export datasets.
Access Policy Builder	Define access policies.	PHEMI Administrator
System Metrics	View metrics about data collections, system performance, and tasks.	PHEMI Administrator
Users	Manage PHEMI Central users.	PHEMI Administrator
Object Browser	View or delete individual objects stored in PHEMI Central.	PHEMI Administrator
Audit log	Monitor what operations have been performed from and what data requests have been made of PHEMI Central.	PHEMI Administrator

Management and Governance Console Reference

This section steps you through all the functions and procedures in the Management and Governance Console

Quick Tasks

At the top right corner of the screen, a few tasks are always from the quick task button. The quick task button is labeled with your username.

You can quickly:

- *Change your password*
- *Get system version information*
- *Log off*

Change Your Password

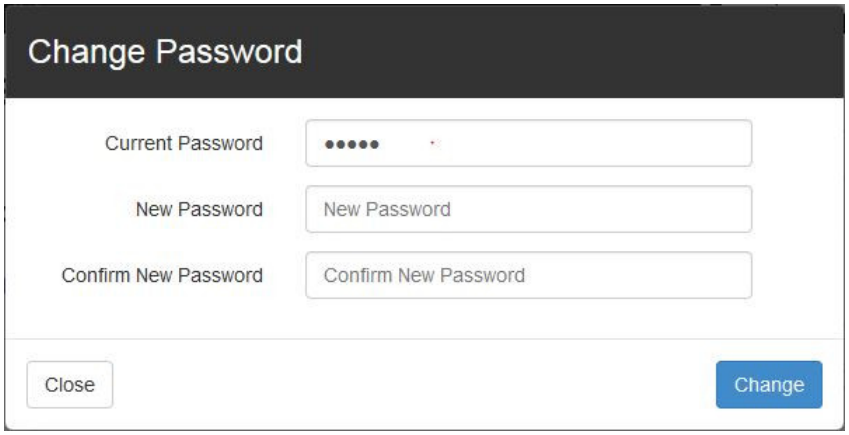
Change your password quickly by using the quick task button at the top of any screen.

To change your password:

1. Locate the quick task button at the top right of the screen.

2. Click the drop-down arrow and select **Change Password**.

   The **Change Password** screen opens.

   The current password is not shown in plain text, but is represented by a sequence of dots in the **Current Password** field.

3. Enter the new password in the **New Password** field. Retype your new password in the **Confirm New Password** field.
4. Click the **Change** button to submit the change.

Get System Version Information

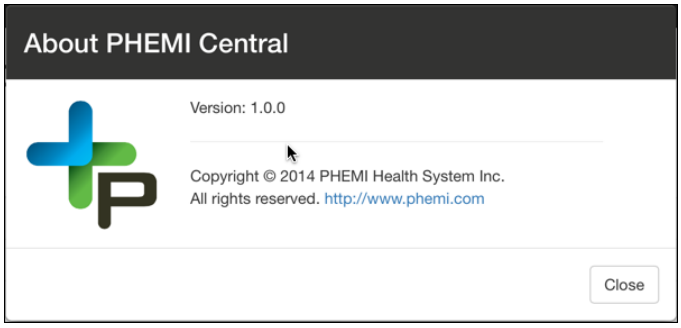
Get system version information from any screen by using the quick task button at the top of the screen.

To get system version information:

1. Locate the quick task button at the top right of the screen.

2. Click the drop-down arrow and select **About**.

   The **About PHEMI Central** screen opens.



3. Click the **Close** button to dismiss the screen.

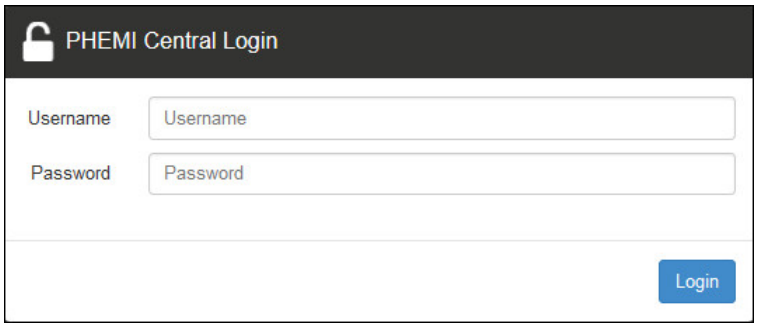
Log Off

Log off from any screen by using the quick task button at the top of the screen.

To log off the PHEMI Central Management and Governance Console:

1. Locate the quick task button at the top right of the screen.

2. Click the drop-down arrow and select **Logout**. You are logged off the Management and Governance Console and the **Login** screen reopens.



Data Collections

In PHEMI Central, a data collection is the set of management and governance rules and policies that will be applied to a collection of data. A data collection configuration should be defined for each set of data that is to be stored and managed according to the same retention, legal, and governance rules.

Data collection configuration includes:

- A data policy
- The Data Processing Function for processing the data collection

The **Data Collections** page also includes a facility for manually ingesting data.

How do I manually ingest data?

Connection information to specific systems is not a part of data collection configuration. Data is "pushed" from the site submitting the data. PHEMI Central extracts any necessary connection information and login credentials from the session information. *How do I submit data to PHEMI Central?*

Data Policies

The data policy provides several key items of information about a data collection.

The data policy describes what type and format of data is expected from the data source and classifies the data collection into one of the configured data categories. The data policy also lists the users who "own," or are responsible for, various aspects of the information.

The data policy also specifies the privacy settings for the data collection. It specifies which of the configured data visibilities to attach to data belonging to this collection. The data policy also specifies which access policy (if any) will be used to enforce rightful access to the information. All raw data ingested from this data collection, as well as every item of data derived from processing this data collection, will be tagged with the specified data visibility and access policy to protect privacy.

The data policy is also where the data sharing agreement is stored for reference. In this context, the data sharing agreement is the document recording permission for this data collection to be stored in PHEMI Central. You upload the agreement document and specify the time period for which the agreement is valid.

The data policy also records the retention rules to be applied to information from this data source. The system uses the retention rules and looks at the ingest timestamp to calculate a time to live for each data element. When the time to live expires, PHEMI Central deletes the raw data and all associated derived data items from its data store.

If you want your information to be version-controlled, the data policy is the place where you enable version control.

Data Processing Functions

Data Processing Functions allow data items to be parsed, data elements to be recognized and extracted, and the derived data to selectively tagged with metadata.

A Data Processing Function, or DPF, is an executable piece of code that supplies the instructions for processing raw data (for example, a log message or medical report) to extract from heterogeneous data collections meaningful, context-specific information (such as a temperature reading or blood glucose measurement) that can be queried or exported for analysis. The code is executed by the PHEMI Central DPF Engine, which uses it to direct curation of the data. The input to a DPF is the raw binary data ingested into the system. The output of a DPF is a set of structured elements, each of which includes a type property (for example, INT or STRING) and can specify data visibilities (for example, SECRET or IDENTIFIABLE) on a per-field basis. The data elements output by a DPF are called derived data. The collection of derived data produced by a DPF is automatically indexed in PHEMI Central.

The set of code that makes up a DPF is called a DPF archive. A DPF archive is delivered as a ZIP file archive. It consists of two parts: a manifest file and a code library. To associate a DPF with a data collection, the DPF archive is ``registered`` with the data collection by uploading the archive during data collection configuration.

A DPF is associated with a data collection as part of data collection configuration. To associate the DPF with the data collection you upload the DPF archive on the data collection configuration page.

PHEMI Central includes a library of helper functions to simplify DPF development. DPFs can be developed in either Java or Python, or PHEMI Central can be extended to support DPF development in any modern programming language that runs on a Linux OS. No MapReduce or YARN knowledge is necessary. Your DPF can be written by PHEMI, by your organization’s in-house programmers, or by third-party developers. Training in DPF development is also available from PHEMI.

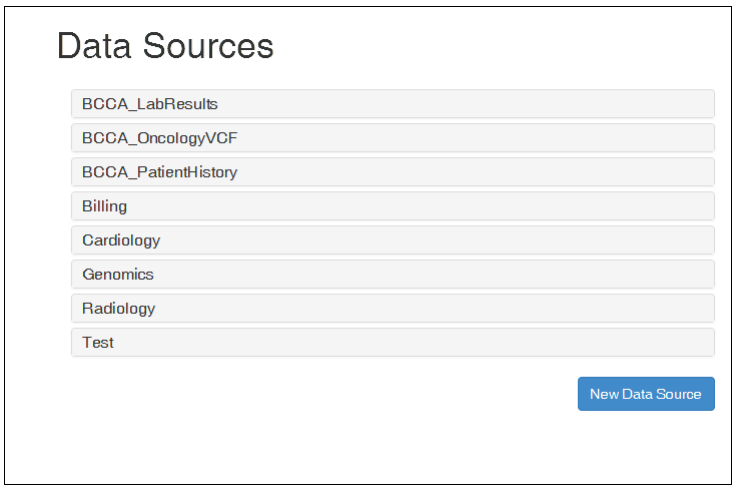
View Data Collections

View data collections on the **Data Collections** page.

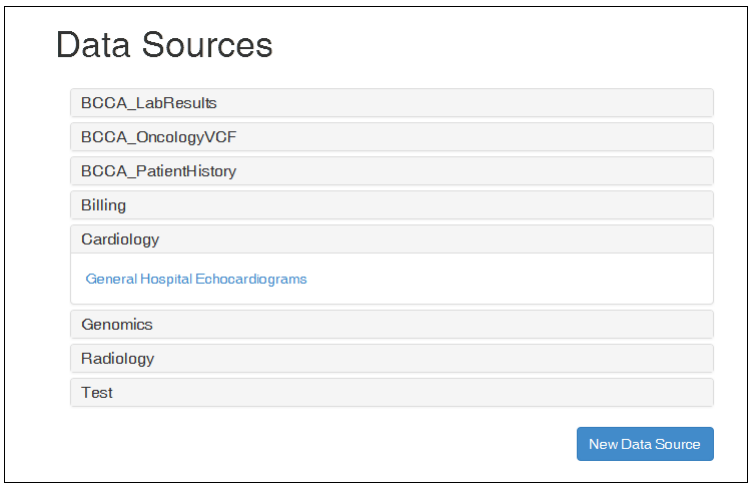
To view defined data collections:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon in the left navigation bar.

   The **Data Collections** page opens showing defined data categories. *Tell me about data categories.*



2. Click any data category to expand the category and see the data collections included in the category.



Click the data category a second time to collapse the category again.

Define a Data Collection

Define a data collection on the**Data Collections** page.

Before defining a data collection, you must configure the following:

- Data categories
- Data visibilities
- Users

To be able to configure users, you must first configure *user authorizations*. Your users must include at least one user with a role of PHEMI Administrator and at least one user with a role of Privacy Officer.

If you are applying an access policy to the data collection, you must first configure the *access policies*.

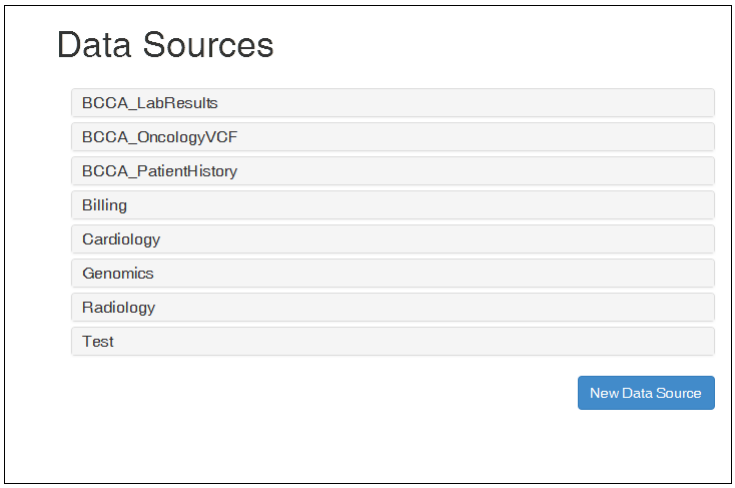
When you first define a data collection, only the **Data Policy** screen is available to you. Configure the data policy and save it. After saving the data policy information, the **Data Processing Function** and **Ingest Data** tabs become available to you.

Define the Data Policy

To define the data policy:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon in the left navigation bar.

The **Data Collections** page opens showing all defined data categories.



2. Click the **New Data Collection** button.
   The **New Data Collection** screen opens with only the **Data Policy** tab showing.

3. Describe the data collection.

Option	Description
Name	Mandatory. A name for the data collection. Numbers, letters, spaces, hyphens, and the underscore character are supported. **Note:** Once you save a data collection, the name cannot be edited. To change the name, you must delete the whole data collection and reconfigure it with the new name.
Source Category	Mandatory. The data category of the data collection. Choose from the drop-down list of data categories. *How do I define data categories?*
Institutional Owner	Mandatory. The individual responsible overall for data stored in PHEMI Central. Only users with a role of PHEMI Administrator are eligible. Choose from the drop-down list of eligible users.

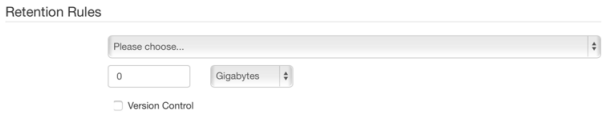
Option	Description
Privacy Officer	Mandatory. The individual responsible for defining the organization's governance policy and for approving access policies. Only users with a role of Privacy Officer are eligible. Choose from the drop-down list of eligible users.
Source Owner	Mandatory. The individual responsible for approving dataset requests involving this data collection. Only users with a role of PHEMI Administrator are eligible. Choose from the drop-down list of eligible users.
Data Visibilities	Optional. The data visibility (privacy tag) to be associated with this data collection. Select from the list of configured data visibilities. You can select multiple items by holding down the Shift key.
Document Format	Optional. The kinds of document expected from this data collection. Examples are Microsoft Word, Excel, or JSON.
Definition	Optional. A brief description of the kinds of documents expected from this data collection.
Notes	Optional. Any additional notes for the data collection.

4. Upload the data sharing agreement. The data sharing agreement records permission for this data to reside on PHEMI Central.

   Click the **Choose File** button and navigate to the document in your local file system. Double-click the file to select it. The system uploads the document.

   Specify the period during which this data sharing agreement is in effect. The format for the start and end dates is *mm-dd-yyyy*.

5. Specify the retention rules. These rules are used to determine how long each item from this data collection can remain in the system.



Option	Description
Please choose...	Mandatory. Specifies when data should be erased from the system. Supported values are as follows: • Retain for a time period. Keeps the data for the period specified. Specify some number of minutes, hours, days, weeks or years. • Delete after time period. Erases the data after the specified time period. Specify some number of minutes, hours, days, weeks or years. • Do not delete. The data is never deleted. • Delete oldest data once capacity is reached. Deletes data items with the oldest timestamp after the specified capacity is reached. Specify the capacity as some number of Kilobytes, Megabytes, or Gigabytes.
Version control	Optional. Maintains version control over data. Check to enable version control; uncheck to disable version control. By default, version control is disabled.

6. Click the **Save Data Collection** button to save the data policy. When the data policy has been successfully saved, the **Data Processing Function** and **Ingest Data** tabs appear as available on the screen.

Specify the Data Processing Function

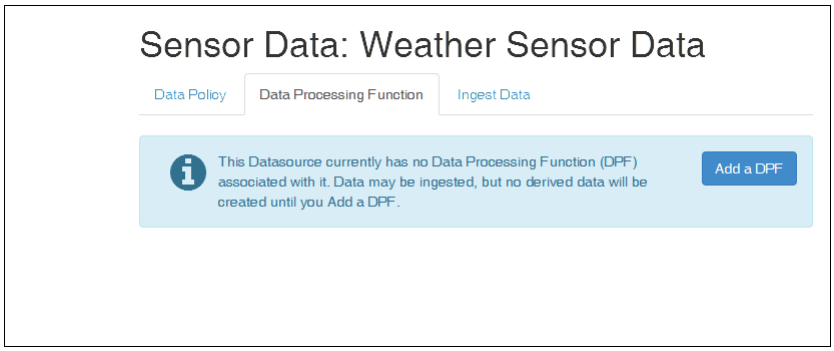
To associate a DPF with a data collection, you upload the DPF archive onto the **Data Processing Function** screen of the **Data Collections** page.

Tell me about DPFs and DPF archives.

To associate a DPF with a data collection:

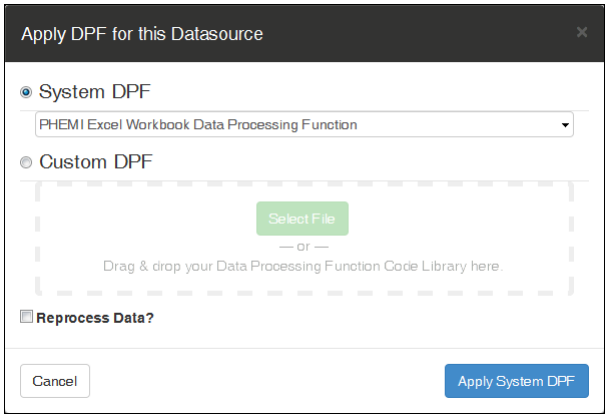
1. From the **Data Policy** screen of the **Data Collections** page, click the **Data Processing Function** tab.

   The **Data Processing Function** screen opens. When you first define a data collection, no Data Processing Function (DPF) is associated with it.



2. Click the **Add a DPF** button.

   The **Apply DPF for this Data Collection** screen opens.



3. Choose to use either a **System DPF** or a **Custom DPF**.

   - If you choose **System DPF**, use the drop-down arrow to select which PHEMI system DPF you want to use. Choose between a DPF for processing **Variant Call Format (VCF) data** and a DPF for processing **Microsoft Excel workbook** data. Once the system DPF is selected, click the **Apply System DPF** button to apply the DPF.
   - If you choose **Custom DPF**, click the **Select File** button, navigate to the DPF archive and double-click the ZIP file. Or, drag and drop the DPF archive from your file manager oto the target area on the Management and Governance Console screen. Click the **Apply Custom DPF** button to upload the archive file and apply the DPF.

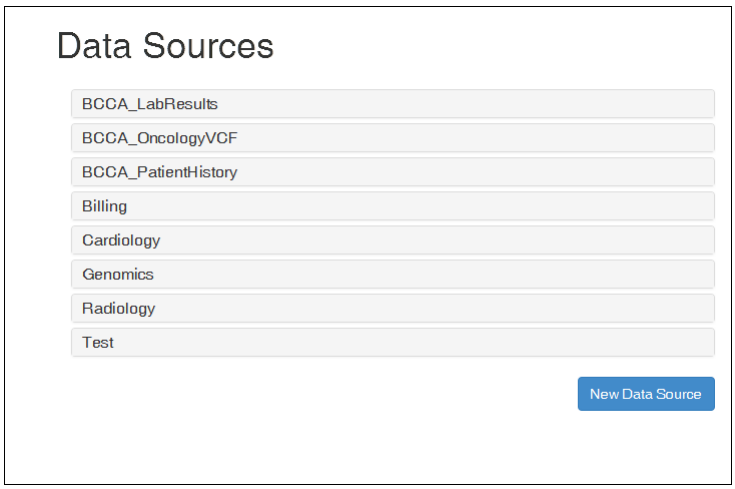
View Data Collection Information

View data collection information from the **Data Collections** page.

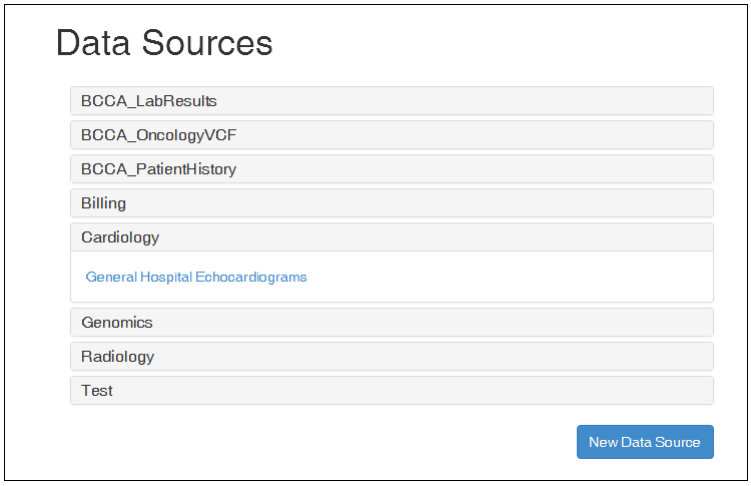
To view information about a particular data collection:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon. in the left navigation bar.

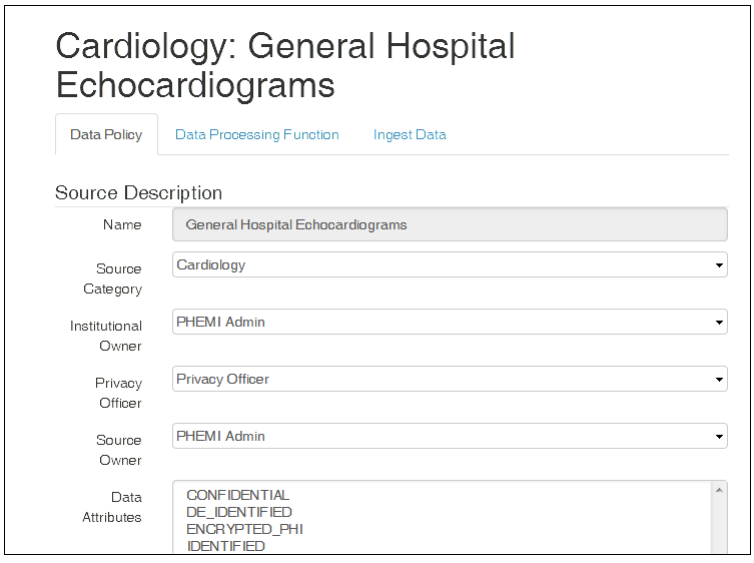
   The **Data Collections** page opens showing defined data categories.



2. Click the data category that contains the data collection, so that it expands and shows the data collections in the category.



3. Click the data collection name. The page for the data collection opens on the **Data Policy** screen.



4. Do any of the following:

   - View data policy information on the **Data Policy** tab.

- See the DPF associated with this data collection by clicking the **Data Processing Function** tab to .
- Access a screen where you can manually ingest files by clicking the **Ingest Data** tab. *How do I manually ingest files?*

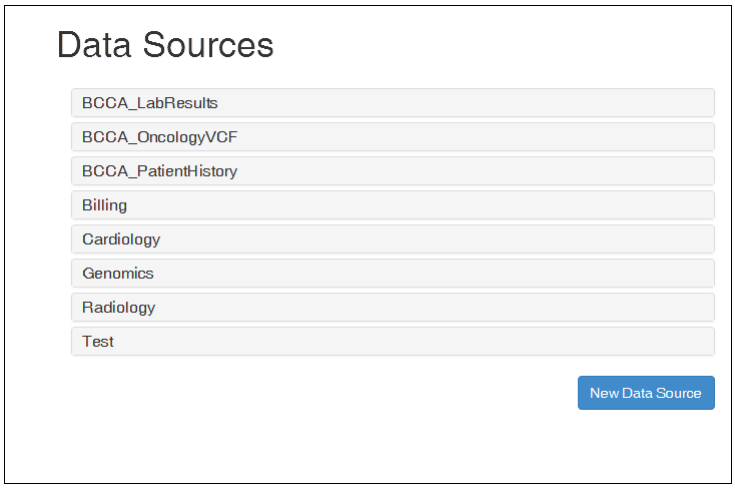
Modify Data Collection Information

Modify data collection information from the **Data Collections** page.

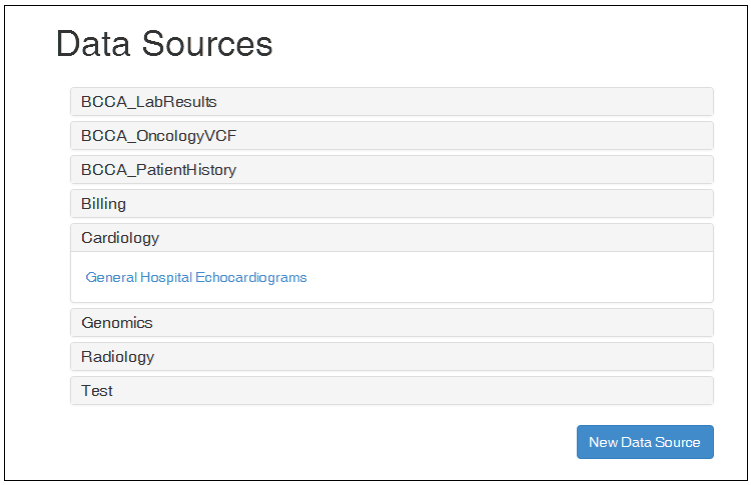
To modify information for a particular data collection:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon. in the left navigation bar.

   The **Data Collections** page opens showing defined data categories.

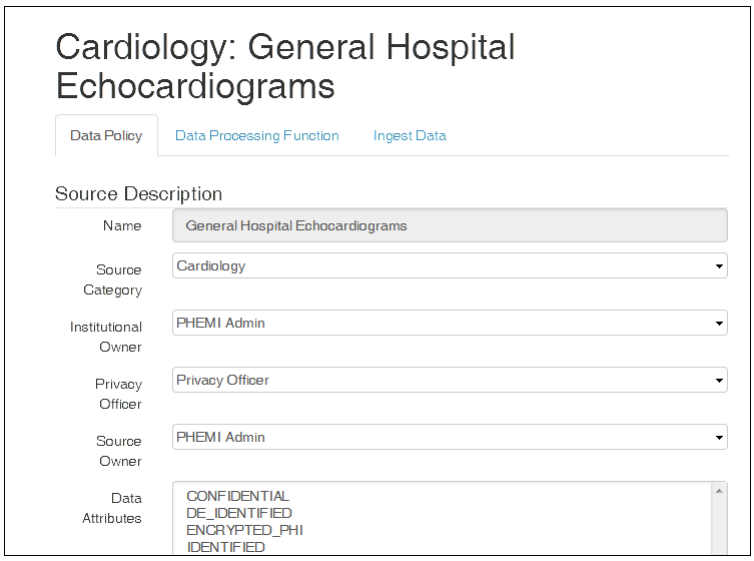


2. Click the data category that contains the data collection, so that it expands and shows the data collection in the category.



3. Click the data collection name.

   The page for the data collection opens on the **Data Policy** screen.



4. Do any of the following:

   - Modify data policy information on the **Data Policy** screen. *What do these fields mean?*
   - Click the **Data Processing Function** tab to change the DPF associated with this data collection. *How do I specify the DPF?*
   - Click the **Ingest Data** tab to access a screen where you can manually ingest files. *How do I manually ingest files?*

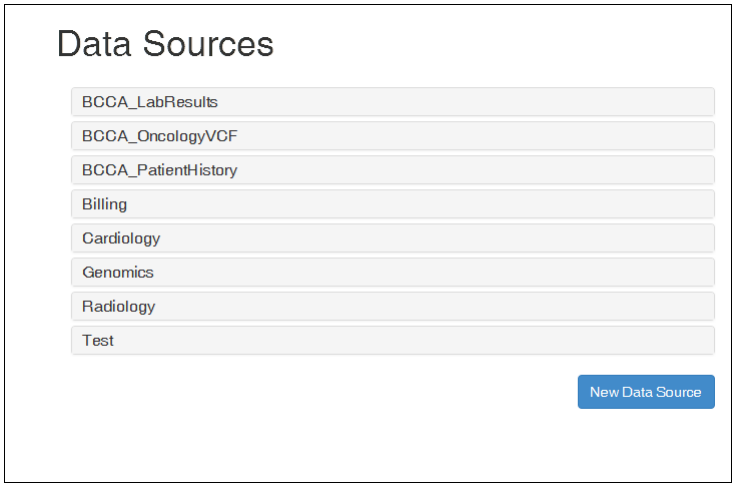
Delete a Data Collection

Delete a data collection from the **Data Collections** page.

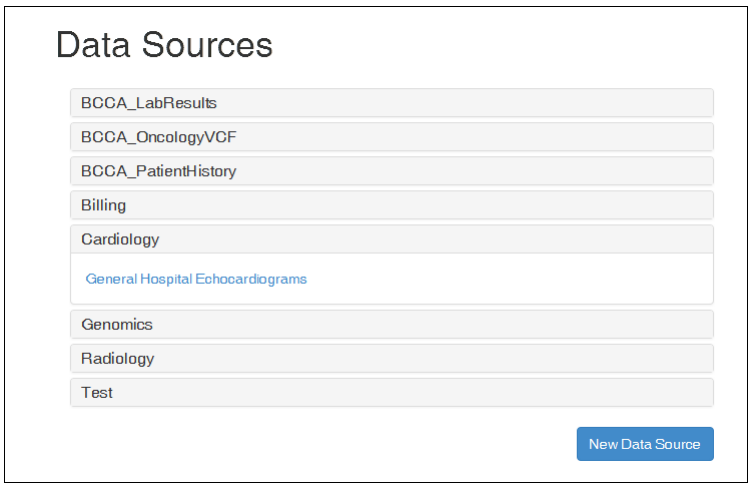
To delete a data collection:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon. in the left navigation bar.

   The **Data Collections** page opens showing defined data categories.

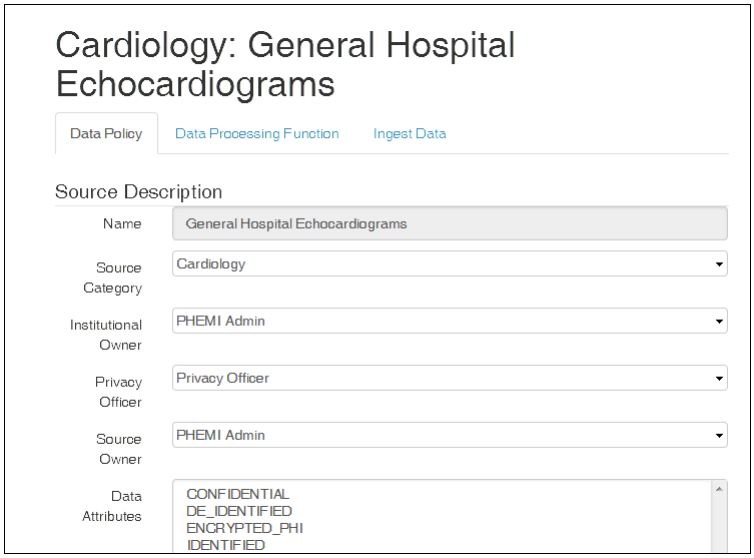


2. Click the data category that contains the data collection, so that it expands and shows the data collection in the category.



3. Click the data collection name.

   The page for the data collection opens on the **Data Policy** screen.



4. Click the **Delete Data Collection** button.

   The system asks you to confirm permanent deletion of the data collection. Click **Delete**.

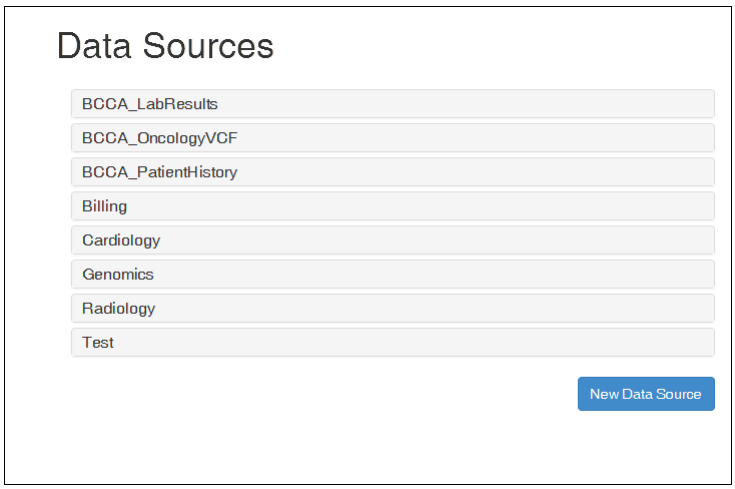
Manually Ingest Files

You can quickly manually ingest data files from a data collection into PHEMI Central from the **Data Collections** page.

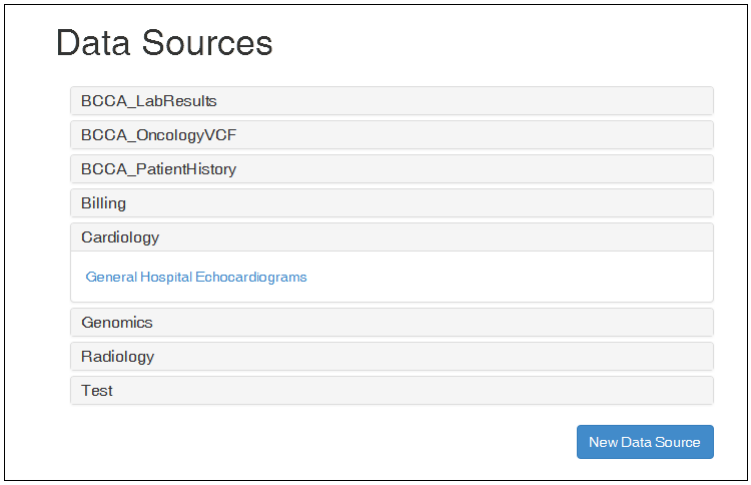
To manually ingest files:

1. Open the **Data Collections** page, by clicking the **Data Collections** icon in the left navigation bar.

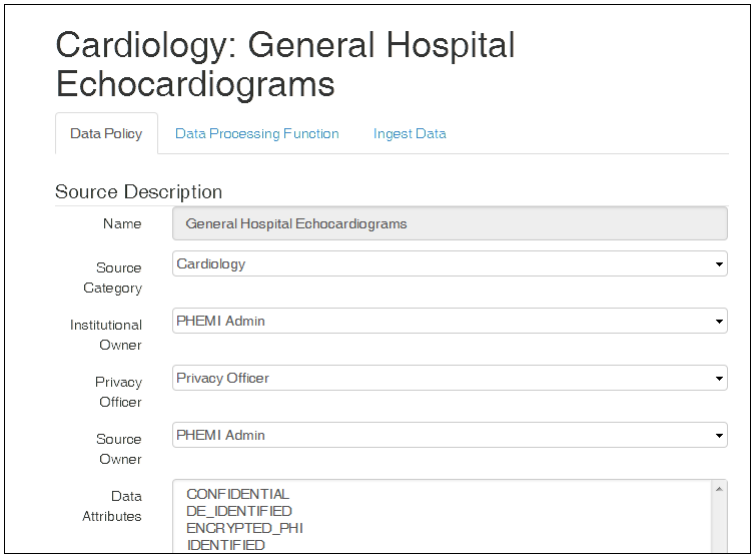
   The **Data Collections** page opens showing defined data categories. *Tell me about data categories.*



2. Click any data category to expand the category and see the data collection included in the category.

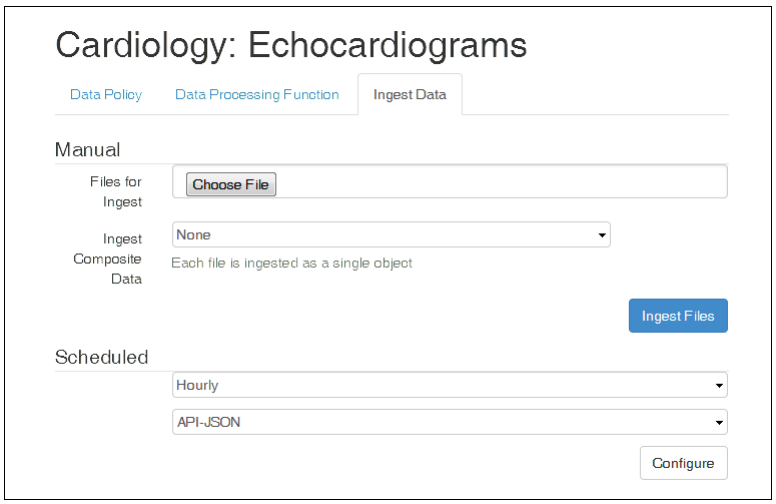


3. Click the data collection name. The **Data Policy** screen for the data collection opens.



4. Click the **Ingest Data** tab.

   The **Ingest Data** screen opens.



5. Click the **Choose File** button (or **Browse** button, depending on your browser). Navigate to the folder and select the file or files you want to ingest. Click the **Choose** or **Open** button to set your selection.
6. For structured or composite file such as a ZIP files or CSV files, if you want the PHEMI system DPFs to automatically process the file on ingest, click the drop-down arrow in the **Ingest Composite Data** field and select the file type from the list. If you want PHEMI Central to store the original data along with the derived data items, check the **Store Original File** checkbox.
7. Click the **Ingest Files** button.

Datasets

A dataset is a specific view of data in PHEMI Central.

Datasets are virtual constructs, created by selecting data elements from across all of the digital assets data collections stored in PHEMI Central. You can contsruct a dataset using any available data elements, across multiple and disparate data collections. They can be created in advance or on demand, and they can be altered whenever circumstances dictate. You don't have to predefine the data and you don't have to navigate a complex database schema.

To be able to define a dataset, a user must have a role of PHEMI Administrator. To be able to execute or export a dataset, a user must have a role of Data Analyst.

Datasets are instantiated only when they are executed. Datasets can be be executed directly by users and downloaded or exported to spreadsheets, applications, or analytics tools. Because all data is indexed and cataloged in advance, dataset execution is fast.

Defining a dataset does not modify any configuration for data collections or impact any protections to data, because the PHEMI Central Policy Enforcement Engine mediates all requests for data. Users can only access and export data to which they have rightful access, based on data visibility tags, user authorizations, and access policies, so access to data remains governance-compliant at all times.

Datasets are often created for research or exploratory data use. As such, the intended use for a given dataset may be different from the intended use of the original data collections. In particular, the governance and controls intended for the data in a dataset may differ from the governance of the original data collections. In PHEMI Central, you can attach an access policy to a dataset that is different from, and independent of, the access rules applied to the consistuent data collections.

Similarly, a single dataset can be executed by multiple users—even by users with different authorizations. A given user's actual view into the data in an executed dataset is always mediated by the Policy Enforcement Engine, and is therefore restricted by data visibility and user authorization, as experssed in an access policy. Thus, two users with different authorizations might execute the same dataset but end up with different views of the data.

View Defined Datasets

View the list of defined datasets on the **Manage Datasets** page.

To see what datasets have already been defined:

Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.

The **Manage Datasets** page opens, listing the datasets that have already been defined.

Define a Dataset

Define a new dataset on the **Manage Datasets** page.

Note: Only users with a role of PHEMI Administrator can define datasets.

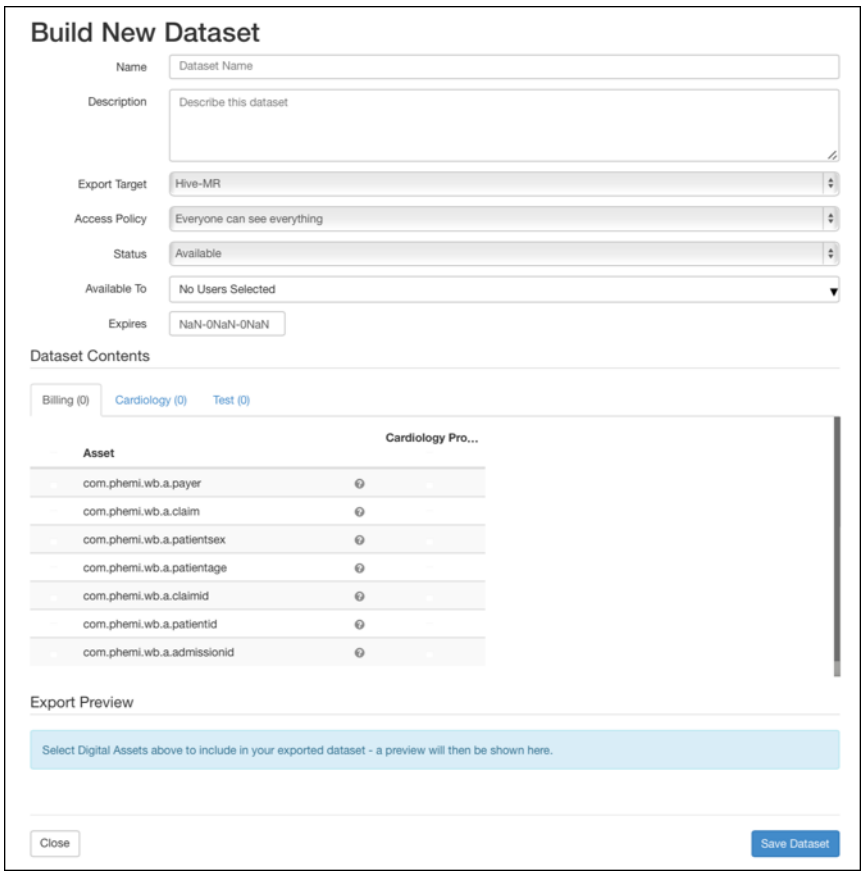
To define a dataset:

1. Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.

   The **Manage Datasets** page opens, listing the datasets that have already been defined.

2. Click the **Define New Dataset** button.

   The **Build New Dataset** screen opens.



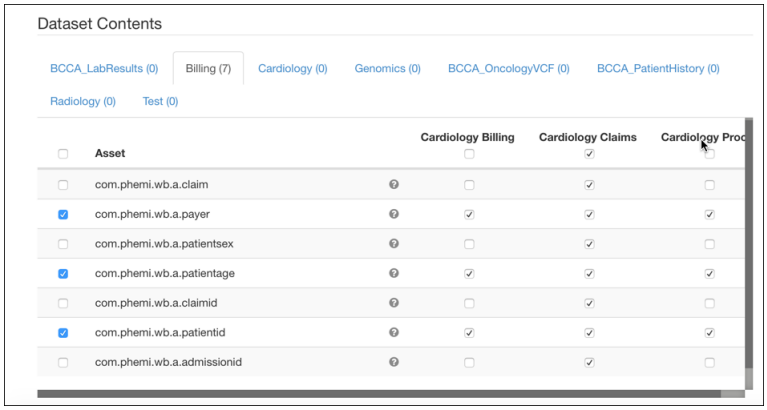
3. Describe the dataset.

Option	Description
Name	Mandatory. A name for the dataset.
Description	Mandatory. A brief description of the dataset.
Export Target	Optional. The format required by the system to receive the dataset. Supported values are as follows: • Hive-MR. Apache Hive MapReduce format. • JDBC. Java Database Connectivity format. • CSV. Comma-separated values format. • TSV. Tab-separated values format. The default is Hive-MR. If you choose JDBC as the format, you have the option of selecting one of the dataset destinations that has been configured for the system. *Tell me about dataset destinations.*
Access Policy	Optional. The access policy to protect the dataset. The access policy selected for the dataset may match or may be different from any applied to the constituent data collection(s). By default, the first configured access policy is applied.
Status	Optional. The availability of the dataset. The only supported value is Available.
Available To	Mandatory. The users who are allowed to access this dataset. Select one or more users from the drop-down list; only users with a role of Data Analyst appear on the list. By default, no users are allowed to access the dataset.

Option	Description
Expires	Mandatory. An expiry date for the dataset. When this date is reached, PHEMI Central deletes the dataset from the system.

4. Choose the fields you want in the dataset.

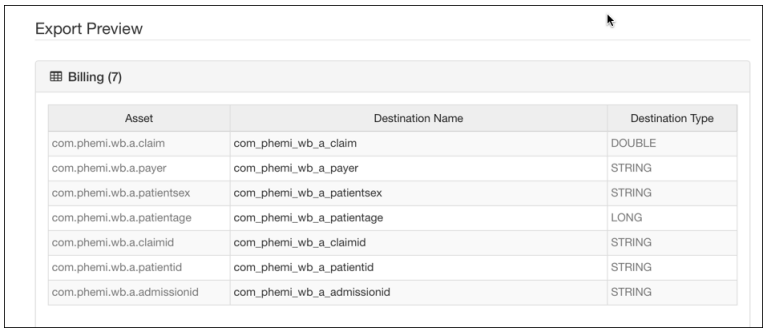
   You select the fields for the dataset in the **Dataset Contents** pane. This pane will show a number of tabs; these tabs reflect the data categories configured for your data. Clicking a tab will list all the fields extracted from all the data collections within the category, where each data collection is represented by a column. Each data source and each field has a checkbox.



   - Select an entire data collection by checking the checkbox for the column.
   - Select any number of individual fields.

   Continue for each data category you want to include in the dataset.

   As you select fields, a preview of your selections appears in **Export Preview** pane.



5. When your dataset is complete, click the **Save Dataset** button. The system confirms when the dataset has been successfully saved. Click **Close** to dismiss the **Build New Dataset** screen.

View Dataset Information

View information for a dataset on the **Manage Datasets** page.

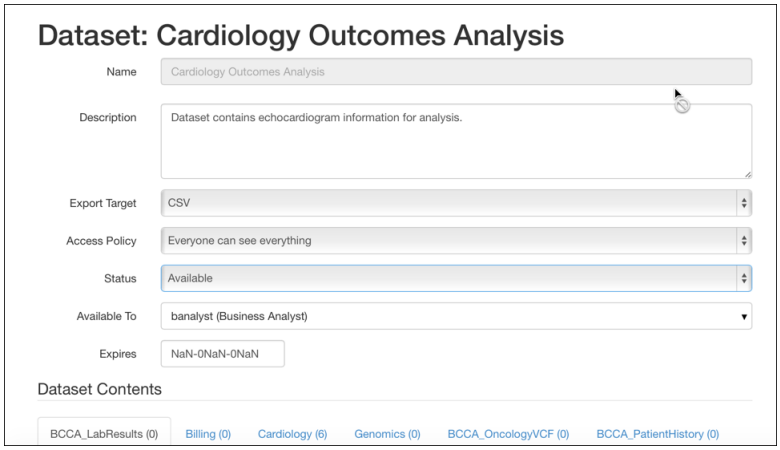
Note: Only users with a role of PHEMI Administrator can view dataset information.

To see information for a dataset:

1. Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.

   The **Manage Datasets** page opens, listing the datasets that have already been defined.

2. Click the name of the dataset you want to view.
   The information screen for the dataset opens.



3. Click **Close** to dismiss the screen.

Modify a Dataset

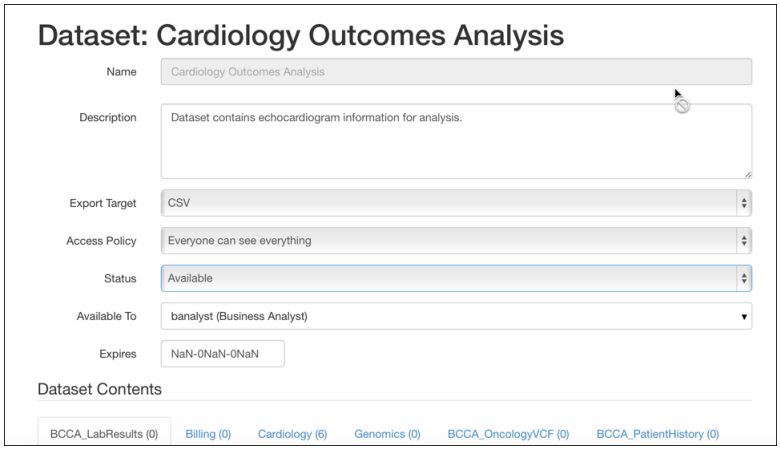
Modify information for a dataset on the **Manage Datasets** page.

Note: Only users with a role of PHEMI Administrator can modify a dataset definition.

To see information for a dataset:

1. Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.
   The **Manage Datasets** page opens, listing the datasets that have already been defined.

2. Click the name of the dataset you want to modify.
   The information screen for the dataset opens.



3. Make your changes. *What do these fields mean? How do I change the fields in the dataset?*
   Click **Save Dataset** to save your changes. The system confirms when the dataset has been successfully saved.
   Click **Close** to dismiss the dataset information screen.

Execute a Dataset

View the list of defined datasets on the **Manage Datasets** page.

Note: Only users with a role of Data Analyst can execute a dataset.

To see what datasets are available:

1. Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.

   The **Manage Datasets** page opens, listing the defined datasets.

2. Check the checkbox next to the dataset you want to execute, or check **Select/Deselect All** to select all the datasets.

   You will only be able to select datasets that the PHEMI Administrator has designated as available to you in the dataset definition.

3. Click **Execute Selected Datasets**.

   The dataset executes.

Delete a Dataset

Delete a dataset from the **Manage Datasets** page.

Note: Only users with a role of PHEMI Administrator can delete a dataset.

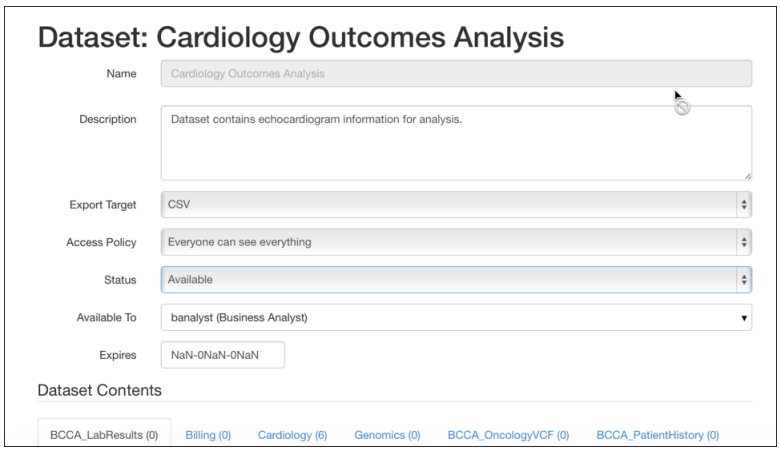
To delete a dataset:

1. Open the **Manage Datasets** page, by clicking the **Datasets** icon in the left navigation bar.

   The **Manage Datasets** page opens, listing the datasets that have already been defined.

2. Click the name of the dataset you want to delete.

   The information screen for the dataset opens.



3. Click the **Delete Dataset** button. The system asks you to confirm permanent deletion. Click **Delete**.

Access Policies

Access policies let you characterize rightful access in terms of user authorizations and data visibility.

An access policy is a set of logical rules that determines how users can consume data stored in PHEMI Central. The access policy specifies what user authorizations are required to interact with data tagged with specified sensitivity, or visibility. Access policies can be applied to data collections and datasets.

To create an access policy, you define one or more access rules. Each rule has three parts.

- Subject specifies who may access the data. Access is characterized in terms of user authorizations. *Tell me about user authorizations.*
- Action specifies what action authorized users may take to interact with the data.
- Object specifies what kind of data for which the access is being granted. The data is specified in terms of data visibility. *Tell me about data visibilities.*

A access policy is matched when the request satisfies at least one access rule in the policy. A rule is satisfied if the user making the request has one of the authorizations listed for Subject, and the data being requested one of the visibilities listed for Object. When there is a match, the user may take the specified action(s) on the data.

The rules in a given access policy are intended to implement specific controls over data. Depending on the number and kinds of datasets your organization works with, you may need just one access policy or you may need multiple access policies.

If you have multiple access policies, it is possible for policies to conflict with one another and still represent a consistent governance policy, provided that each access policy is used to control different data collections or datasets. For example, one access policy may allow users with Researcher authority to read CONFIDENTIAL data while another access policy does not. This can be perfectly consistent, given the policies control different data.

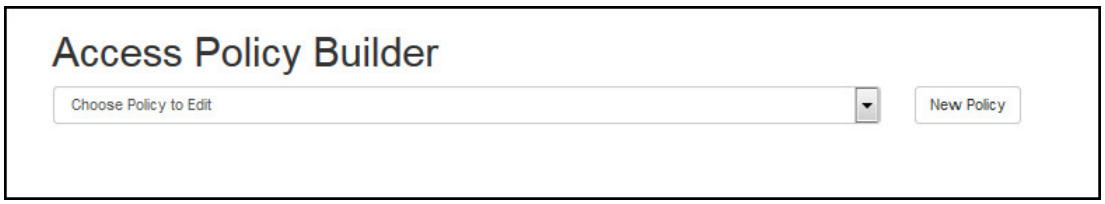
View Existing Access Policies

See what access policies have been configured on the **Access Policy Builder** page.

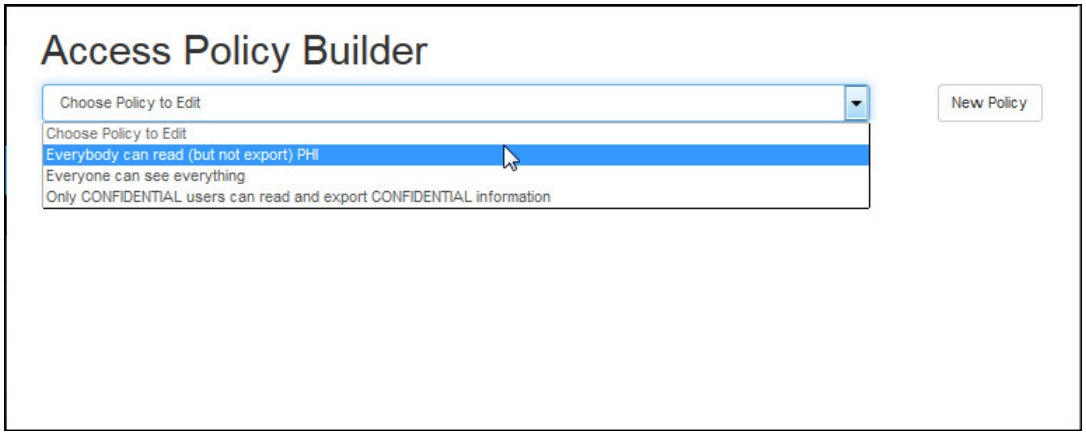
To view defined access policies:

1. Open the **Access Policy Builder** page, by clicking the **Access Policy Builder** icon in the left navigation bar.

   The **Access Policy Builder** page opens.



2. At the right of the **Choose Policy to Edit** field, click the drop-down arrow. The list of configured access policies display.



Create an Access Policy

Create a new access policy on the **Access Policy Builder** page.

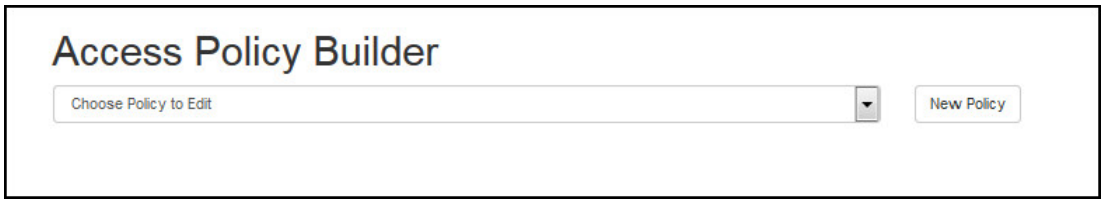
Before you can create an access policy you must configure the following:

- User authorizations
- Data visibilities

To create a new access policy, define one or more access rules:

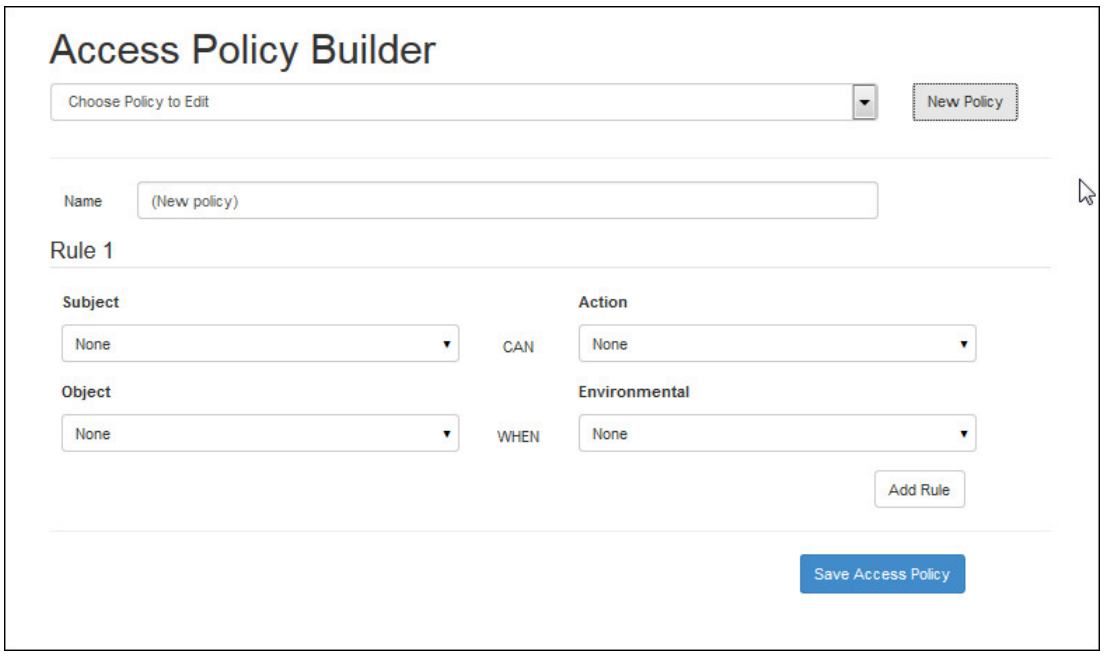
1. Open the **Access Policy Builder** page, by clicking the **Access Policy Builder** icon in the left navigation bar.

   The **Access Policy Builder** page opens.



2. Click the **New Policy** button.

   The form for the new access policy opens, with Rule 1 ready for you to edit.



3. Enter the access rule information.

Option	Description
Subject	Mandatory. The user authorizations allowed to perform the action on the data. User authorizations are configured for the system by the administrator.
Action	Mandatory. The action(s) an authorized user may take on the data. Supported actions are as follows: • Read. The user may view the data. • Export. The user may export the data to a destination, such as a local computer for analysis.
Object	Mandatory. The data visibilities authorized users are allowed to access. Data visibilities are configured by the administrator.

4. Add another rule by clicking the **Add Rule** button. Or, save the access policy by clicking the **Save Access Policy** button. The system confirms when the access policy has been successfully saved.

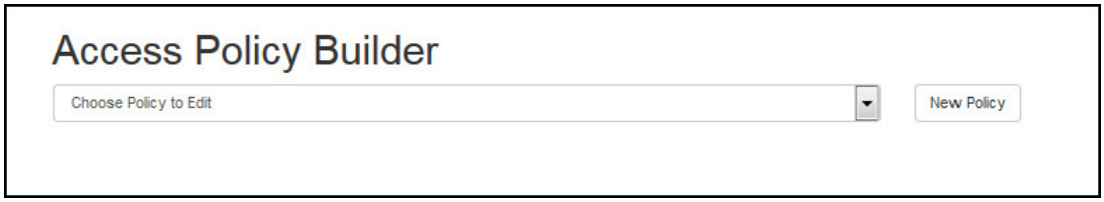
View Access Policy Information

View the information configured for a given access policy on the **Access Policy Builder** page.

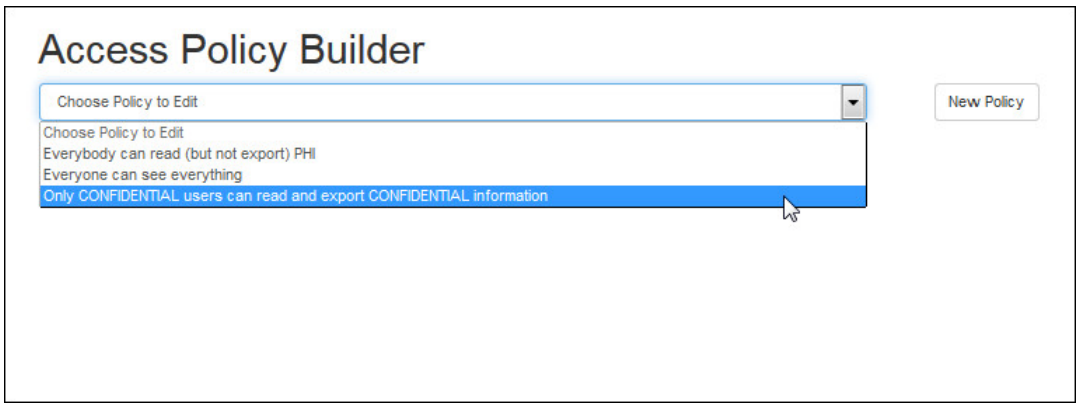
To view information for an access policy:

1. Open the **Access Policy Builder** page, by clicking the **Access Policy Builder** icon in the left navigation bar.

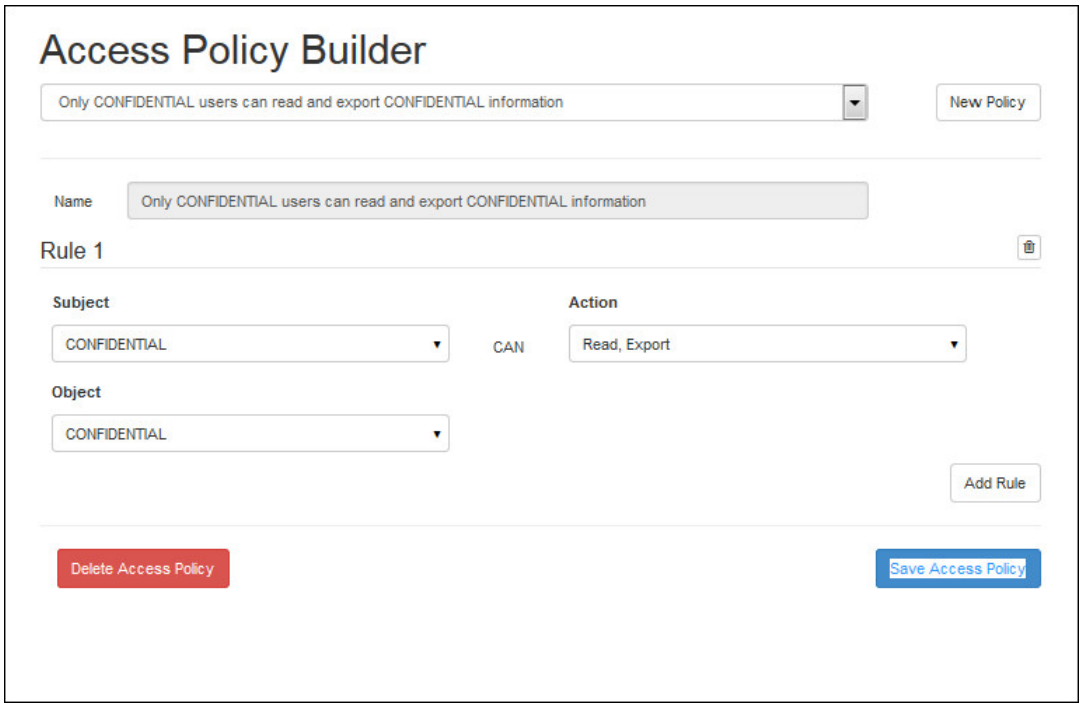
   The **Access Policy Builder** page opens.



2. At the right of the **Choose Policy to Edit** field, click the drop-down arrow to see configured access policies. Select the policy you want to view.



The screen for the selected access policy opens, showing the information configured for it.



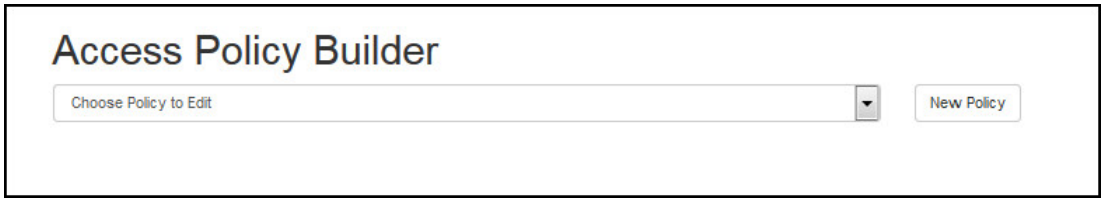
Modify an Access Policy

Modify an access policy on the **Access Policy Builder** page.

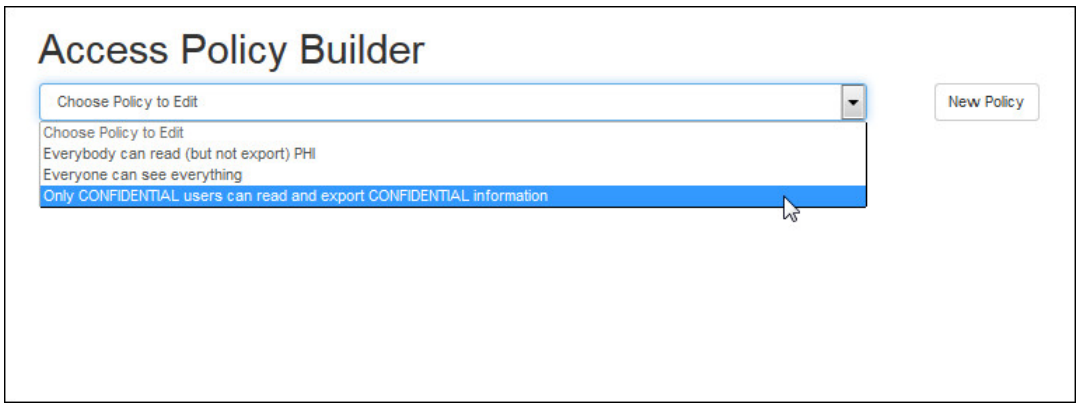
To modify an access policy:

1. Open the **Access Policy Builder** page, by clicking the **Access Policy Builder** icon in the left navigation bar.

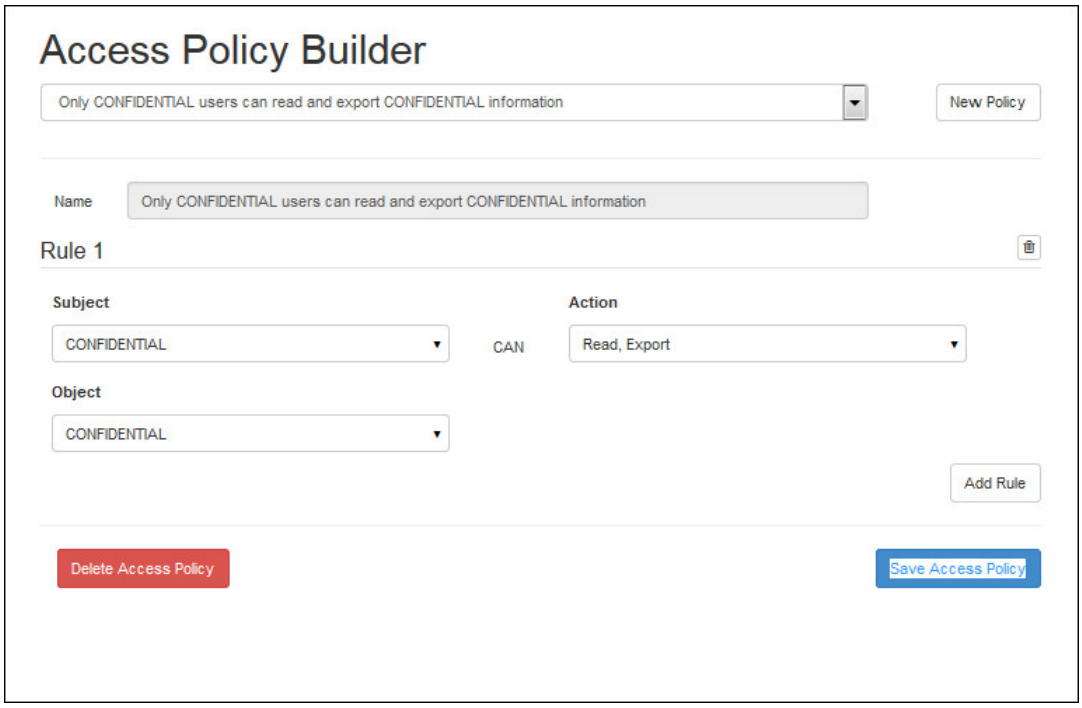
   The **Access Policy Builder** page opens.



2. At the right of the **Choose Policy to Edit** field, click the drop-down arrow to see configured access policies. Select the policy you want to modify.



The screen for the selected access policy opens, showing the information configured for it.



3. Do any of the following.
   - Modify an existing rule by editing values for Subject, Action, or Object.
   - Add a new rule by clicking the **Add Rule** button and populating the fields.
   - Delete a rule by clicking the trash can icon to the right of the rule.
4. Click the **Save Access Policy** button to save the changes.

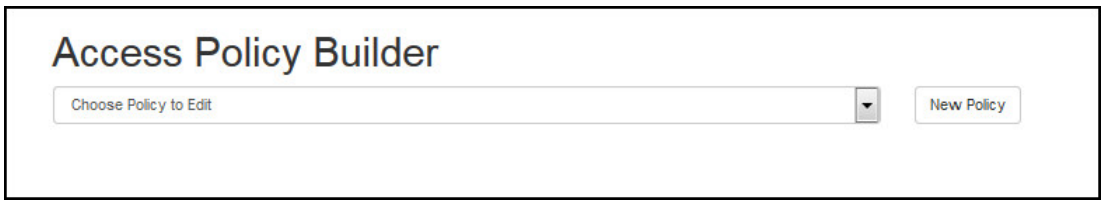
Delete an Access Policy

Delete an access policy on the **Access Policy Builder** page.

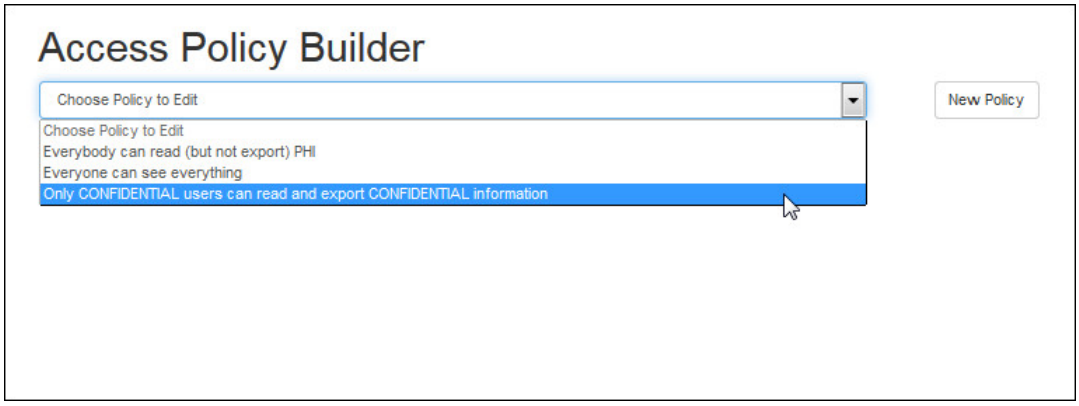
To delete an access policy:

1. Open the **Access Policy Builder** page, by clicking the **Access Policy Builder** icon in the left navigation bar.

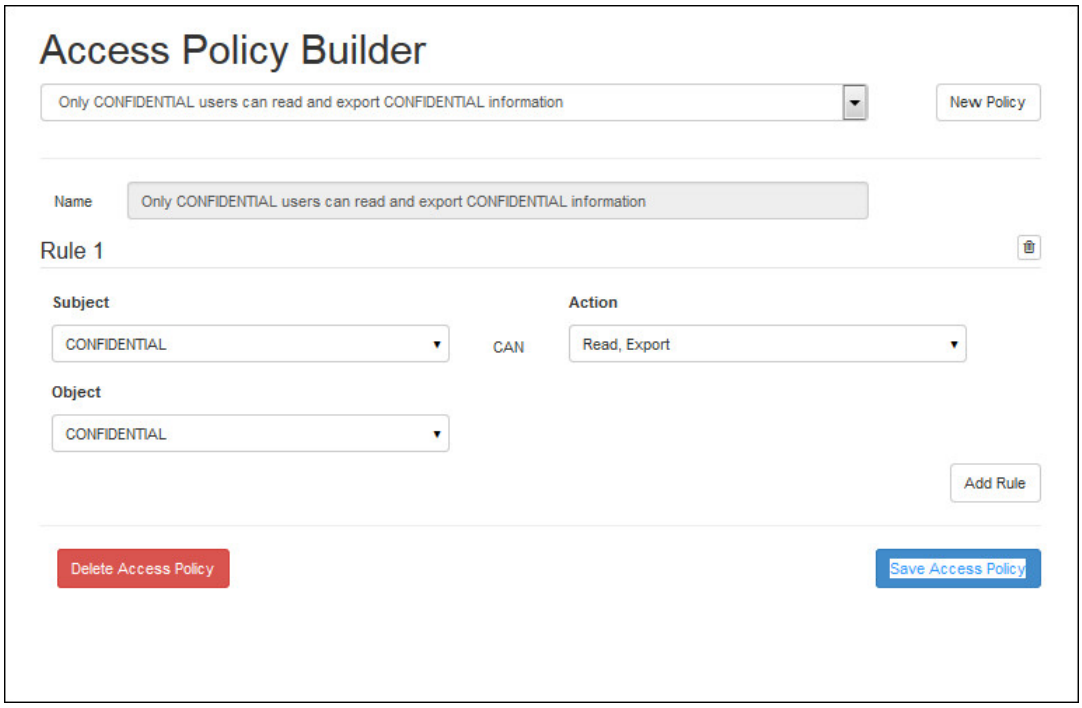
   The **Access Policy Builder** page opens.



2. At the right of the **Choose Policy to Edit** field, click the drop-down arrow to see configured access policies. Select the policy you want to modify.



The screen for the selected access policy opens, showing the information configured for it.



3. Click the **Delete Access Policy** button. The system asks you to confirm deletion; click **Delete**.

System Metrics

Monitor system status and health on the **System Metrics** page.

The **System Metrics** page of the Management and Governance Console reports information about users and system usage, as well as tracking data collection statistics, system performance, and the status of systems tasks.

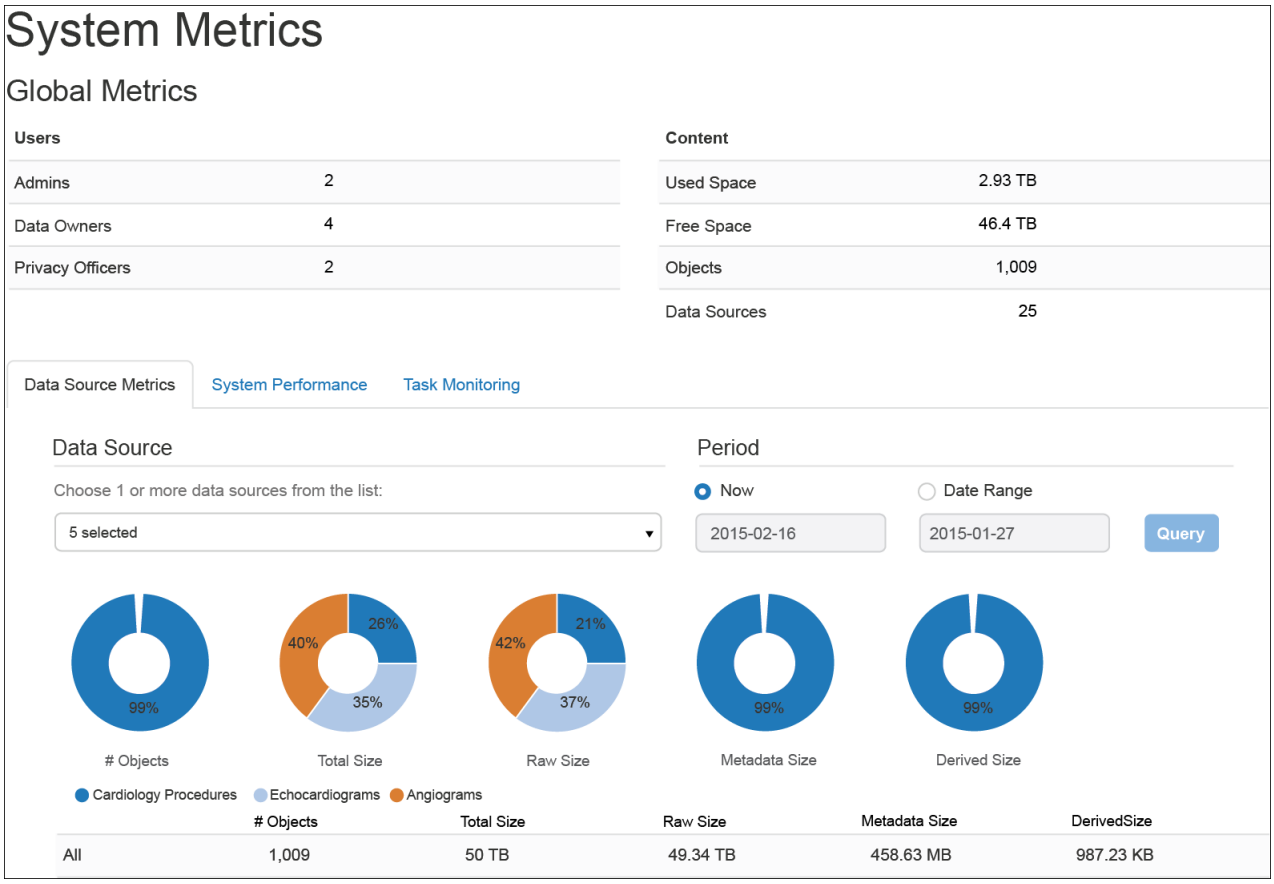
View Global Metrics

View summary information about users and the content residing on your system in the **Global Metrics** pane of the **System Metrics** page.

To view global metrics:

Open the **System Metrics** page, by clicking the **System Metrics** icon in the left navigation bar.

The **System Metrics** page opens showing the **Global Metrics** pane and the **Data Collection Metrics** tab.



In the **Users** column, you can see how many users are currently created each user role. In the **Content** column, you can see how much used and free space there is on the system, as well as the number of objects the system is currently storing and the number of data collections that have been configured.

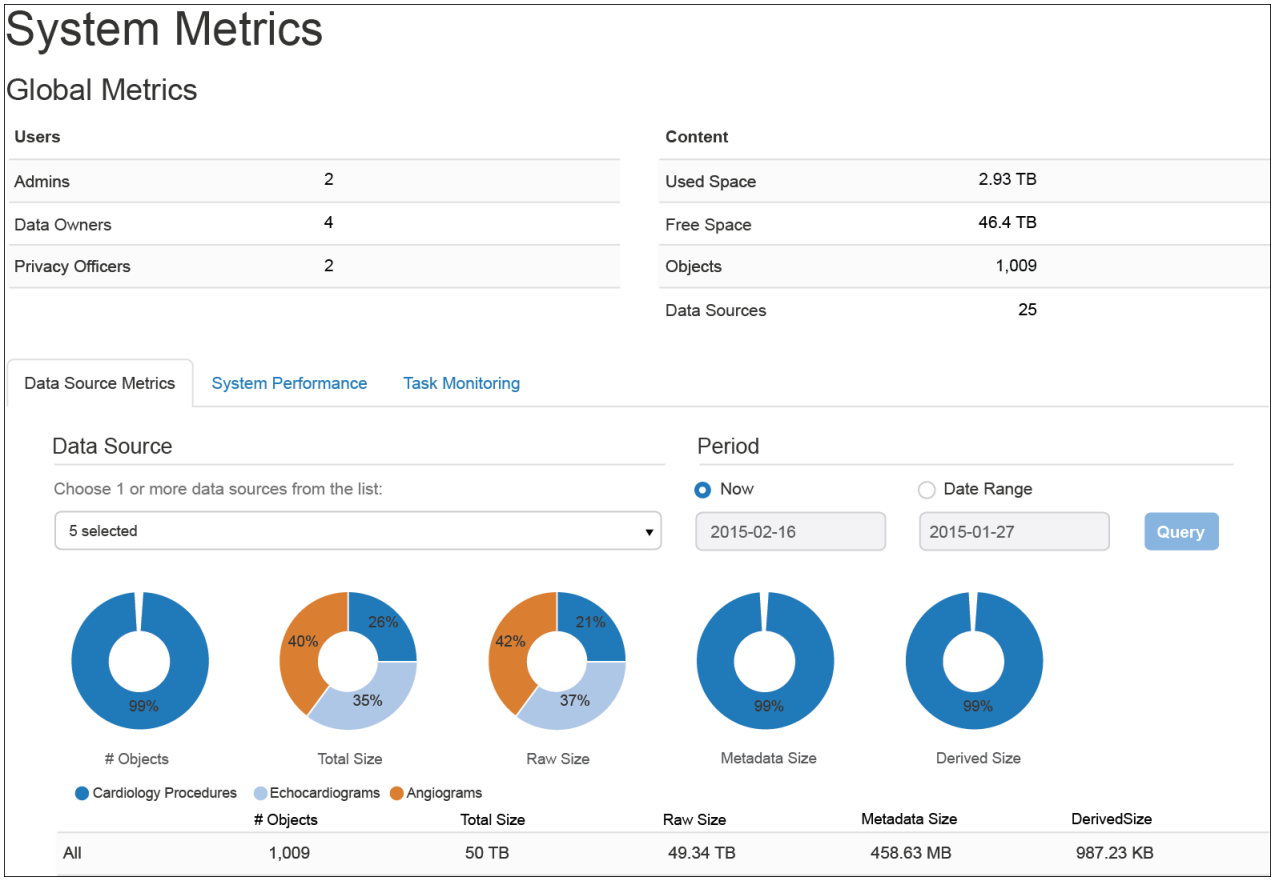
View Data Collection Metrics

View statistics about data collections on the **Data Collection Metrics** tab of the **System Metrics** page.

To view data collection metrics:

1. Open the **System Metrics** page, by clicking the **System Metrics** icon in the left navigation bar.

   The **System Metrics** page opens showing the **Global Metrics** pane and the **Data Collection Metrics** tab.



2. By default, the **Data Collection Metrics** pane shows metrics for all data collections. To view information for some other set of data collections, click the drop-down arrow in the **Data Collections** field and check each data collection you want included in the metrics. If you want to include all data collections, you can check **All**.
3. Choose the query period: select **Now** to see a current snapshot, or select **Date Range** to specify a range of dates. The format for dates is *yyyy-mm-dd*.
4. Click **Query**.

   The results of your query are displayed below the selection parameters.

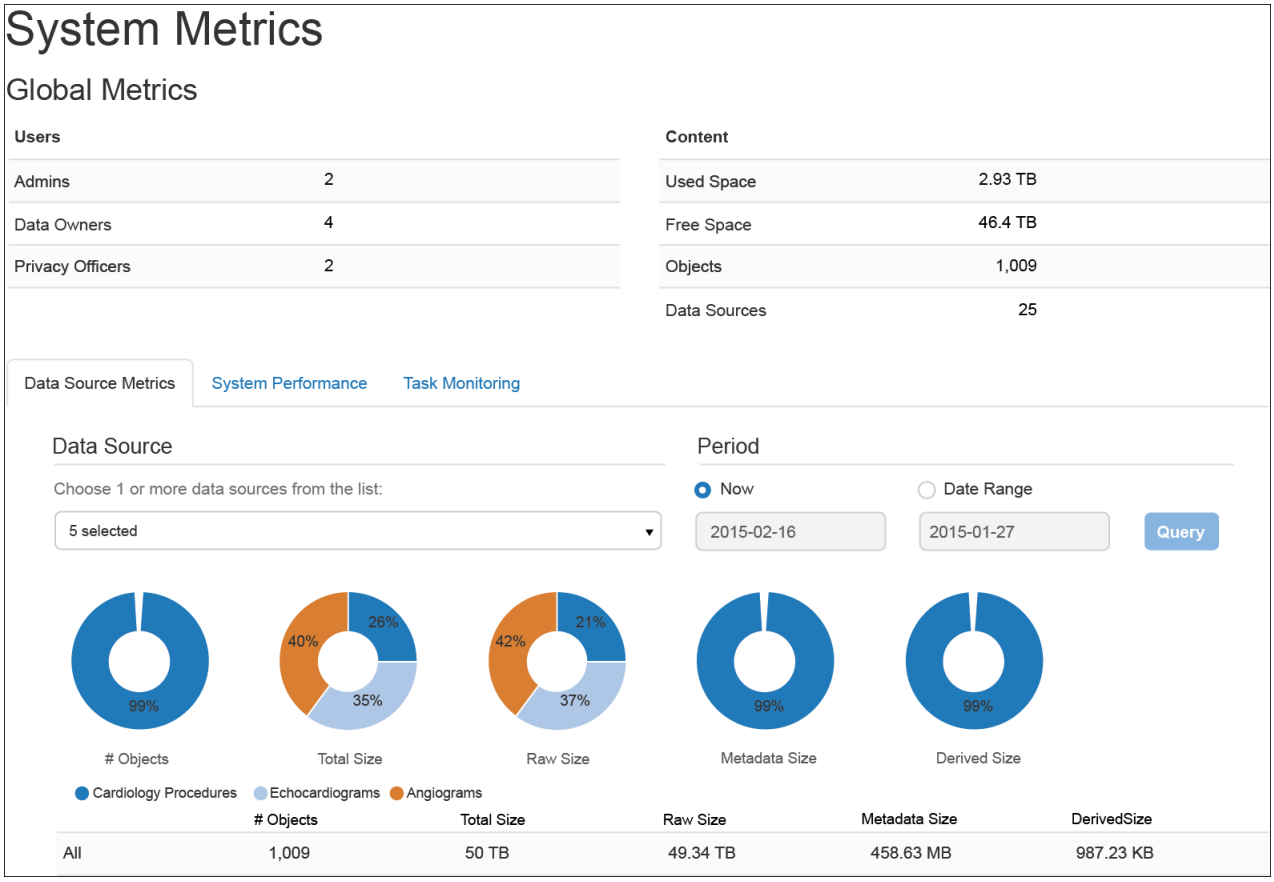
View System Performance

View performance statistics for data ingest and dataset execution on the **System Performance** tab of the **System Metrics** page.

To view data ingest and dataset execution metrics:

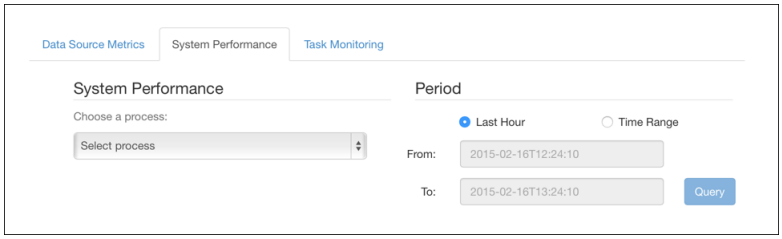
1. Open the **System Metrics** page, by clicking the **System Metrics** icon in the left navigation bar.

   The **System Metrics** page opens showing the **Global Metrics** pane and the **Data Collection Metrics** tab.



2. Click the **System Performance** tab.

   The **System Performance** tab opens.



3. In the **System Performance** field, choose **Data Ingest** to view performance information for data ingest, or **Data Execution** to view performance information for dataset execution.
4. Choose the query period: select **Last Hour** to see statistics for the previous hour, or select **Time Range** to specify a range of times. The format for time is *yyyy-mm-dd*T*hh*:*mm*:*ss*, where hours are specified in 24-hour time format.
5. Click **Query**.

   The results of your query are displayed below the selection parameters.

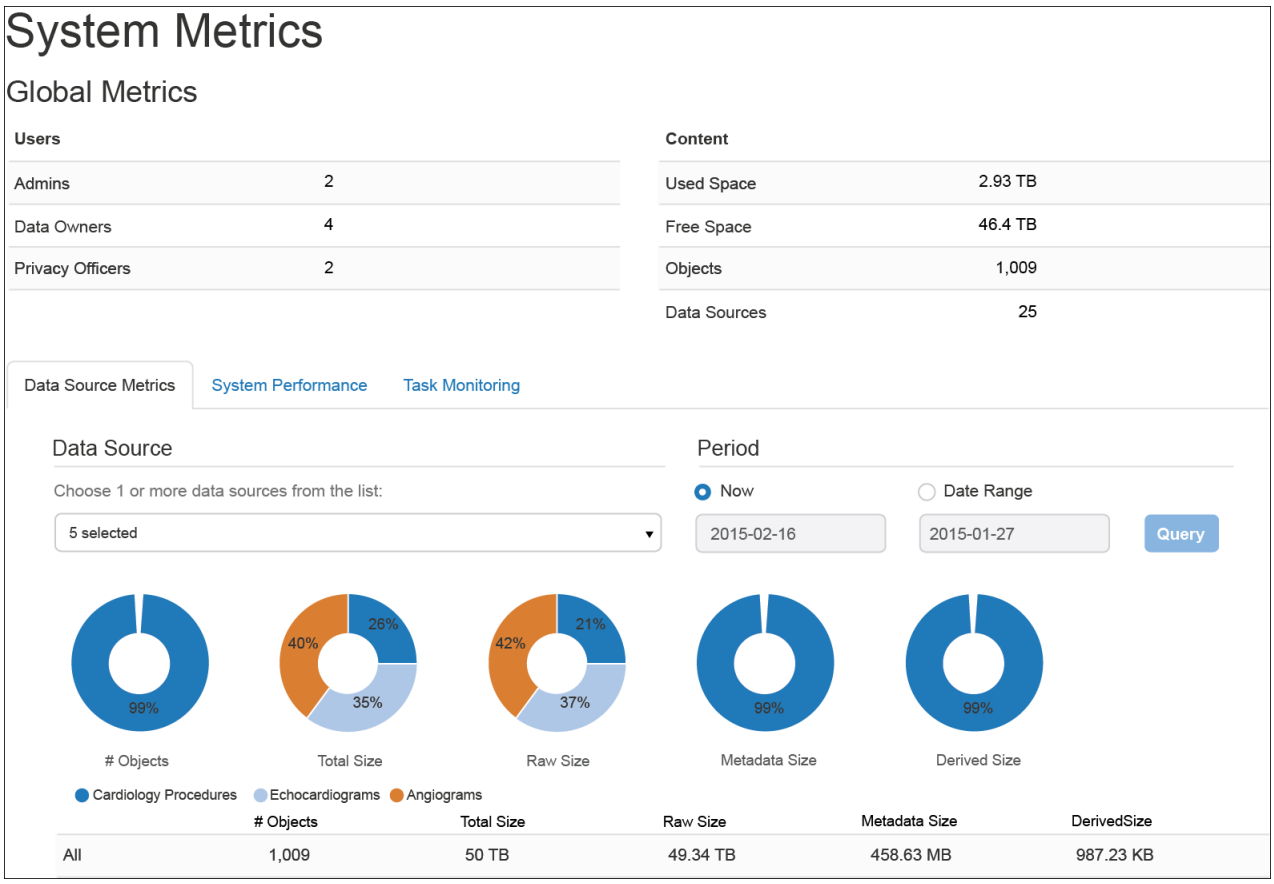
Monitor System Tasks

Monitor PHEMI Central system tasks on the **Task Monitoring** tab of the **System Metrics** page.

To monitor system tasks:

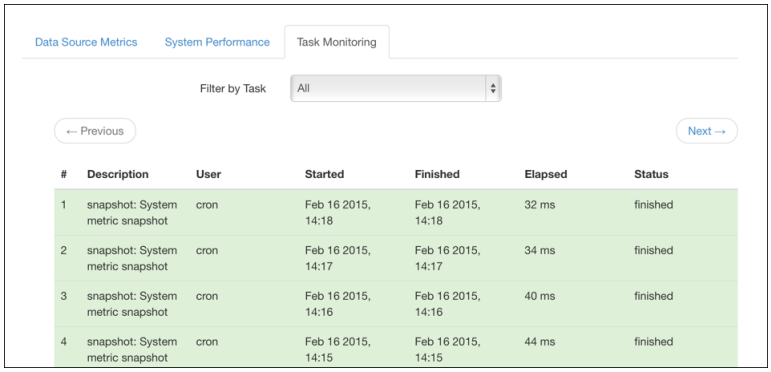
1. Open the **System Metrics** page, by clicking the **System Metrics** icon in the left navigation bar.

   The **System Metrics** page opens showing the **Global Metrics** pane and the **Data Collection Metrics** tab.



2. Click the **Task Monitoring** tab.

   The **Task Monitoring** tab opens, showing system tasks with most recently executed tasks shown first.



3. By default, the **Task Monitoring** pane lists tasks of all task types. You can focus on a single task type by clicking the drop-down arrow in the **Filter by Task** field and checking the task type you want to see. If you want to see all task types, you can check **All**.

Option	Description
chained	The system has ingested raw data and executed a DPF on the data.
cleanup	The system has checked retention rules for a data collection and deleted expired data.
derive	The system has executed a DPF against ingested data.
download	The system has exported a dataset.
execute	The system has executed a dataset.
ingest	The system has ingested data from the indicated data collection.

Option	Description
snapshot	The system has taken a snapshot of information for system metrics.

When you make your selection, the results display from most recent to less recent below the selection parameters.

Users

User management allows you to say who can use the system to do what, and who can access what data.

PHEMI Central user management is organized around user roles and user authorizations. Your user role defines what parts of the Management and Governance Console and RESTful API you can use, and your user authorization together with data visibilities, are used in access policies that specify how user with your access authorizations are allowed to interact with data.

User information is set and modified on the **Manage Users** page. . The exception is user authorizations, which are defined as part of system configuration.

Tell me about user authorizations.

User Roles

User roles define what you are allowed to do within the PHEMI Central Management and Governance Console. Users can be assigned any or all of three roles.

Table 2: User Roles

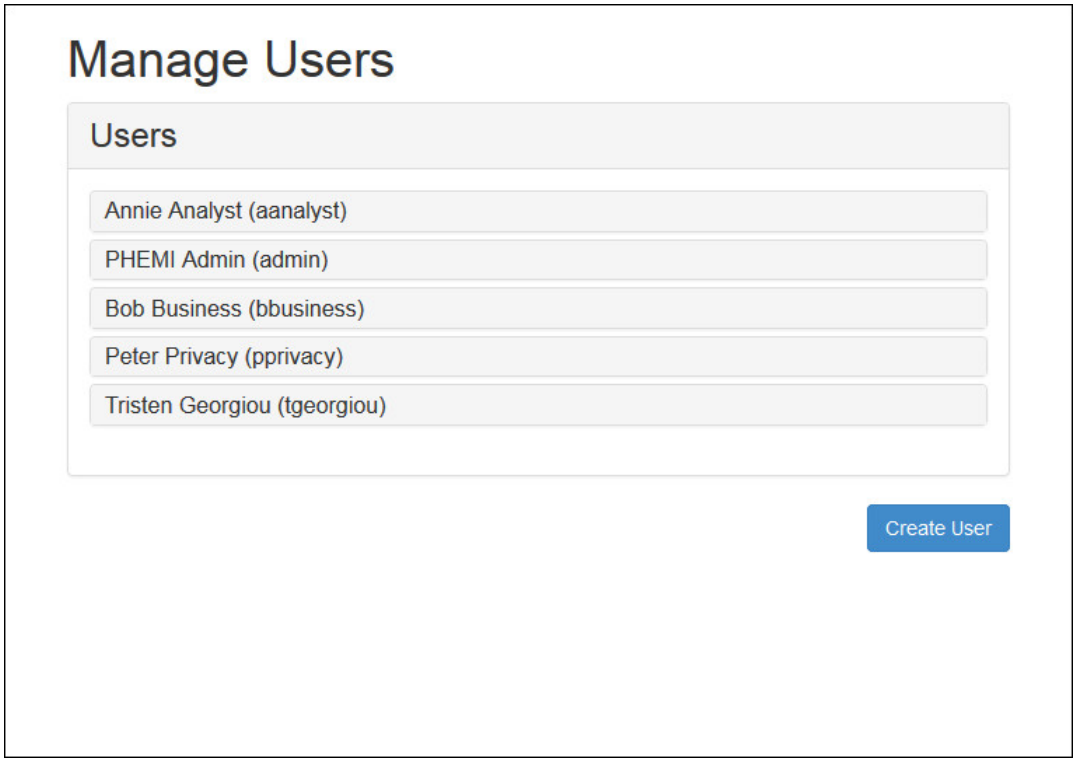
Role	Purpose	PHEMI Central Management Console Access
PHEMI Administrator	Configures access to PHEMI Central and to data.	• System configuration: password policy, dataset destinations, data retention behavior, data categories, data visibilities, and user authorizations • Configure data collections, including deploying DPFs • Create access policies • Monitor system metrics • Manage users • Monitor audit logs
Privacy Officer	Responsible for governance policies that define the organization's approach for safeguarding data and assigning privileges to users.	The privacy officer has no functional ability within the PHEMI Central Management and Governance Console. The privacy officer elucidates the governance policies prior to system configuration.
Data Analyst	Submits data for ingestion and consumes data.	• Ingest data • Execute and export datasets

View System Users

View system users on the **Manage Users** page.

To view system users:

Open the **Manage Users** page, by clicking the **Users** icon in the left navigation bar.
The **Manage Users** page lists all the users defined on the system.



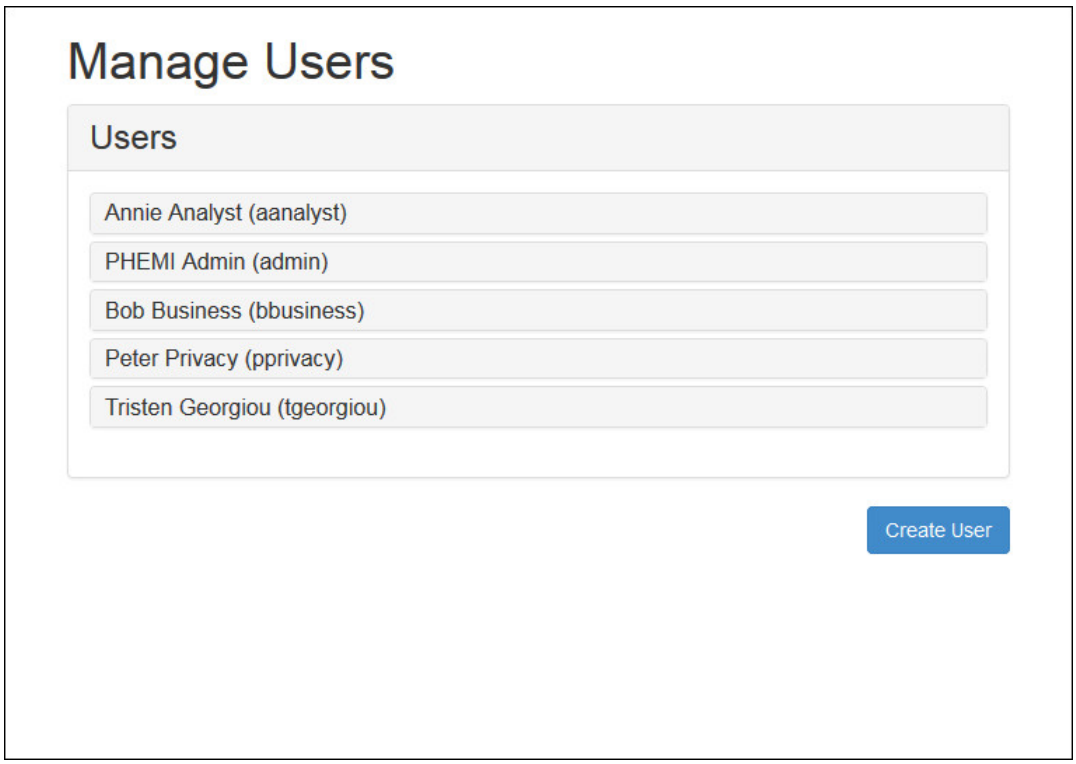
Create a New User

Create a new user on the **Manage Users** page.

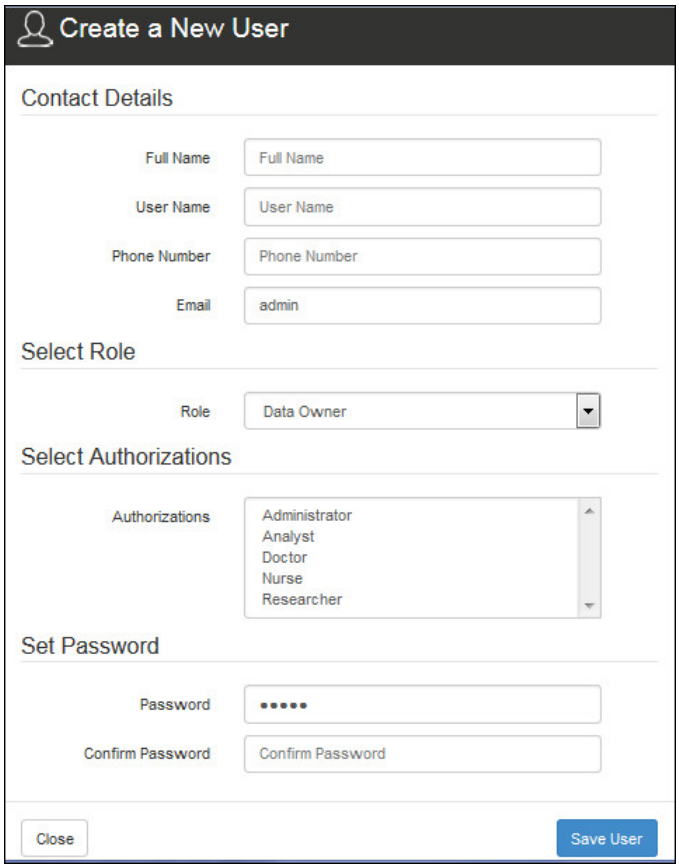
Before you can create users, you must configure user authorizations.

To create a new user:

1. Open the **Manage Users** page, by clicking the **Users** icon in the left navigation bar.
   The **Manage Users** page lists all users defined in the system so far.



2. Click the **Create User** button.
   The **Create a New User** window opens.



3. Enter the user information.

Option	Description
Full Name	Mandatory. The user's full name.
User name	Mandatory. The user ID for this user. The **User Name** field autopopulates with the first initial and last name entered for as the user's full name. For example, if the user's full name is Jane Smith, the **User Name** field autopopulates with jsmith. The user ID can be edited after it has been autopopulated. IDs can be up to 16 characters long. Alphabetic and numeric characters are permitted, as well as underscore ("_")
Phone Number	Optional. The user's phone number. You must configure this field if you want the system to send alerts to the user's phone.
Email	Mandatory. The user's email address. If you configure the system to send email alerts to the user, this is the email address that will be used.
Role	Mandatory. The user's system role. Together with the user authorization configured and the visibility set for data, the user role determines what access the user will have to data. A user can be assigned more than one role.
Authorizations	Optional. The types of data the user is authorized to access. Use either the **Shift** key or the **Ctrl** key to make multiple selections.
Password	Mandatory. Note that the password must comply with your organization's password policy.

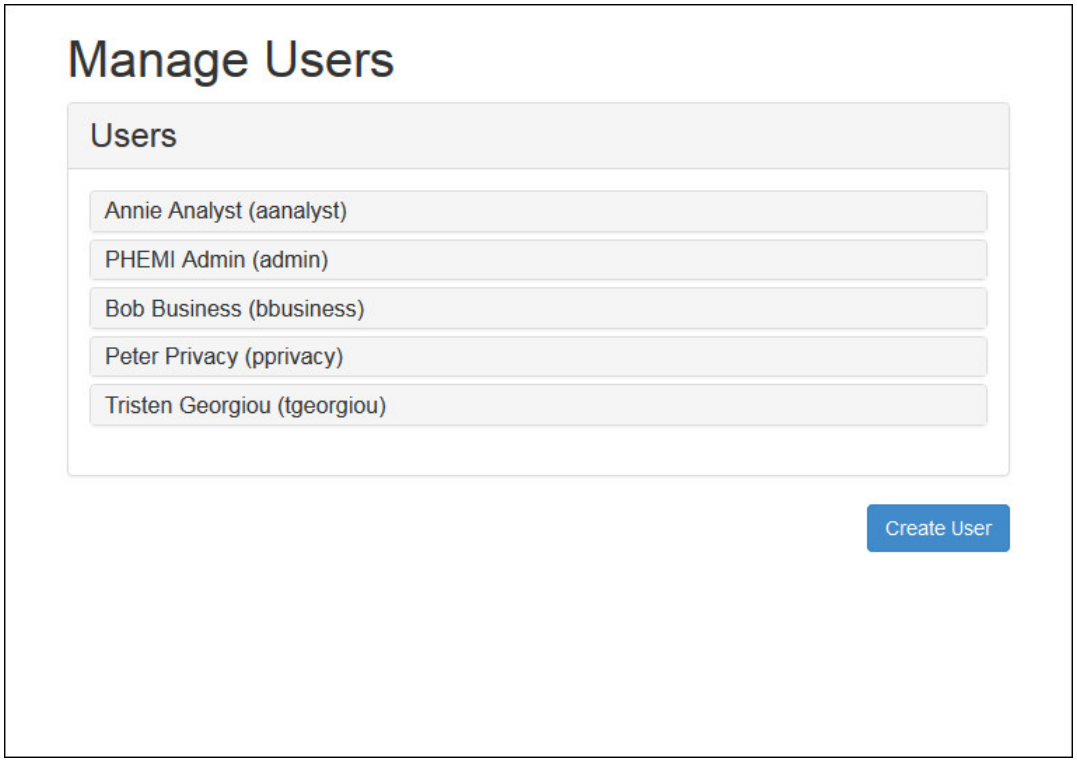
4. Save the user information by clicking the **Save User** button. The system confirms when the user has been successfully saved. Click **Close** to close the screen.

View User Information

View user information from the **Manage Users** page.

To view user information:

1. Open the **Manage Users** screen, by clicking the **Users** icon in the left navigation bar.



2. Click the user's name to expand the user record.

Click the user's name a second time to collapse the user record again.

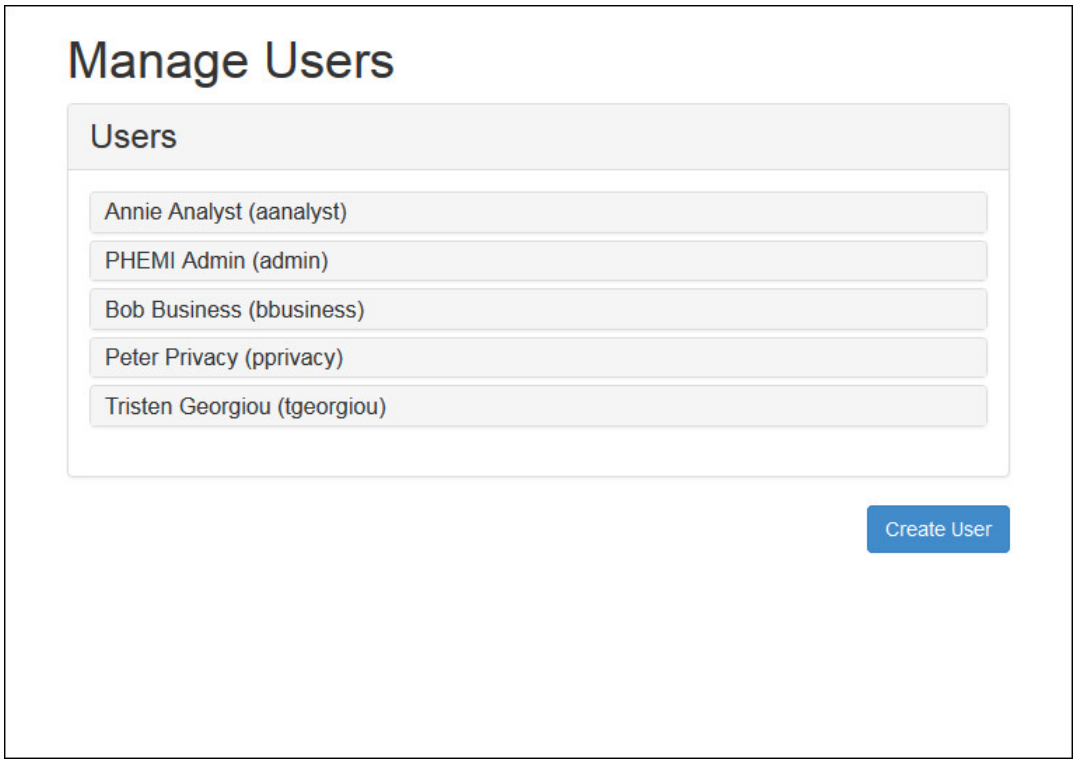
Modify User Information

Modify user information on the **Manage Users** page.

You must know a user's password in order to change their user information.

To modify user information:

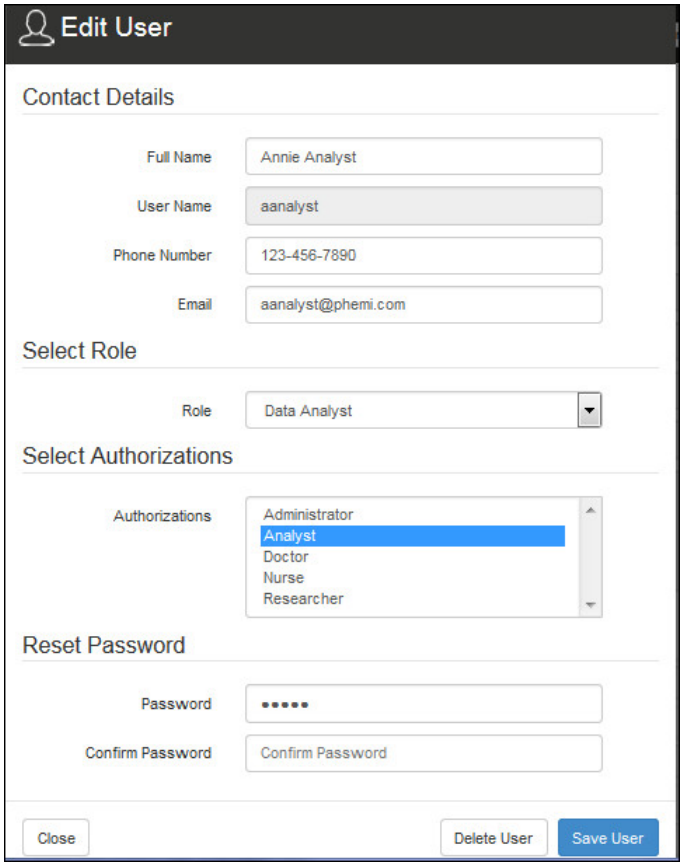
1. Open the **Manage Users** page, by clicking the **Users** icon in the left navigation bar.



2. Click the user's name to expand the user record.

3. Click the **Modify** button.

   The **Edit User**screen opens.



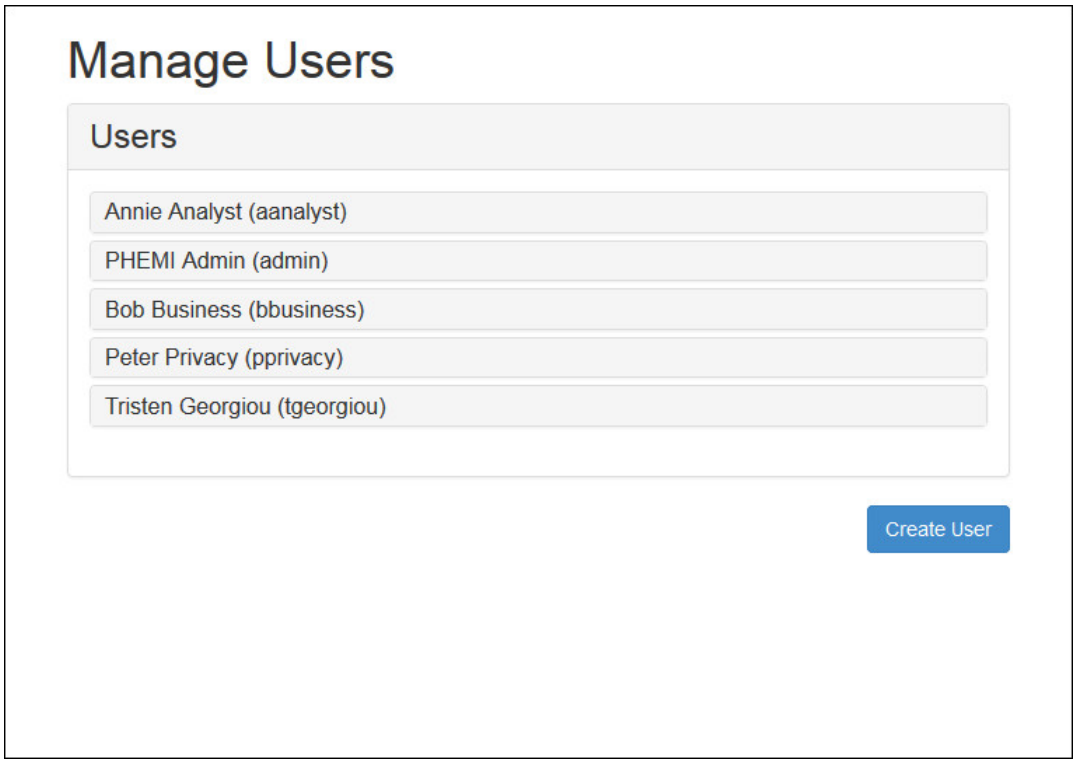
4. Modify the user information as necessary. You must confirm the user's password by typing it in both the **Password** and the **Confirm Password** fields. *What do these fields mean?*
5. Save the changes by clicking the **Save User** button. The system confirms when the user has been successfully saved. Click **Close** to close the screen.

Delete a User

Delete a user from the **Manage Users** page.

To delete a user:

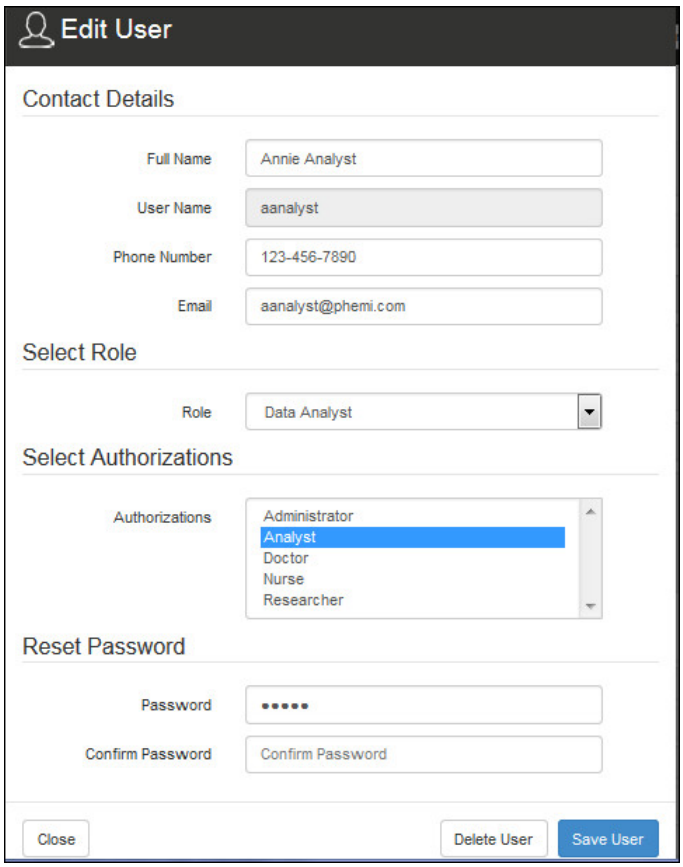
1. Open the **Manage Users** page, by clicking the **Users** icon in the left navigation bar.



2. Click the user's name to expand the user record.

3. Click the **Modify** button.

   The **Edit User**screen opens.



4. Click the **Delete User** button. The system asks you to confirm. Click the **Confirm Delete** button.

   The system confirms when the user has been successfully deleted. Click **Close** to close the screen.

The Object Browser

View or delete objects stored in PHEMI Central using the **Object Browser**.

The Object Browser lets you view individual objects that have been stored in PHEMI Central. You can see the metadata that has been applied to the object, the data elements (if any) that have been derived by running a DPF on the data, and the binary data that makes up the object, shown as hexadecimal with an ASCII interpretation.

Only a PHEMI Administrator can access the Object Browser. As with all other data, access to data is restricted by the governance placed around the data.

View an Object

View individual objects stored in the system using the **Object Browser** page.

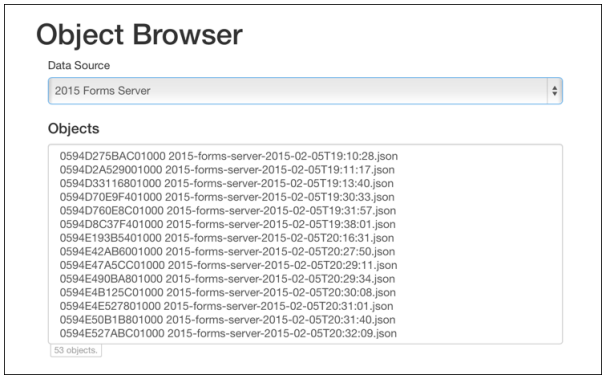
To view an object:

1. Open the **Object Browser** page, by clicking the **Object Browser** icon in the left navigation bar.

   The **Object Browser** page opens.

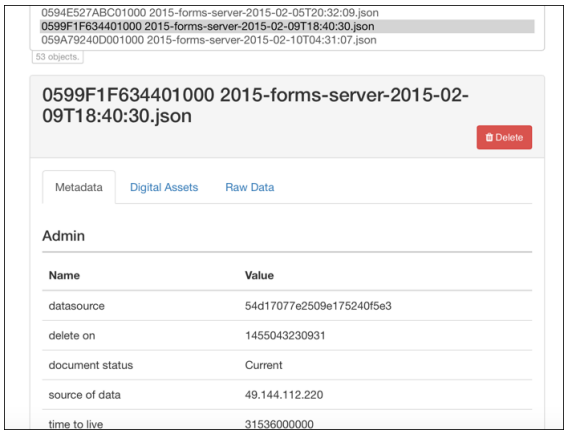
2. Click the drop-down arrow on the **Data Collection** field and select the data collection containing the object.

   The available objects are listed in the **Objects** text box. Each object has the original file name it had on ingest, prepended with the system key that PHEMI Central has assigned.



3. Select the object you want to view, scrolling through the list as necessary.

   Once selected, the object's information is retrieved and displays with the **Metadata** tab initially showing.



   - View the object's metadata on the **Metadata** tab.
   - View any data elements derived by executing a DPF by clicking the **Digital Assets** tab.
   - View a hexadecimal and ASCII representation of the original data object by clicking the **Raw Data** tab.

Delete an Object

Delete an individual object from the system using the **Object Browser** page.

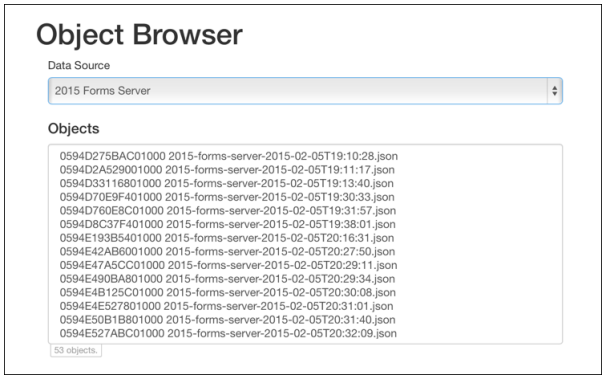
To delete an object:

1. Open the **Object Browser** page, by clicking the **Object Browser** icon in the left navigation bar.

The **Object Browser** page opens.

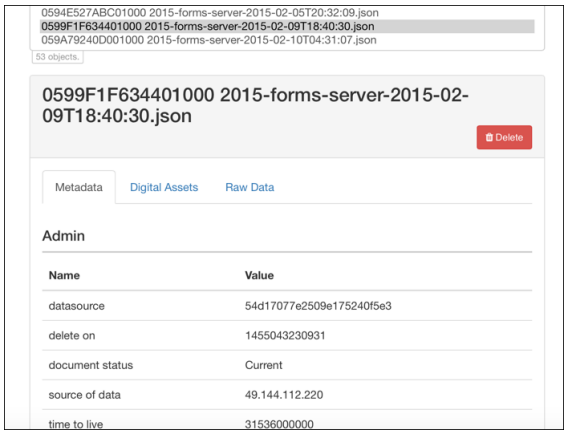
2. Click the drop-down arrow on the **Data Collection** field and select the data collection containing the object.

   The available objects are listed in the **Objects** text box. Each object has the original file name it had on ingest, prepended with the system key that PHEMI Central has assigned.



3. Select the object you want to view, scrolling through the list as necessary.

   Once selected, the object's information is retrieved and displays with the **Metadata** tab showing, and the **Delete** button appears.



4. To delete the original object, click the **Delete** button. The system asks you to confirm permanent deletion of the object. If you want to delete the derived data items in addition to the original object, check the checkbox. Click **Delete**.

Audit Log

See how PHEMI Central has been accessed and used by viewing the **Audit Log**.

The log tracks all accesses to PHEMI Central: through the RESTful API or through the PHEMI Central.

PHEMI Central maintains complete a complete audit log of system and user operations. Log entries include all create, modify, and delete operations performed through the Management and Governance Console, along with a record of all data access queries made to the system through the PHEMI RESTful API. Audit Log files are completely tamperproof for all users.

View the Audit Log

View the Audit Log on the **Audit Log** page.

To view the Audit Log:

1. Open the **Audit Log** page, by clicking the **Audit Log** icon in the left navigation bar.

   The **Audit Log** page opens.

2. Set your query options.

Option	Description
From	Optional. The start time of log entries. The format for the date is *yyyy-mm-dd*. The format for the time is *hh:mm*, in 24-hour format. The default is the current date and time. Leaving the default From and To values shows the complete log file.
To	Optional. The stop time of log entries. Choose the current time by checking the Now checkbox,or uncheck the Now checkbox and specify a time using *yyyy-mm-dd* for the date and *hh:mm*, in 24-hour format, for the time. The default is Now. Leaving the default From and To values shows the complete log file.
Filter	Optional. Use a filtering expression to filter the log messages. *What filtering expressions can I use?*
Display Order	Optional. The order in which log messages are displayed. Choose between displaying the newest entries first or the oldest entries first. By default, newest entries are displayed first.

3. Click **Load Records** to retrieve the specified log messages.

System Configuration

The System Configuration page includes functions the PHEMI Administrator uses to set up and maintain PHEMI Central.

What is the workflow for initial configuration?

The Password Policy

A password policy is one way your organization can secure your information systems.

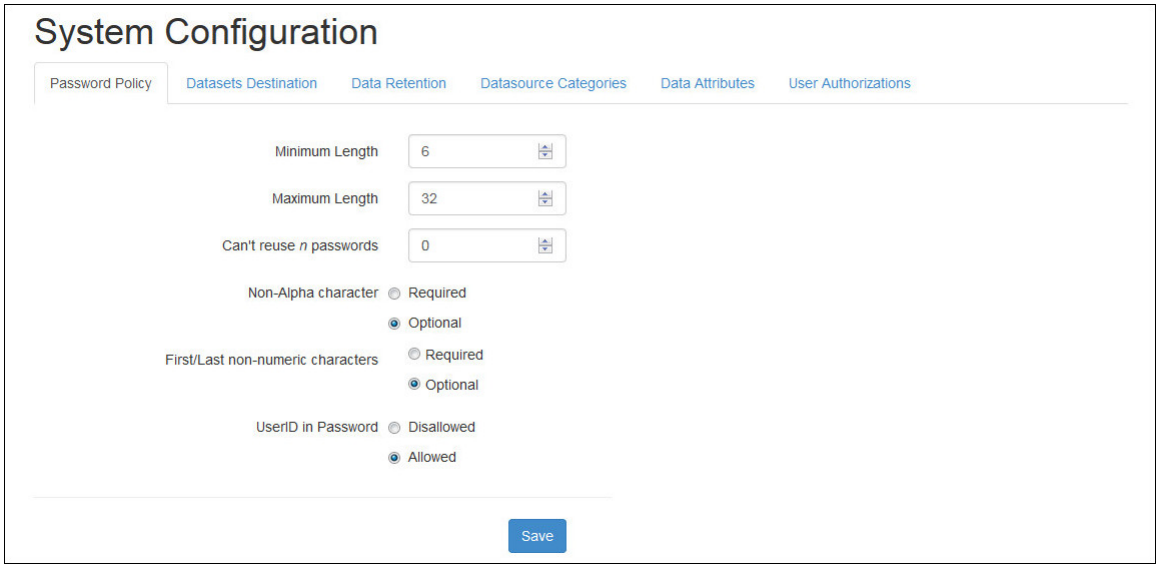
A password policy generally enforces the strength of a password, by requiring passwords to be of a certain length and by stipulating that a password must include a certain mix of letters, numbers, and/or special characters. The password policy may also control how quickly a given password can be reused.

The password policy is generally decided on by the privacy officer, or someone in a similar role. The privacy policy is implemented in PHEMI Central by the PHEMI Administrator, as part of system configuration.

View the Password Policy

View the configured password policy on the **Password Policy** screen of the **System Configuration** page.

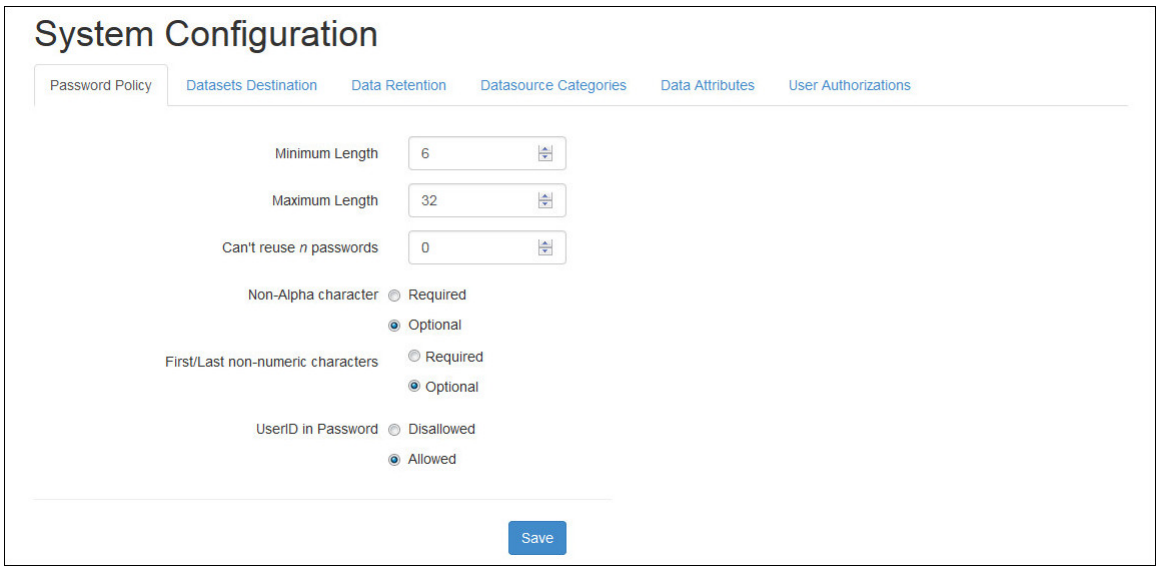
Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar. The **System Configuration** page opens on the **Password Policy** screen.



Configure the Password Policy

Set the password policy on the **Password Policy** screen of the **System Configuration** page.

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar. The **System Configuration** page opens on the **Password Policy** screen.



2. Set the password policy information.

Option	Description
Minimum Length	Mandatory. The minimum length for the password. The range is 6 to 15. The default is 6.
Maximum Length	Mandatory. The maximum length for the password. The maximum starts at the value set for **Minimum Length** (that is, maximum and minimum value can be the same) and ranges to 32 characters. The default is 32.
Can't reuse *n* passwords	Optional. Specifies the number of times in a row a password can be used. For example, if this value is set to 1, the user cannot reuse the same password twice; at least one more password must intervene before reusing the original password. The range is 0 to 12. The default is 0, which means that the same password can be repeated indefinitely.
Non-Alpha Character	Optional. Specifies whether the password must include with a non-alphabetical character. Non-alphabetical characters are numbers or special characters. Spaces are not supported. Supported values are as follows: • Required: Passwords must include at least one non-alphabetical character. • Optional: Passwords can consist of only alphabetic characters. The default is Optional.
First/Last non-numeric characters	Optional. Specifies whether the password must begin and end with a non-numeric character. Non-numeric characters include alphabetical characters and special characters. Spaces are not supported. Supported values are as follows: • Required: Passwords must begin and end with a non-numeric character. • Optional: Passwords may begin and end with alphabetic or special characters. The default is Optional.
User ID in Password	Optional. Specifies whether the string representing the user's ID may appear in the password. Supported values are as follows: • Disallowed: The user ID may not appear in the password. • Allowed: The user ID may appear in the password.

Option	Description
	The default is Allowed.

3. Save the password policy by clicking the **Save** button.

User Authorizations

User authorizations are configurable attributes you can assign to PHEMI Central users. Authorizations are defined in PHEMI Central by the PHEMI Administrator, who sets them in accordance with the organization's governance policies.

User authorizations are used together with data visibilities to create access policies. The access policy matches the authorization against the data visibility to determine what action, if any, a user may take with respect to accessing the data.

Some examples of possible user authorizations are as follows:

- C_LEVEL: The user is a C-Level individual (for example, CEO, COO, CIO, or CTO) with a privileged level of access. Individuals with C_LEVEL authorization, for example, might be permitted to read data with CONFIDENTIAL visibility.
- DOCTOR: A user with DOCTOR authorization might, for example, be permitted to read any information, including personally identifiable information or personal health information.
- ANALYST: A user with ANALYST authorization might be restricted to accessing only the de-identified or nonidentified data.

A user can be assigned multiple authorizations. User authorizations are set by the PHEMI Administrator during system configuration.

All users are assigned the predefined PUBLIC authorization by default. The PUBLIC authorization can subsequently be removed by the PHEMI Administrator.

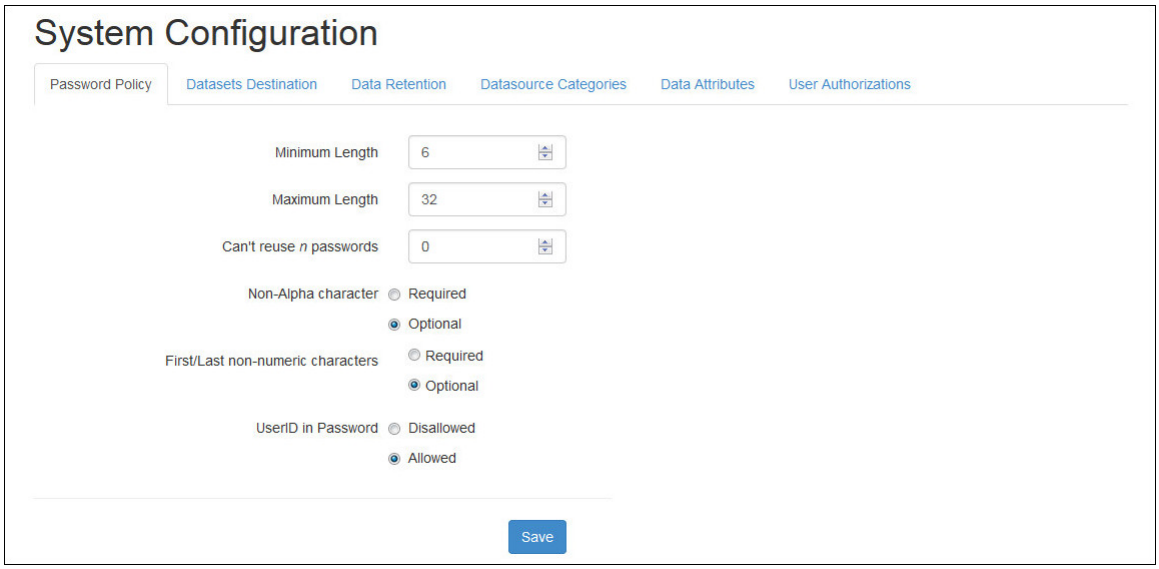
Note: Once defined, a user authorization setting may be neither edited nor deleted. The description may be subsequently edited.

View Defined User Authorizations

View defined user authorizations on the **User Authorizations** screen of the **System Configuration** page.

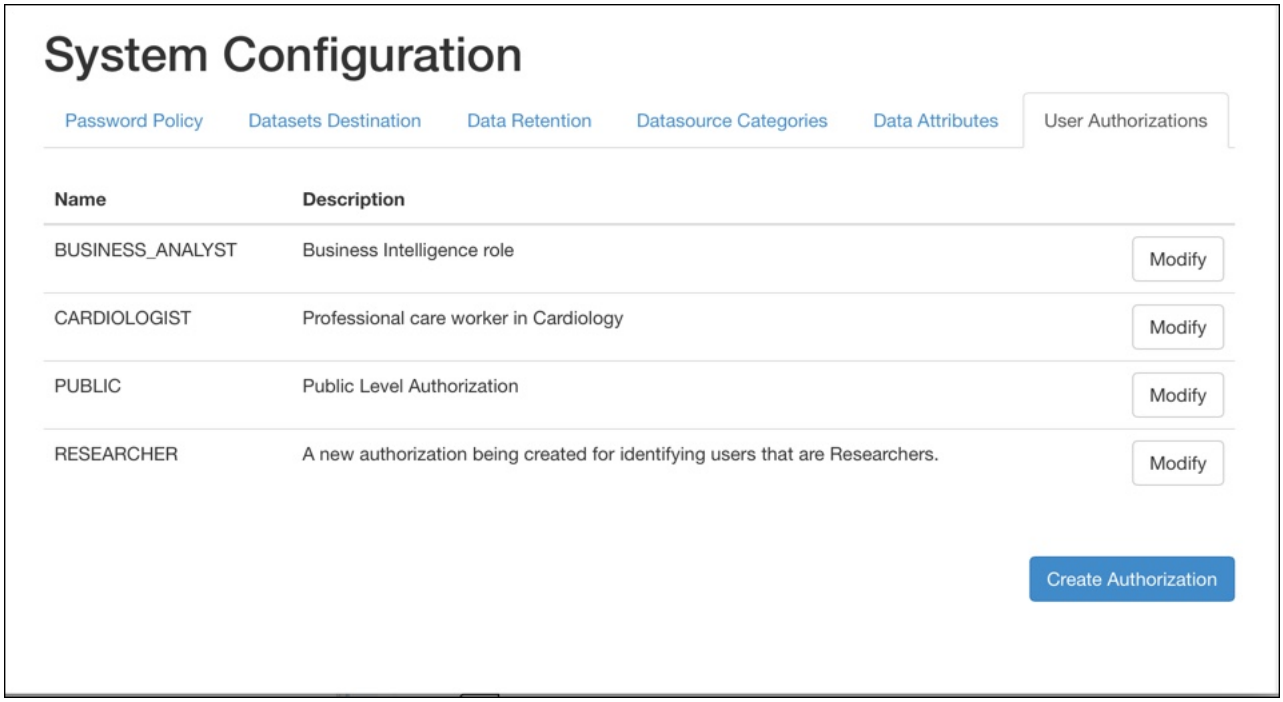
To view defined user authorizations:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar. The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **User Authorizations** tab.

   The **User Authorizations** screen opens, showing you each authorization that has been defined, along with a brief description.



Define User Authorizations

Define user authorizations on the **User Authorizations** screen of the **System Configuration** page.

The user authorizations you define should reflect your organization's governance policies. Consult your privacy officer, or a person in a similar role, to understand what user authorizations your organization recognizes.

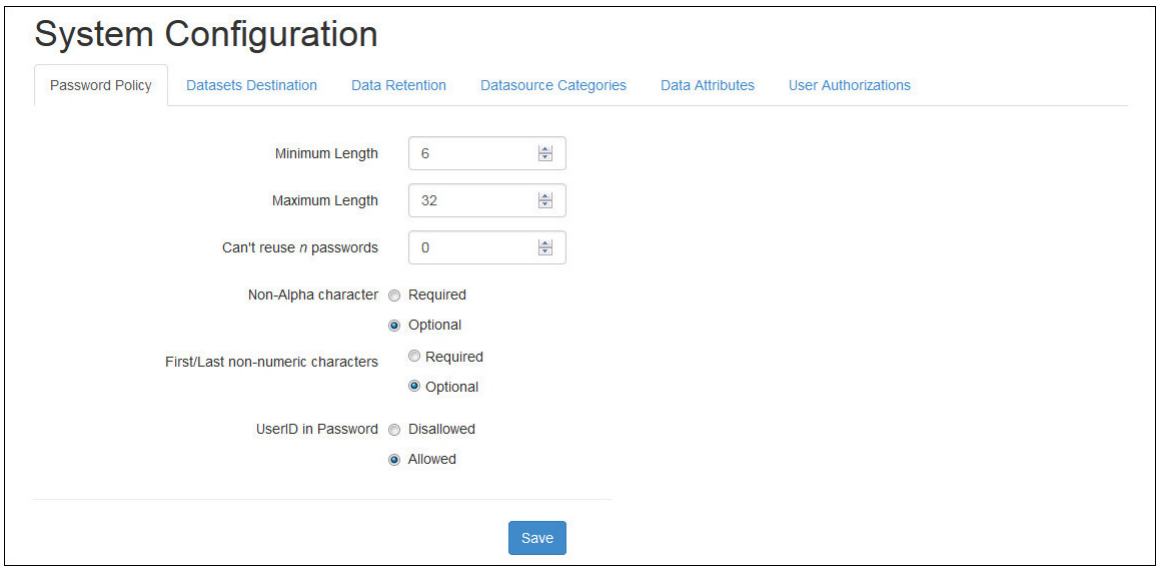
How do I define a governance policy?

Note: Once defined, a user authorization label may be neither edited nor deleted. The description may be subsequently edited.

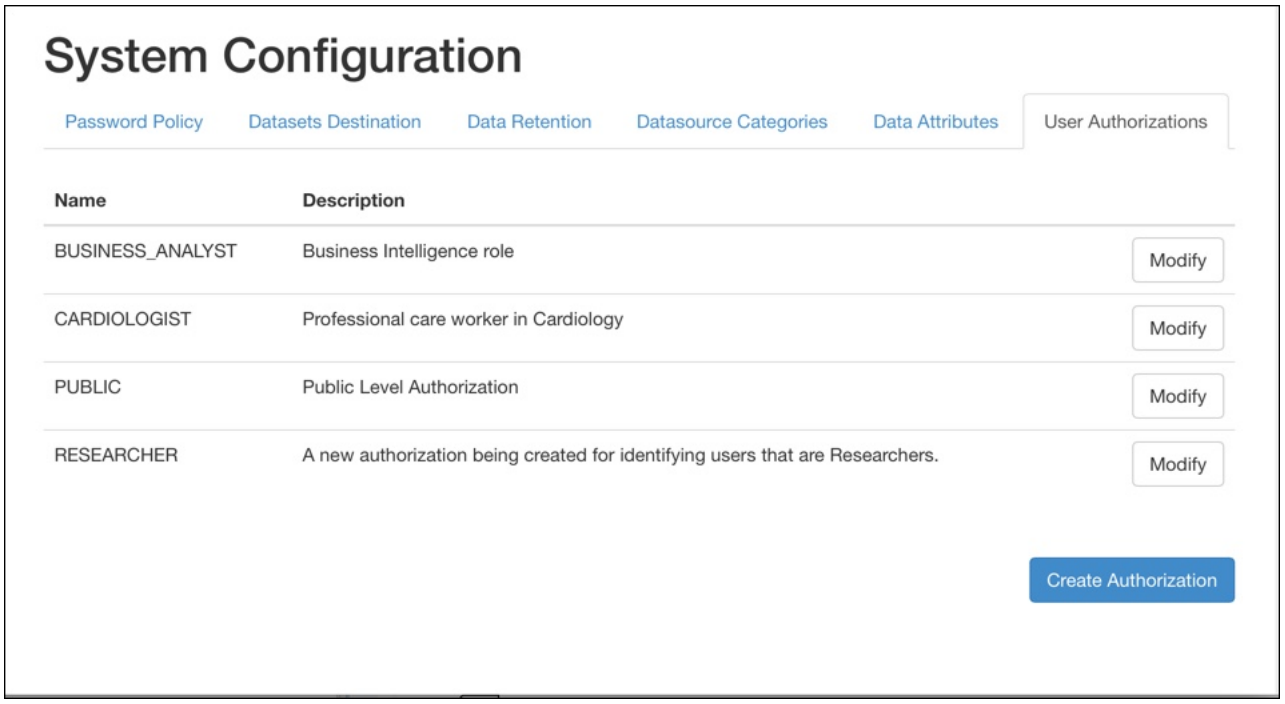
To define a user authorization:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

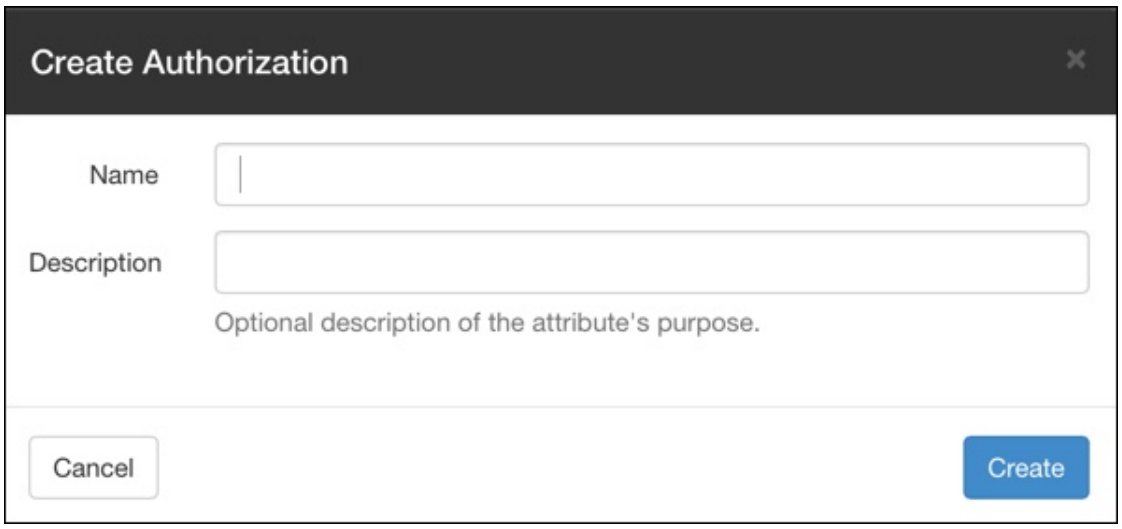
   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **User Authorizations** tab.
   The **User Authorizations** screen opens.



3. Cick the **Create Authorization** button.
   The **Create Authorization** screen opens.



4. Specify the authorization information.

Option	Description
Name	The authorization label to be applied to users.
Description	A brief description for the authorization label.

5. Save the authorization information by clicking the **Create** button.

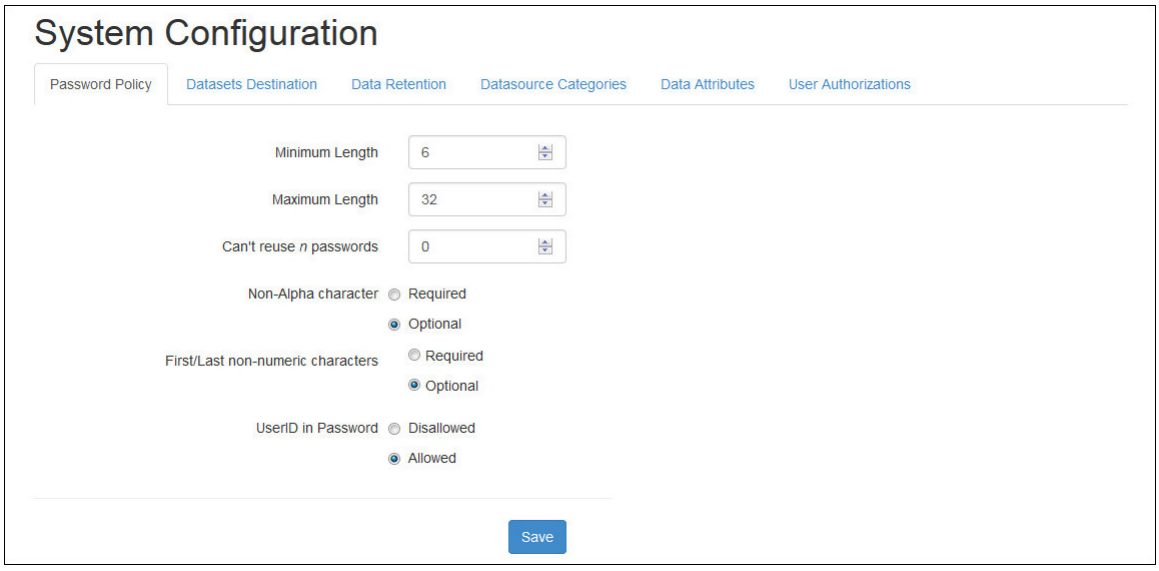
Modify Authorization Description

Modify user authorizations on the **User Authorizations** screen of the **System Configuration** page.

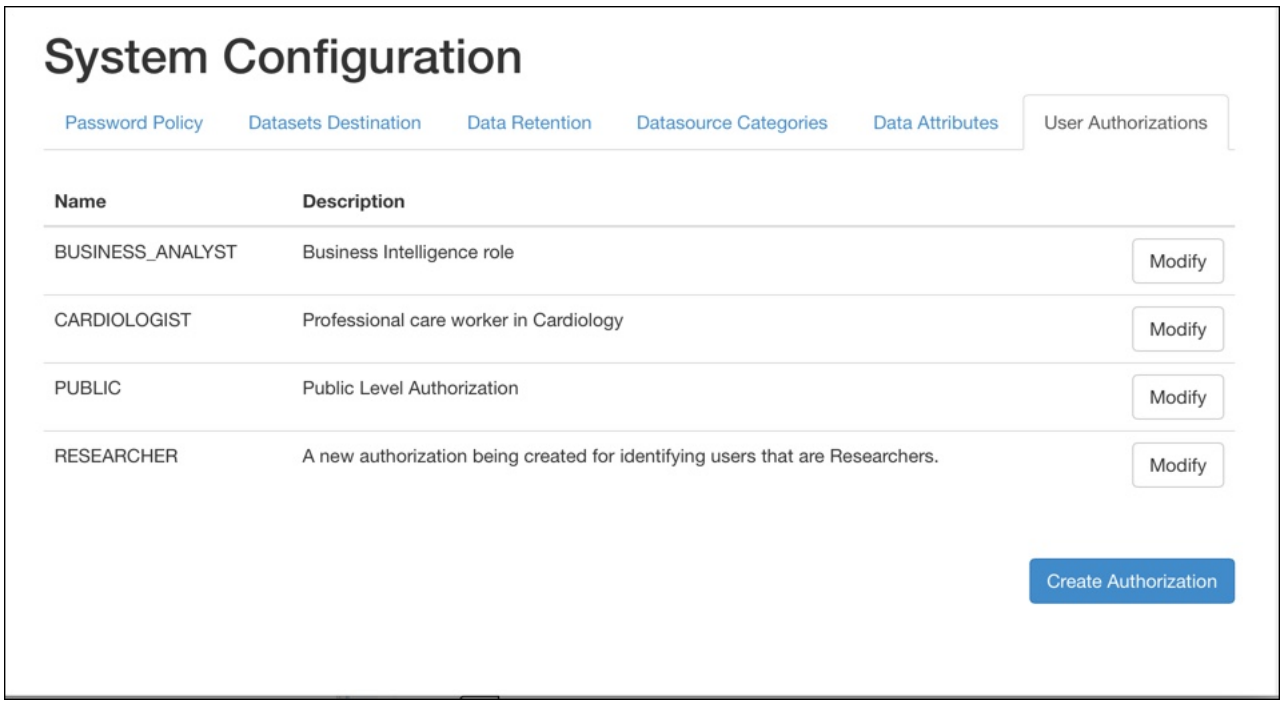
Although you can't delete a user authorization or edit the authorization label, you can edit the description after the authorization has been created.

To edit a user authorization description:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.

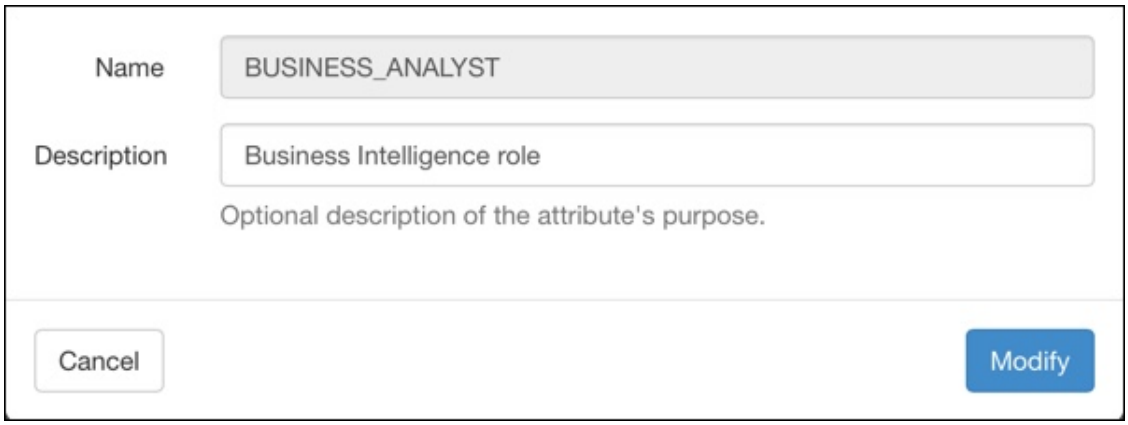


2. Click the **User Authorizations** tab.
   The **User Authorizations** screen opens.



3. Location the description for the authorization you want to edit. Click the **Modify** button.

   The



4. Save the change by clicking the **Modify** button.

Dataset Destinations

Datasets can be exported to consuming applications and tools.

Tell me about datasets.

Datasets can be consumed by querying them through the PHEMI RESTful API or by configuring a dataset export target as a "destination" in the Management and Governance Console.

Dataset destinations are configured by the PHEMI Administrator. The destination is characterized in terms of the connection type, the network parameters, the destination database and schema names, and the user credentials for logging on to the destination.

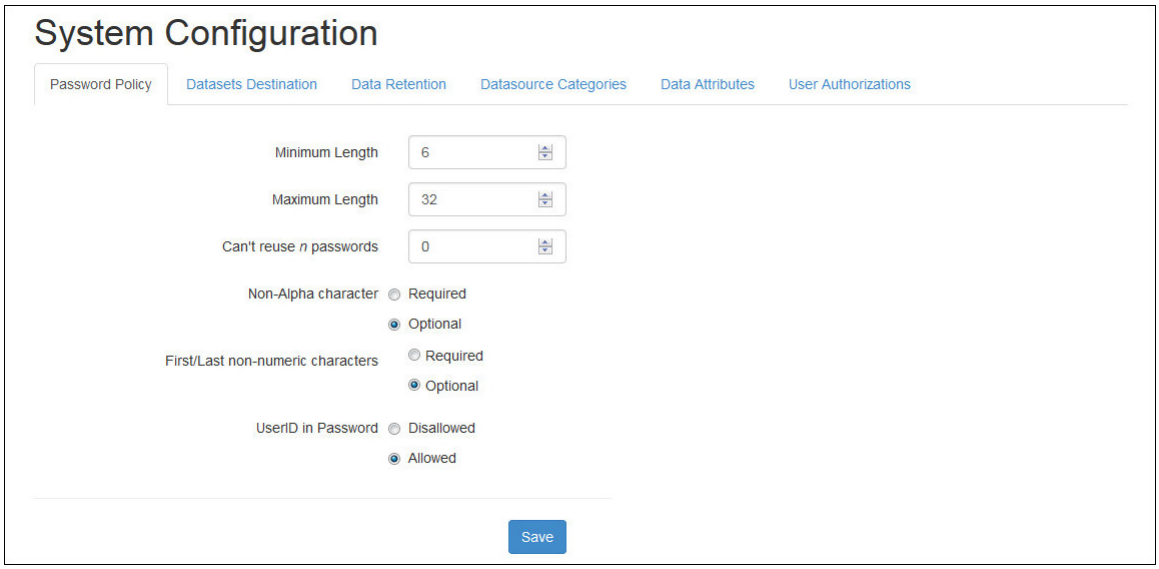
View Dataset Destinations

View dataset destinations on the **Dataset Destinations** screen of the **System Configuration** page.

To view defined dataset destinations:

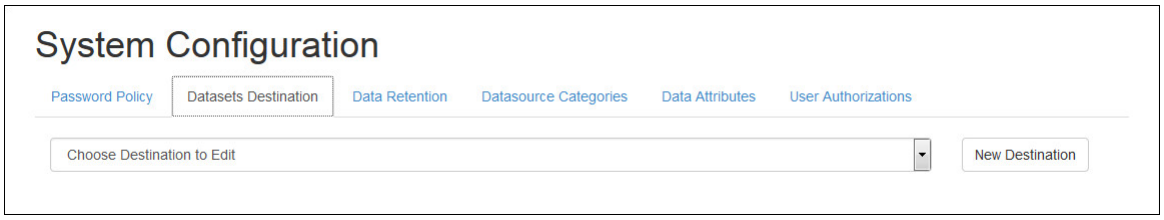
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.

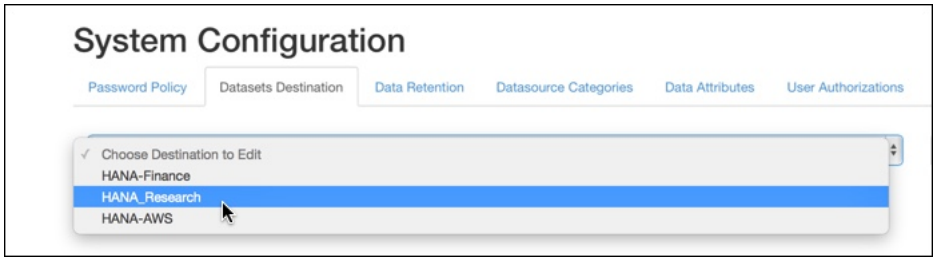


2. Click the **Dataset Destinations** tab.

   The **Dataset Destinations** screen opens.



3. At the right of the **Choose Destination to Edit** field, click the drop-down arrow to see configured dataset destinations.



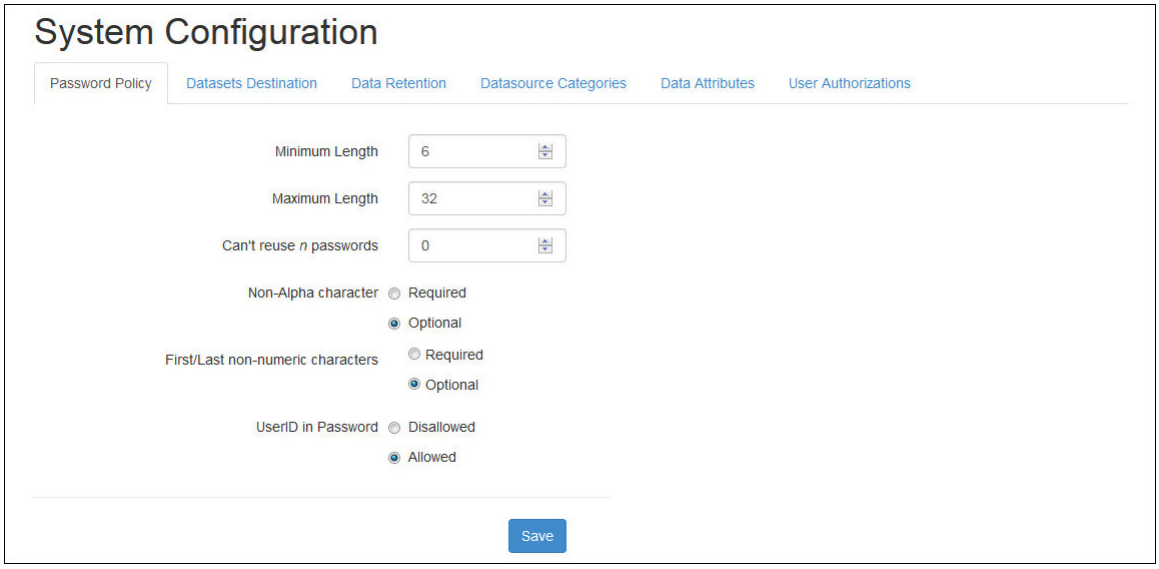
Create a Dataset Destination

Define a new dataset destination on the **Dataset Destinations** screen of the **System Configuration** page.

To create a new dataset destination:

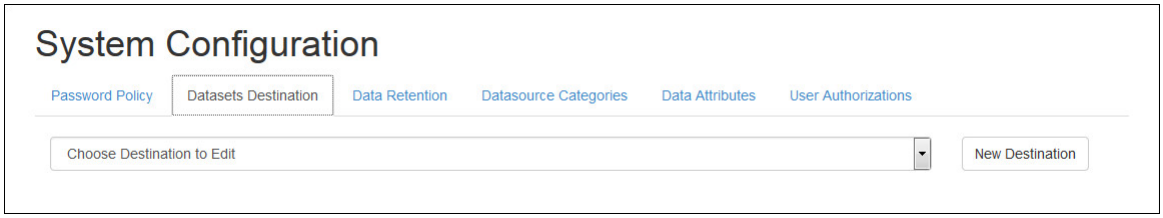
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.



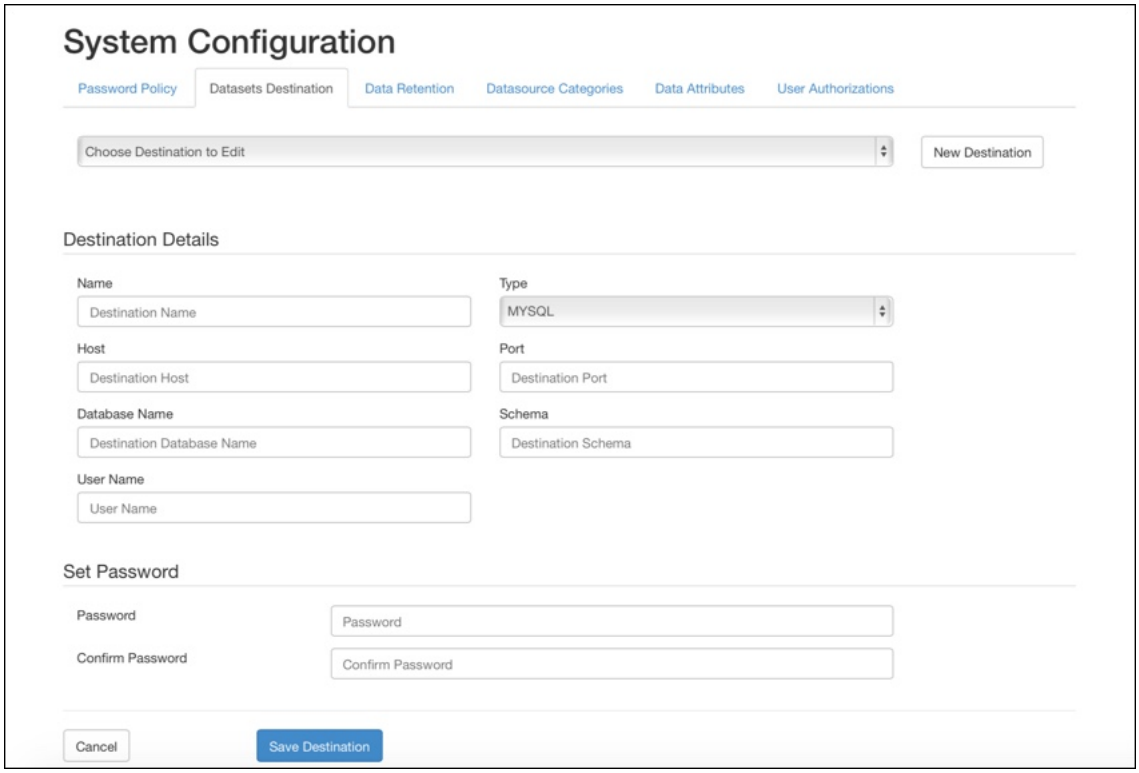
2. Click the **Dataset Destinations** tab.

   The **Dataset Destinations** screen opens.



3. Click the **New Destination** button to the right of the **Choose Destination to Edit** field.

   The **Destination Details** screen opens.



4. Enter the destination details.

Option	Description
Name	Mandatory. Provide a name for the destination.
Type	Mandatory. The destination type. Supported values are as follows: • MySQL. The destination is a MySQL database. • HANA. The destination is a SAP HANA database. Both MySQL and HANA destination types use a Jave Database Connectivity (JDBC) connection.
Host	Mandatory. The IP address of the destination, in dotted decimal format.
Port	Mandatory. The destination TCP port.
Database Name	Mandatory. The name of the destination database.
Schema	Mandatory. The name of the schema being used in the destination database.
User Name	Mandatory. The user name for logging on to the destination.
Password	Mandatory. The password for logging on to the destination.
Confirm Password	Mandatory. Re-enter the password to ensure it is correct.

5. Click the **Save Destination** button to save the new destination.

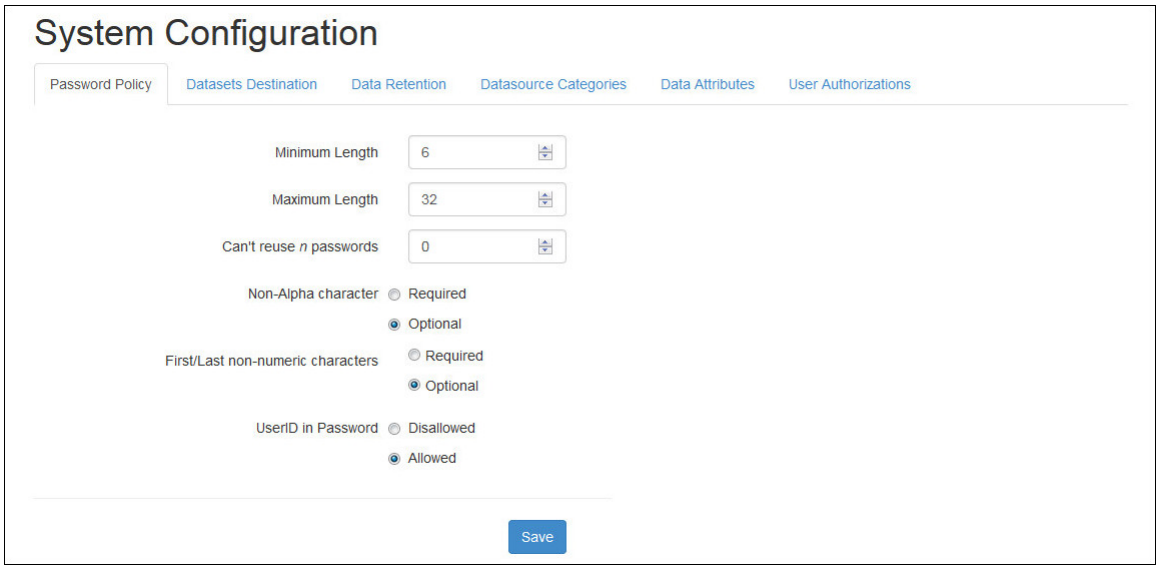
View Dataset Destination Information

View information about a dataset destination on the **Dataset Destinations** screen of the **System Configuration** page.

To view information for a dataset destination:

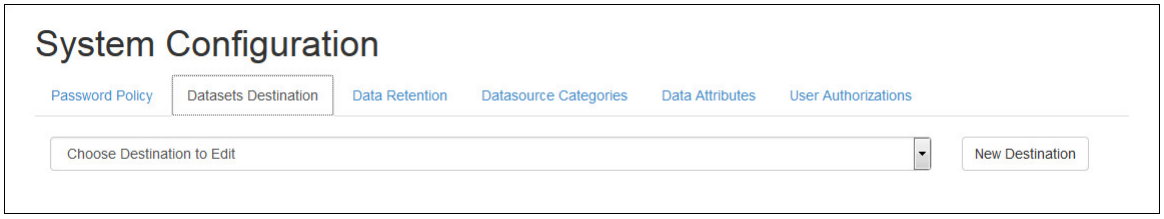
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.

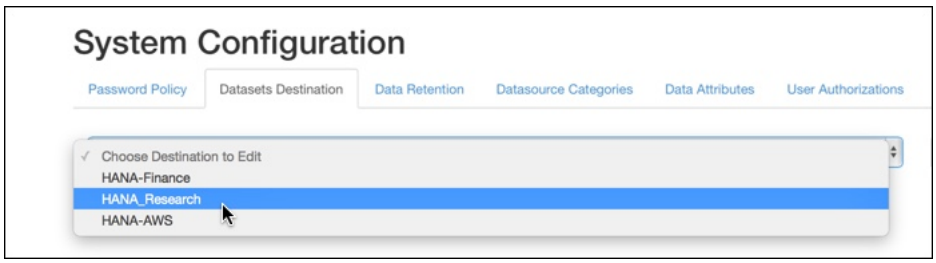


2. Click the **Dataset Destinations** tab.

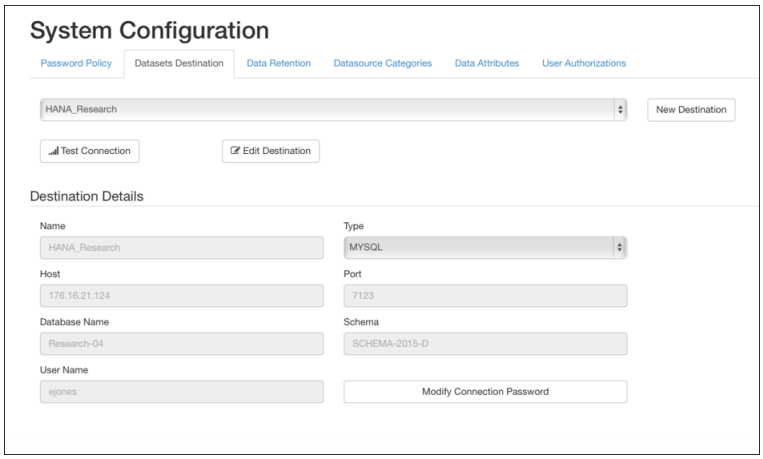
   The **Dataset Destinations** screen opens.



3. Click the drop-down arrow at the right of the **Choose Destination to Edit** field to see configured dataset destinations. Select the destination you want to view.



4. The **Destination Details** screen opens, showing information for the selected dataset.



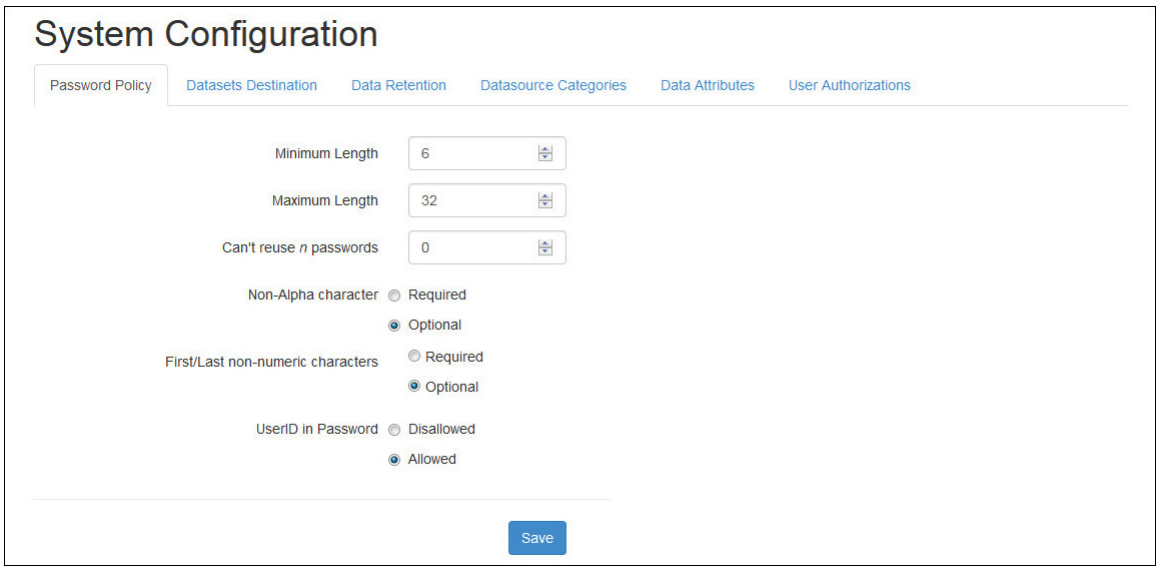
Modify Dataset Destination Information

Modify information for a dataset destination on the **Dataset Destinations** screen of the **System Configuration** page.

To modify information for a dataset destination:

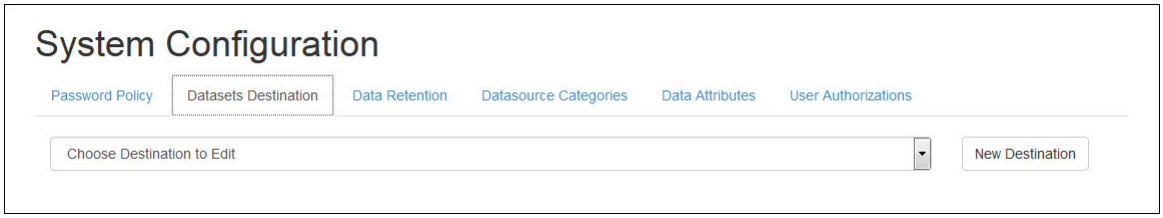
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.

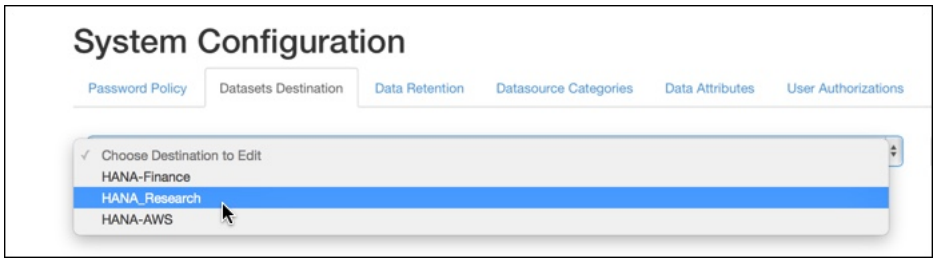


2. Click the **Dataset Destinations** tab.

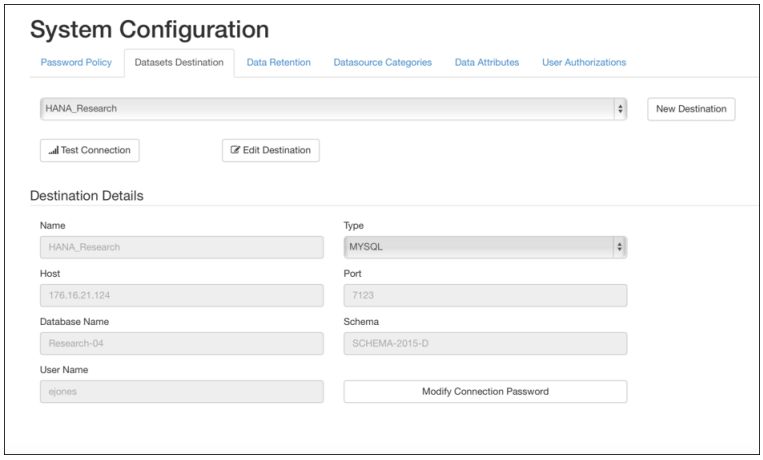
   The **Dataset Destinations** screen opens.



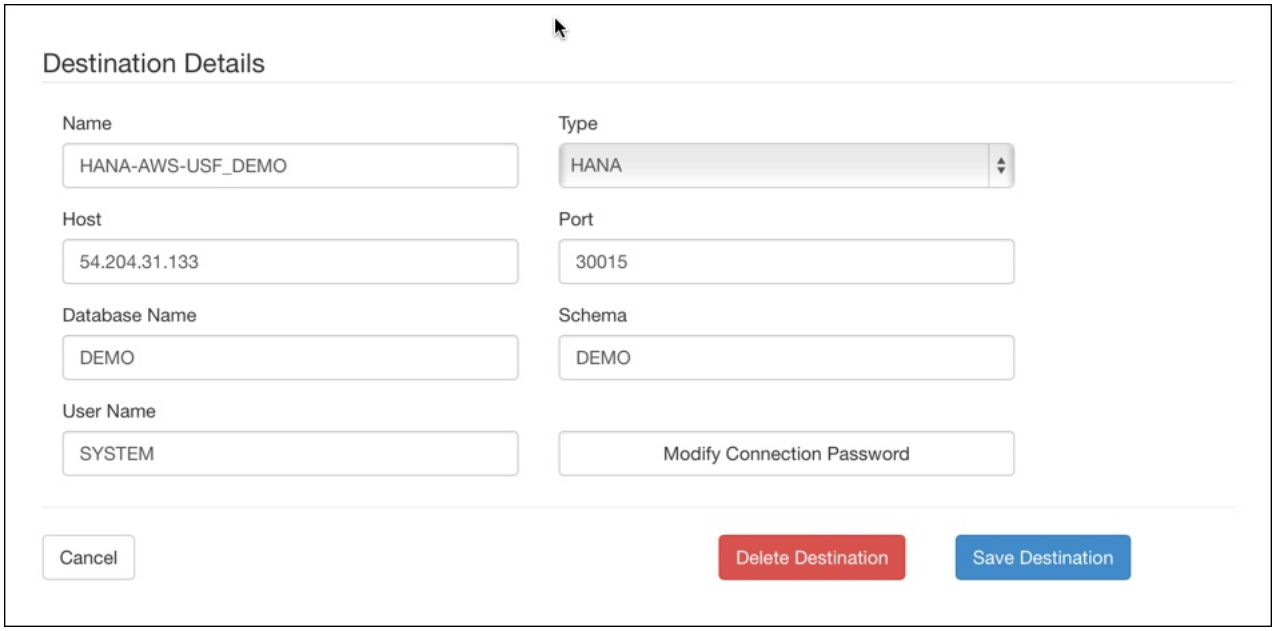
3. Click the drop-down arrow at the right of the **Choose Destination to Edit** field to see configured dataset destinations. Select the destination you want to modify.



4. The **Destination Details** screen opens, showing information for the selected dataset. *What do these fields mean?*

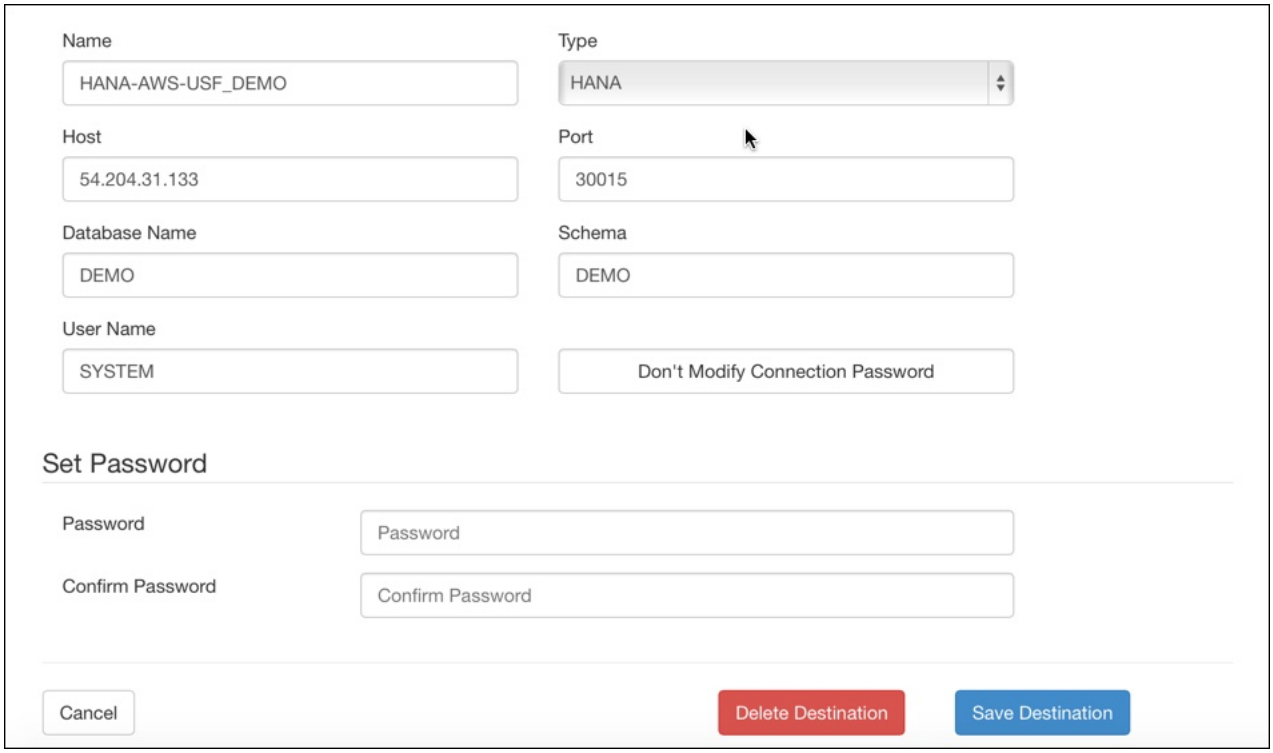


5. Click the **Edit Destination** button. The fields on the **Destination Details** screen become editable, and the **Delete Destination** buttons and **Save Destination** buttons appear.



6. Make your changes. If you need to change the destination password information, click the **Modify Connection Password** button.

   The **Set Password** pane opens underneath the other destination information.



7. Complete your changes, then click the **Save Destination** button to save the changed information.

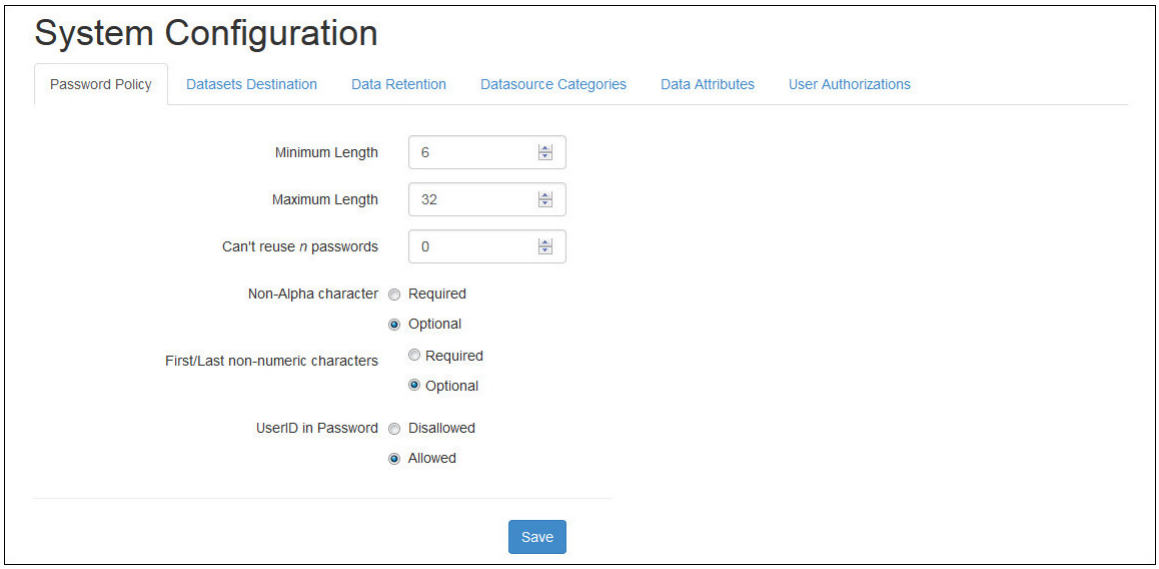
Delete a Dataset Destination

Delete a dataset destination on the **Dataset Destinations** screen of the **System Configuration** page.

To delete a dataset destination:

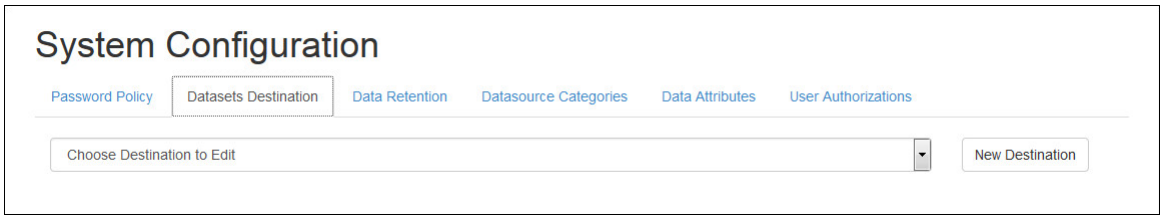
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.

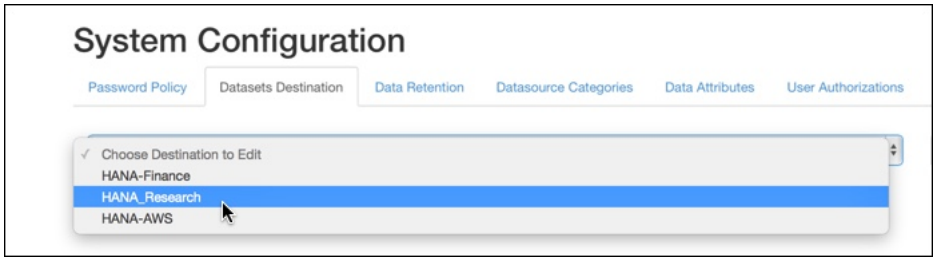


2. Click the **Dataset Destinations** tab.

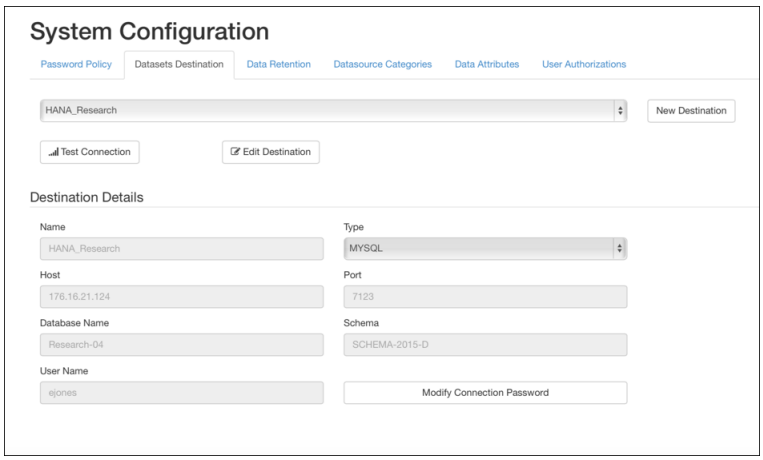
   The **Dataset Destinations** screen opens.



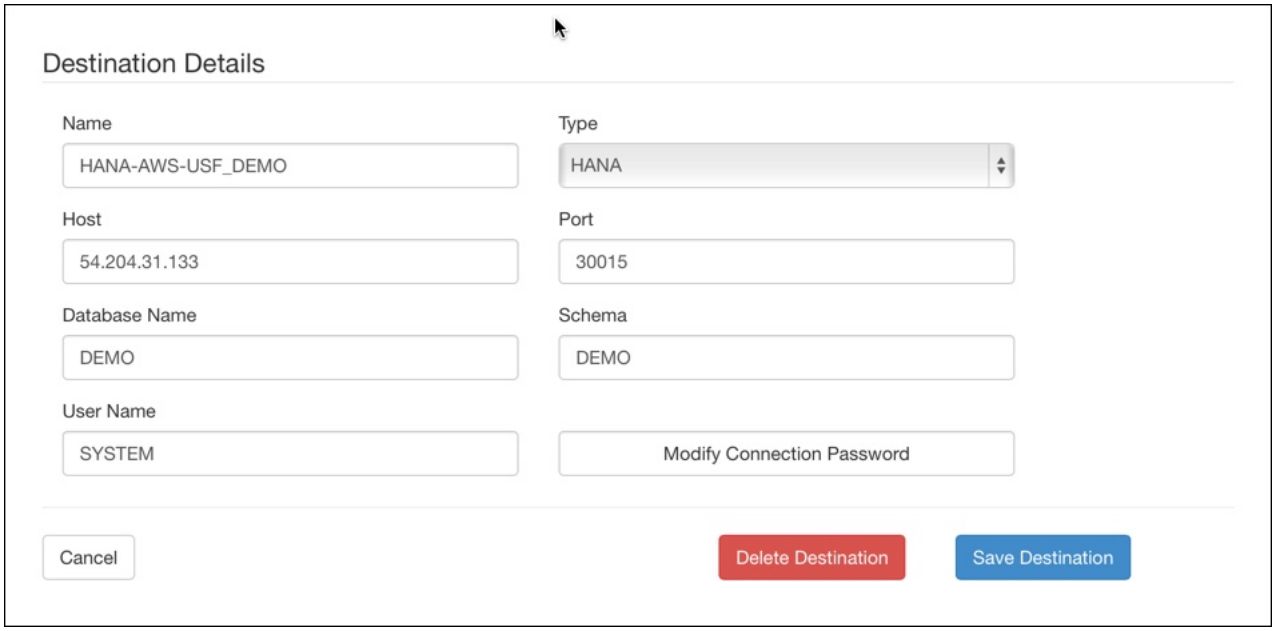
3. Click the drop-down arrow at the right of the **Choose Destination to Edit** field to see configured dataset destinations. Select the destination you want to delete.



4. The **Destination Details** screen opens, showing information for the selected dataset.



5. Click the **Edit Destination** button. The fields on the **Destination Details** screen become editable, and the **Delete Destination** buttons and **Save Destination** buttons appear.



6. Click the **Delete Destination** button. The system asks you to confirm permanent deletion. Click **Delete**.

Data Retention Behavior

Each data collection has a data policy that specifies, among other things, how long data items should be retained in the system. When the item's "time to live" expires, PHEMI Central deletes the item from the data store. The data retention behavior, which is set in system configuration, specifies when PHEMI Central checks the data store to see what data, if any, is expired and should be deleted from the data store.

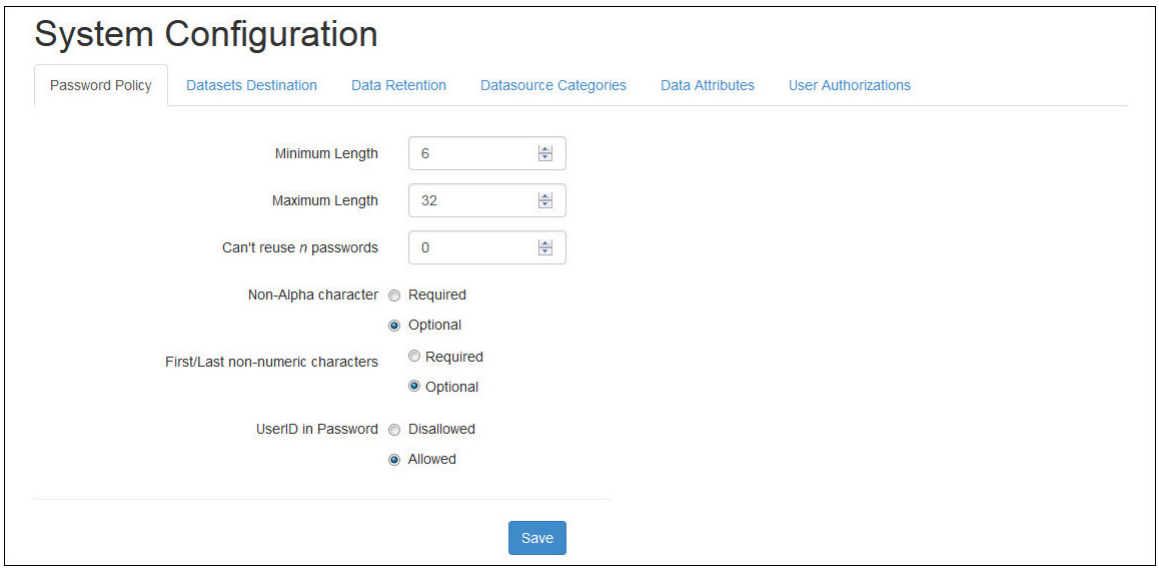
You can configure PHEMI Central to check on a schedule, or you can manually initiate checking.

View the Data Retention Schedule

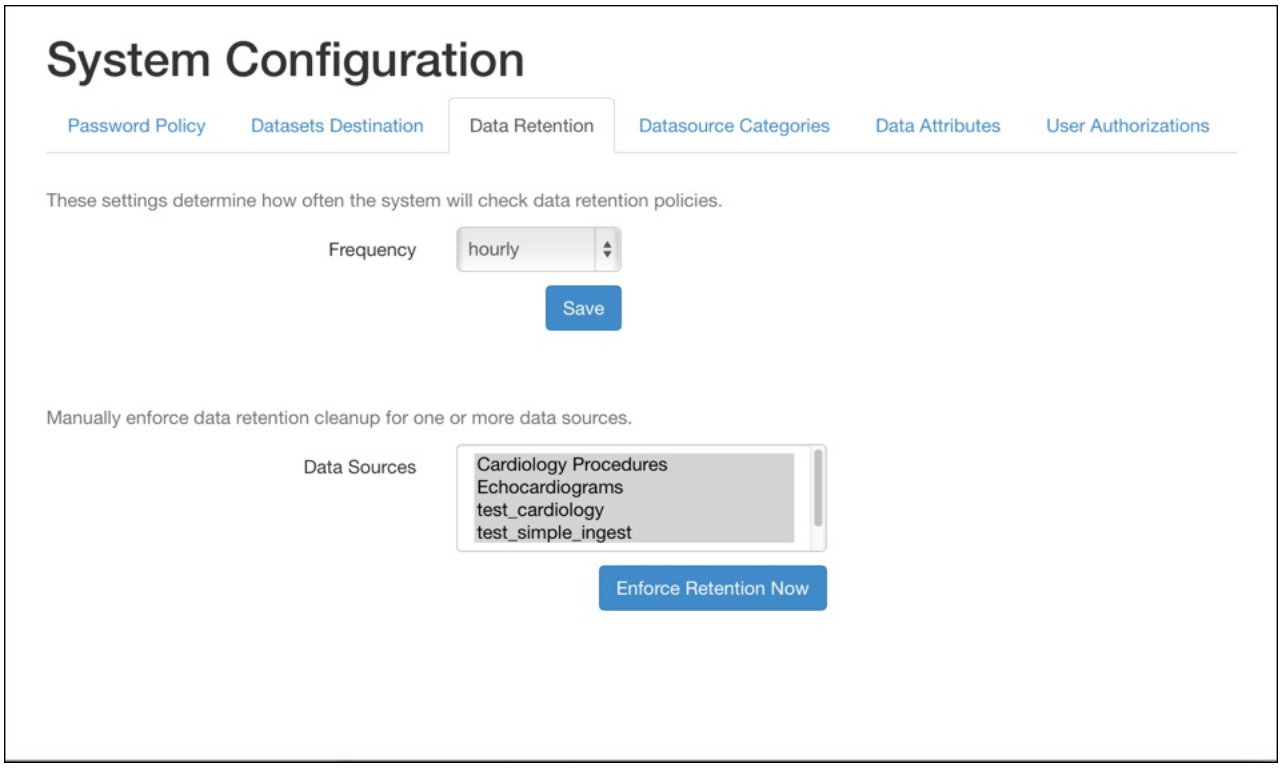
View the schedule for data retention behavior on the **Data Retention** screen of the **System Configuration** page.

To see the configured data retention schedule:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Retention** tab.
   The **Data Retention** page opens, showing the schedule for automatic checking.

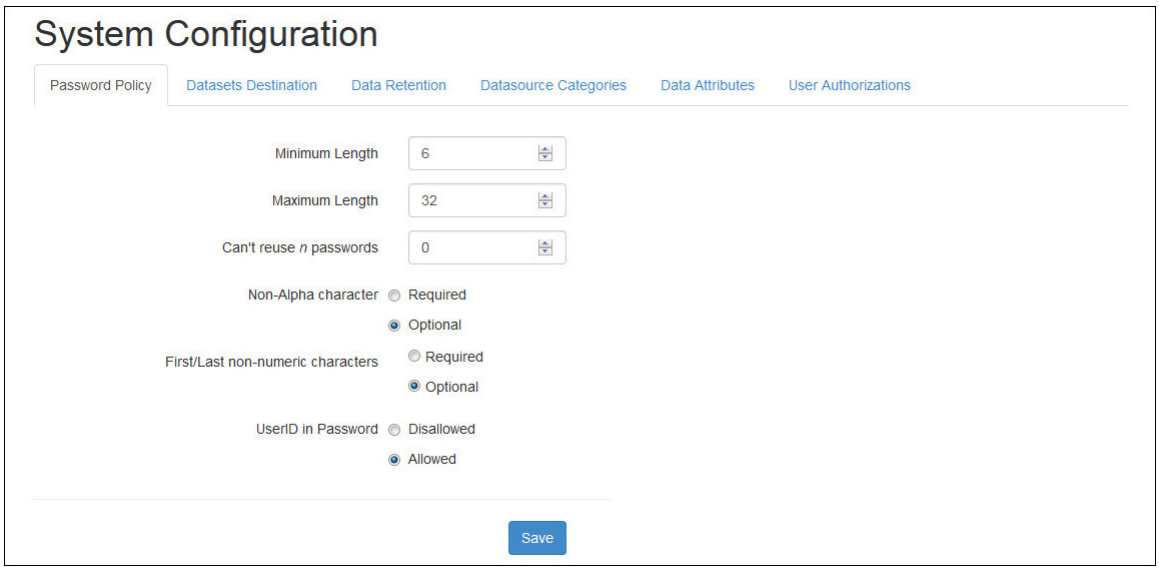


Set the Data Retention Schedule

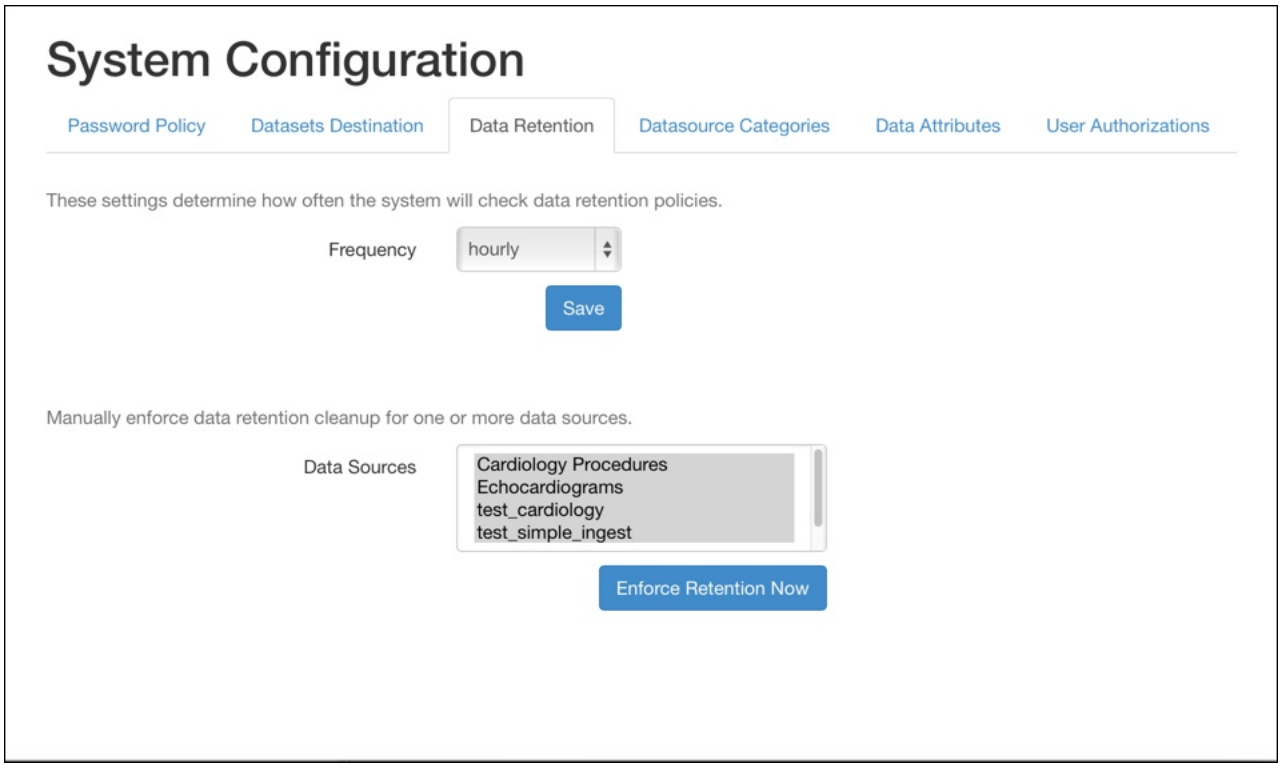
Set the schedule for data retention on the **Data Retention** screen of the **System Configuration** page.

To set how often the system checks for expired data:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Retention** tab.
   The **Data Retention** page opens.



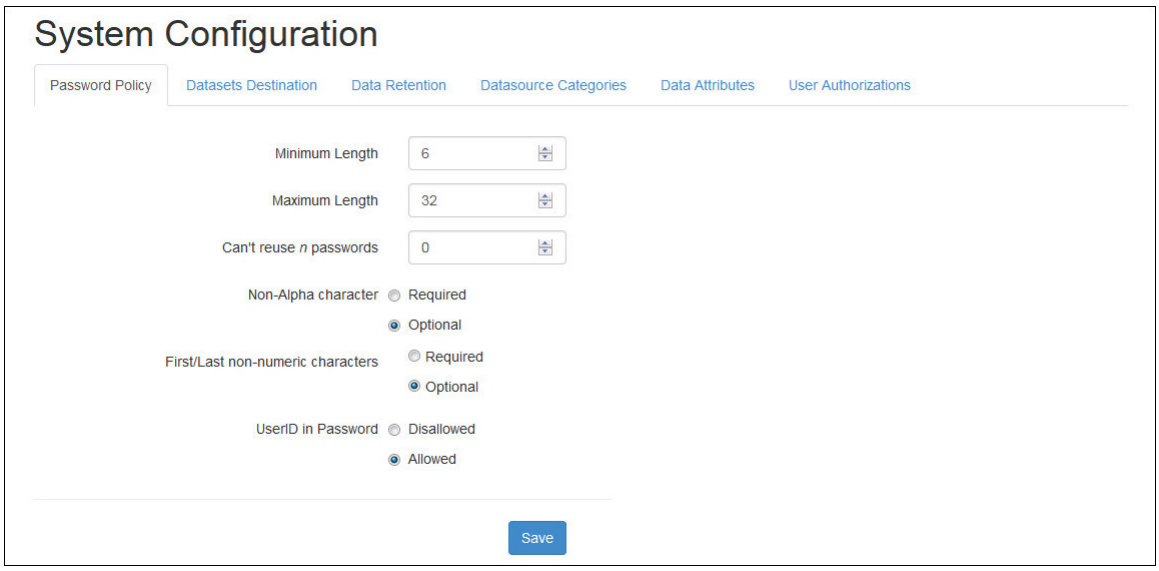
3. In the **Frequency** field, choose between **hourly**, **daily**, or **weekly**, or specify the number of minutes between checks.
4. Click **Save** to save the changes.

Manually Check Data Retention

Trigger data retention checking at any time on the **Data Retention** screen of the **System Configuration** page.

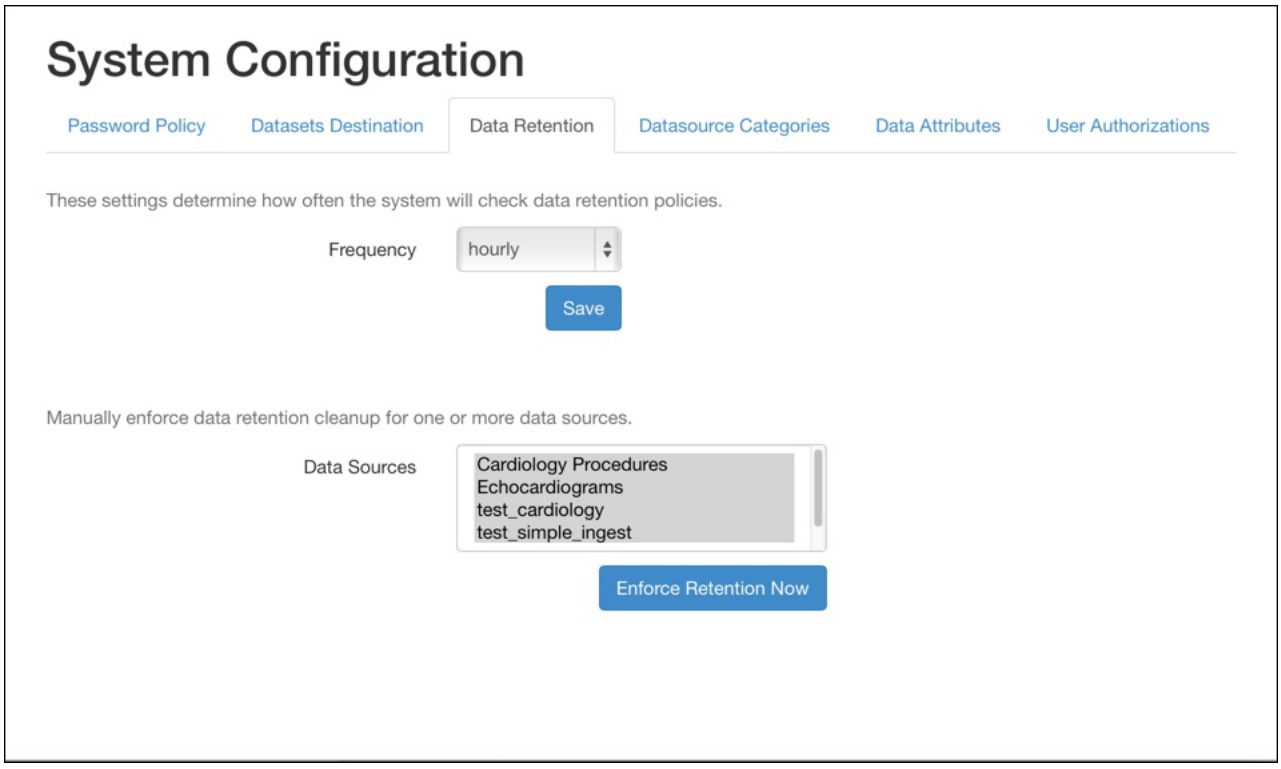
To manually initiate checking for expired data:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Retention** tab.

   The **Data Retention** page opens.



3. In the **Data Collections** field, select all the data collections you want to check.
4. Click **Enforce Retention Now**. PHEMI Central checks the selected data collections for expired data.

Data Categories

High-level data categories help you classify the data that will be stored in PHEMI Central.

Each data category can include multiple collections, data systems (such as different databases), or data collections. For example, an organization might have a category BILLING, which could include data from several different billing systems in the organization. Another might have a category ECG, which might contain electrocardiograms from different data sources.

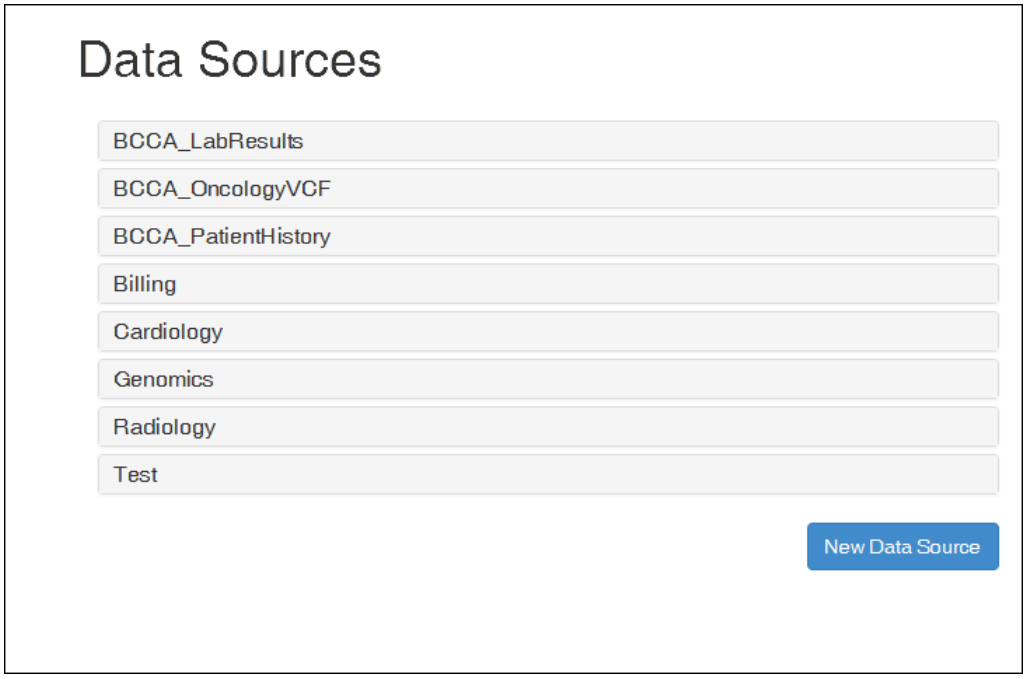
View Data Categories

View the names of defined data categories on the **Data Categories** screen of the **System Configuration** page.

To view data category names:

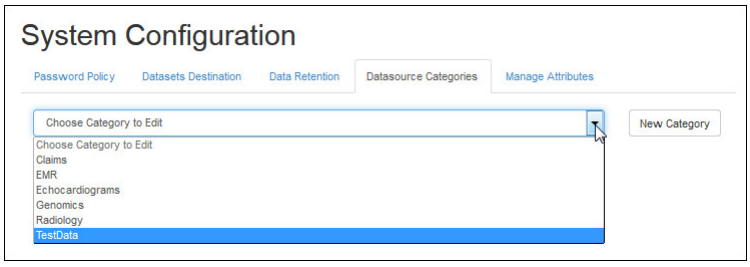
Open the **Data Collections** screen, by clicking the **Data Collections** icon in the left navigation bar.

The **Data Collections** page opens showing the defined data categories.



If you are a PHEMI Administrator, you can also view data category names from the **System Configuration** > **Data Categories** screen.

Open the **System Configuration** screen, by clicking the **System Configuration** icon. Then click the **Data Categories** tab to open the **Data Categories** screen. At the right side of the **Choose Category to Edit** field, click the drop-down list to see the list of defined data categories.

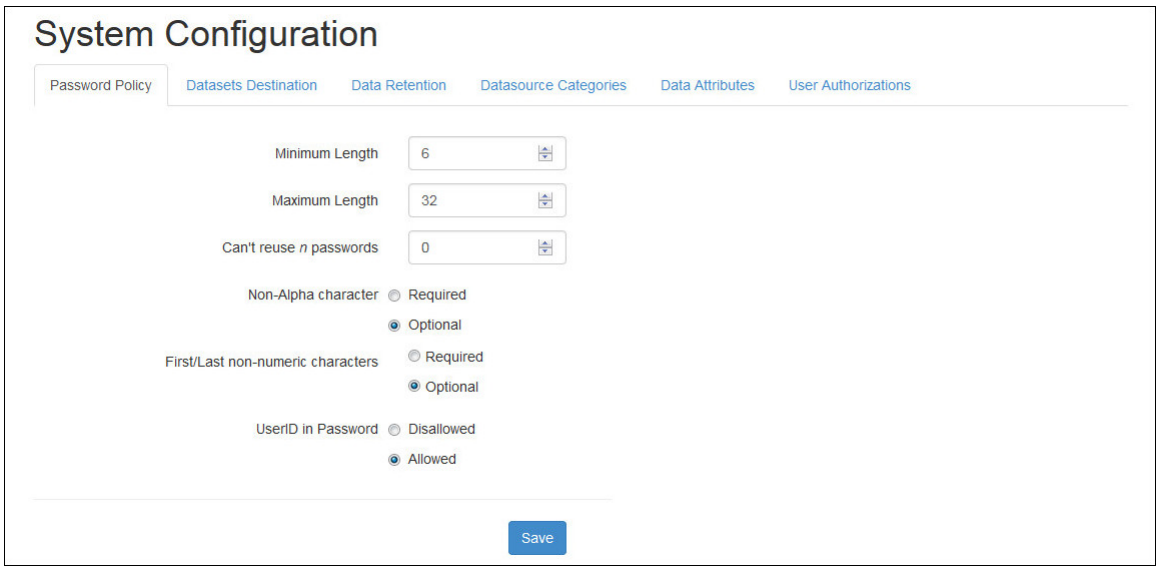


Add a Data Category

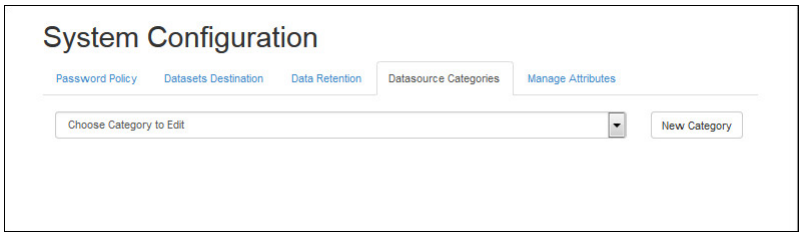
Add a data category on the **Data Categories** screen of the **System Configuration** page.

Datasource categories are configured by the PHEMI Administrator. To add a data category:

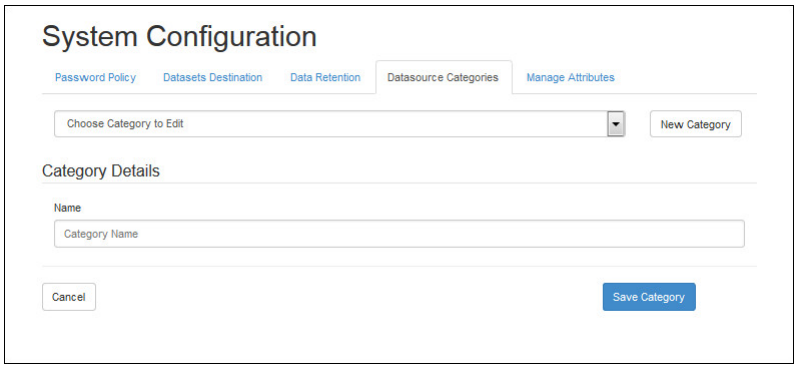
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Categories** tab.
   The **Data Categories** screen opens.



3. Click the **New Category** button.
   The **Data Categories** screen expands to show the **Category Details** area.



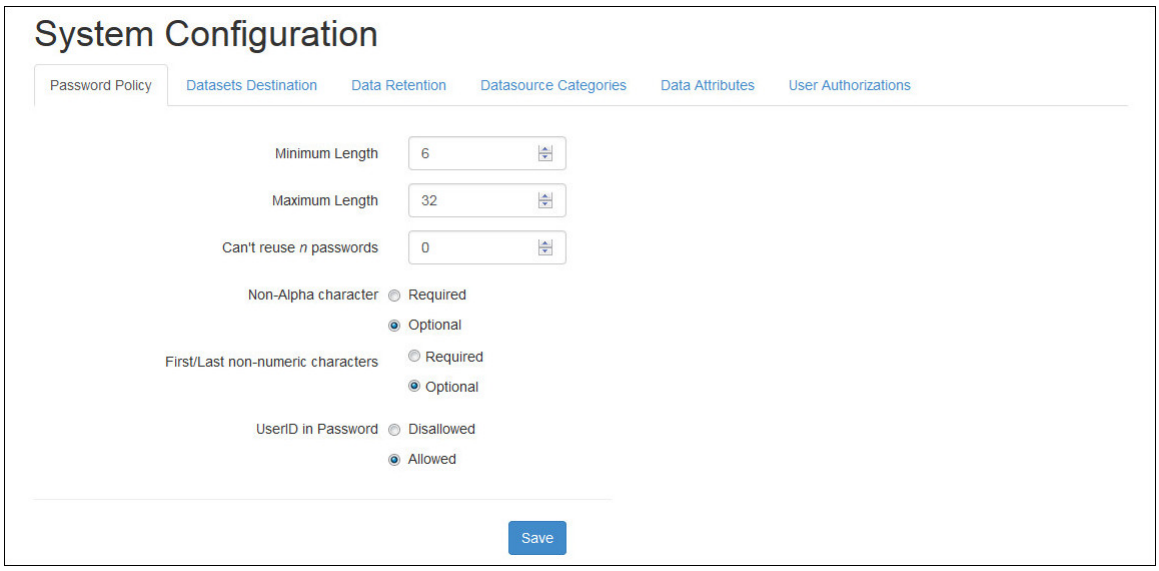
4. Enter a name for the category.
5. Save the data category by clicking the **Save Category** button.

Edit a Data Category Name

Modify a data category name on the **Data Categories** screen of the **System Configuration** page.

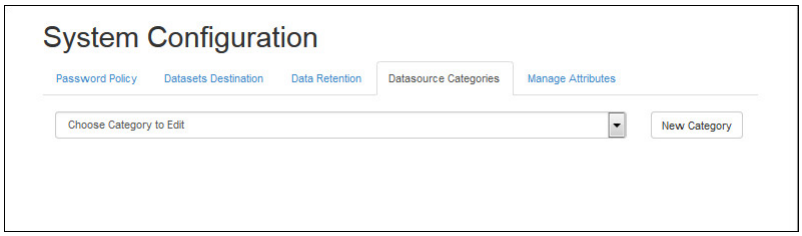
To edit a data category name:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.

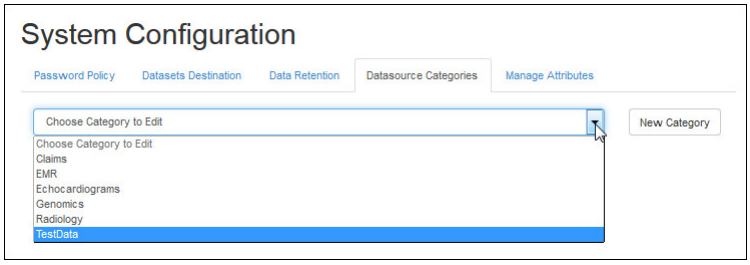


2. Click the **Data Categories** tab.

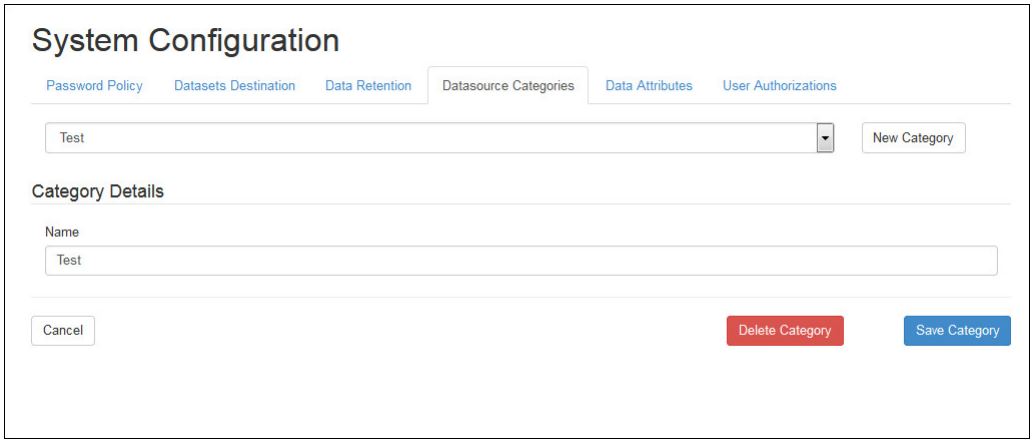
   The **Data Categories** screen opens.



3. At the right side of the **Choose Category to Edit** field, click the drop-down list and select the category you want to edit.



   The **Category Details** screen opens.



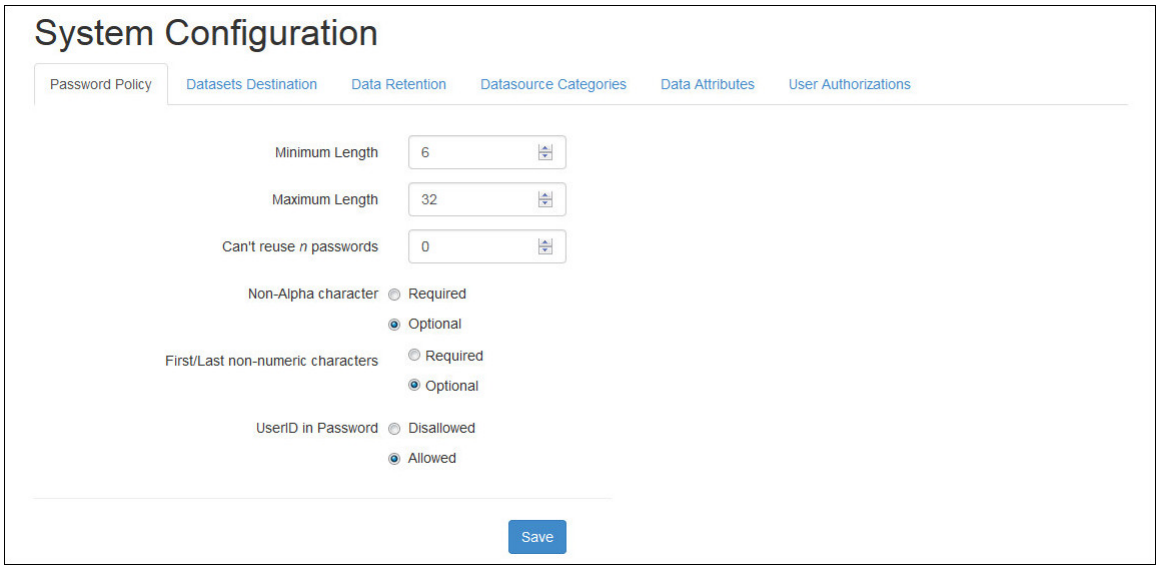
4. Make your edits to the category name.
5. Save the changes by clicking the **Save Category** button.

Delete a Data Category

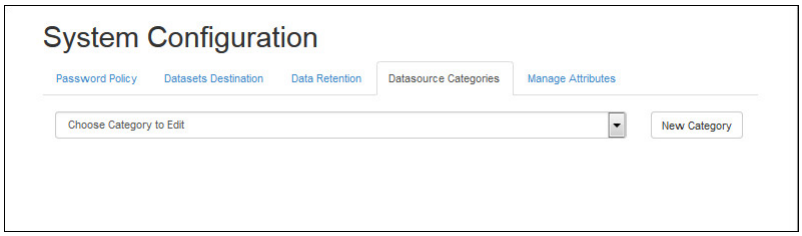
Delete a data category on the **Data Categories** screen of the **System Configuration** page.

To delete a data category:

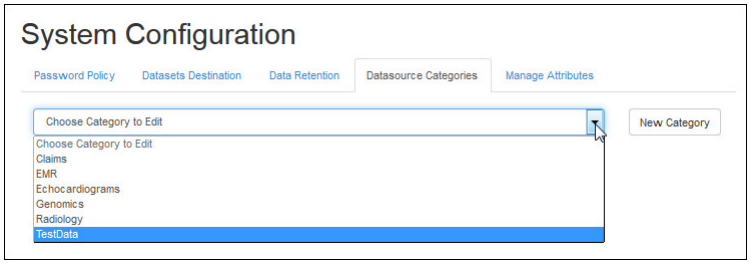
1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.
   The **System Configuration** page opens on the **Password Policy** screen.



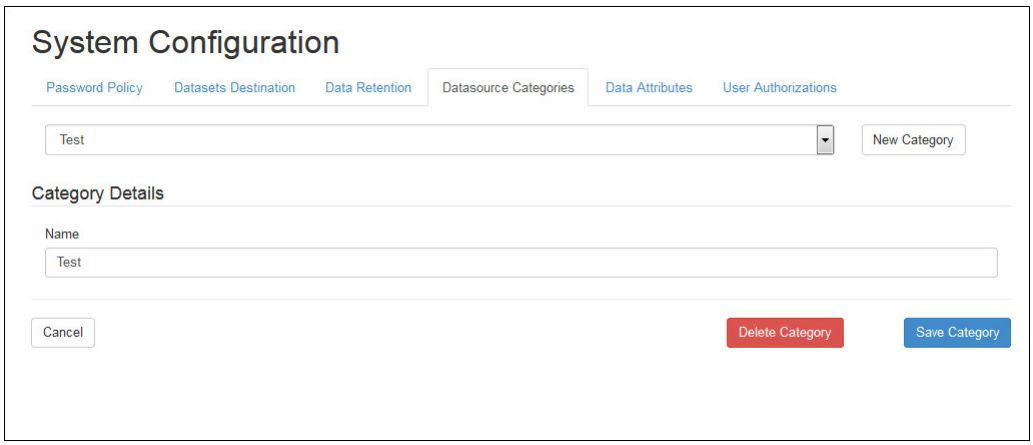
2. Click the **Data Categories** tab.
   The **Data Categories** screen opens.



3. At the right side of the **Choose Category to Edit** field, click the drop-down list and select the category you want to delete.



   The **Category Details** screen opens.



4. Click the **Delete Category** button.
5. The system asks you to confirm permanent deletion of the category. Click **Delete**.

Data Visibilities

Data visibilities identify the privacy requirements for data.

All raw data and derived data stored in PHEMI Central can be tagged with labels that provide information about the data's sensitivity. This sensitivity is described in terms of the visibility the data should have to different system users. The visibility tags you define for your data should reflect the sensitivity of the data as identified by your organization.

The visibility of data in your organization should be set out in your organization's governance policy. Working from the governance policy, the PHEMI Administrator and is configured as part of system configuration.

You can define data visibilities to suit your organization's needs. Possible examples are CONFIDENTIAL to identify data that is sensitive and requires a user to a certain level of access or certification to access, PII to identify Personally Identifiable Information, PHI to identify personal health information, or SECRET to identify especially sensitive material.

Note: Once defined, a data visibility may be neither edited nor deleted. The description for the visibility can be modified subsequently.

The data visibilities specified for a data collection are referred to in access policies and matched against user authorizations to determine what actions, if any, a given user is allowed to perform on the data. The access policy can then be applied to a data collection or dataset during system configuration. *Tell me about user authorizations. Tell me about access policies.*

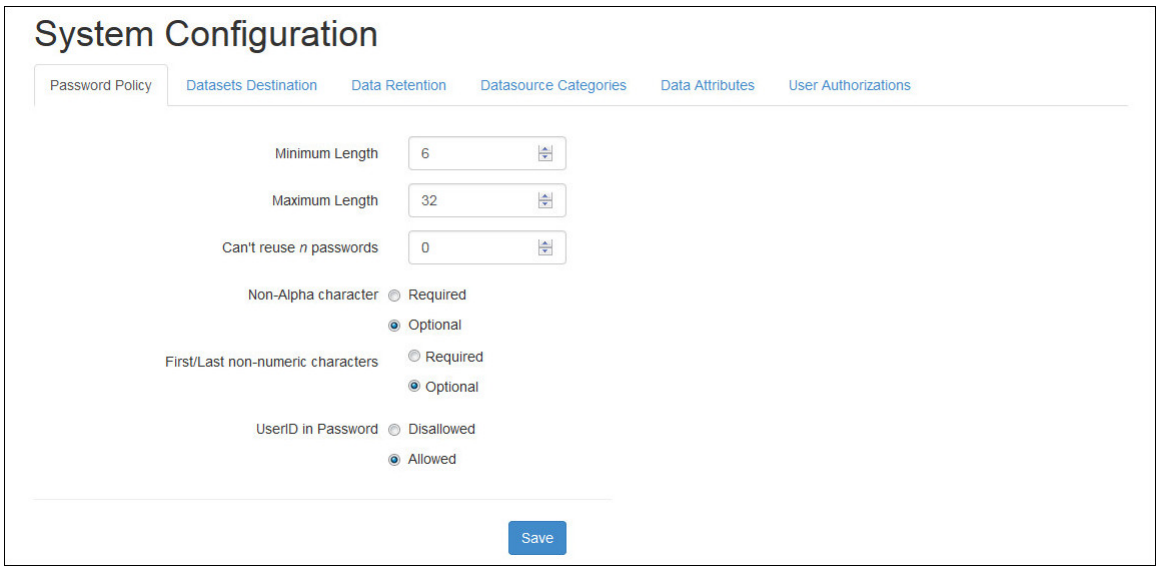
In addition, any data visibility defined in the system can be used by a Data Processing Function (DPF) to tag any derived data fields. These derived data elements can be assigned different privacy levels from the data collection and from one another. For example, the Social Security Number extracted from a health record can be tagged CONFIDENTIAL if that data visibility has been defined in the system. This mechanism provides field-level privacy protection.

View Configured Data Visibilities

View configured data visibilities on the **Data Visibilities** screen of the **System Configuration** page.

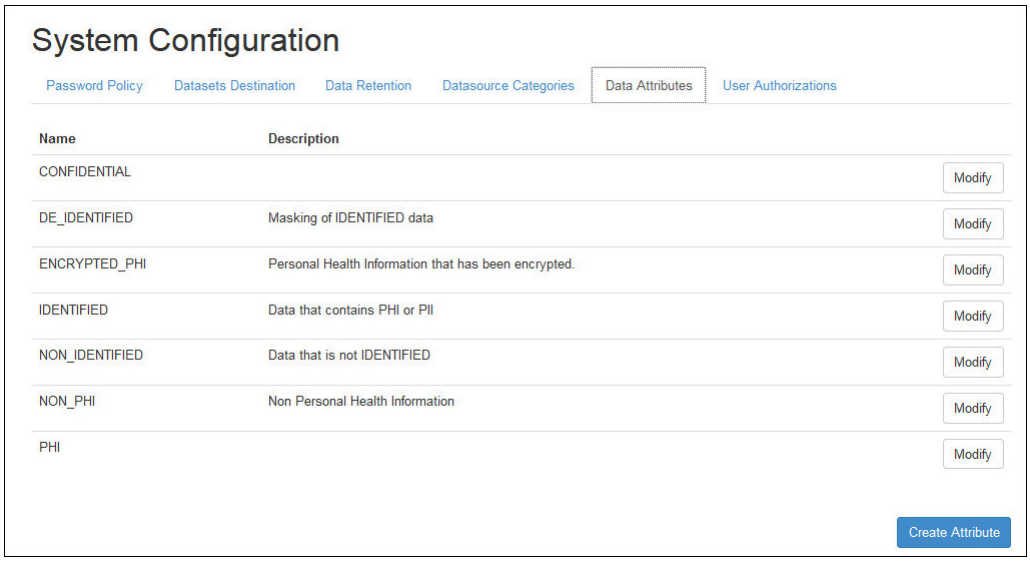
To view the data visibilities that have been configured in the system:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar. The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Visibilities** tab.

   The **Data Visibilities** screen opens, listing all the data visibilities configured for the system.



Define Data Visibilities

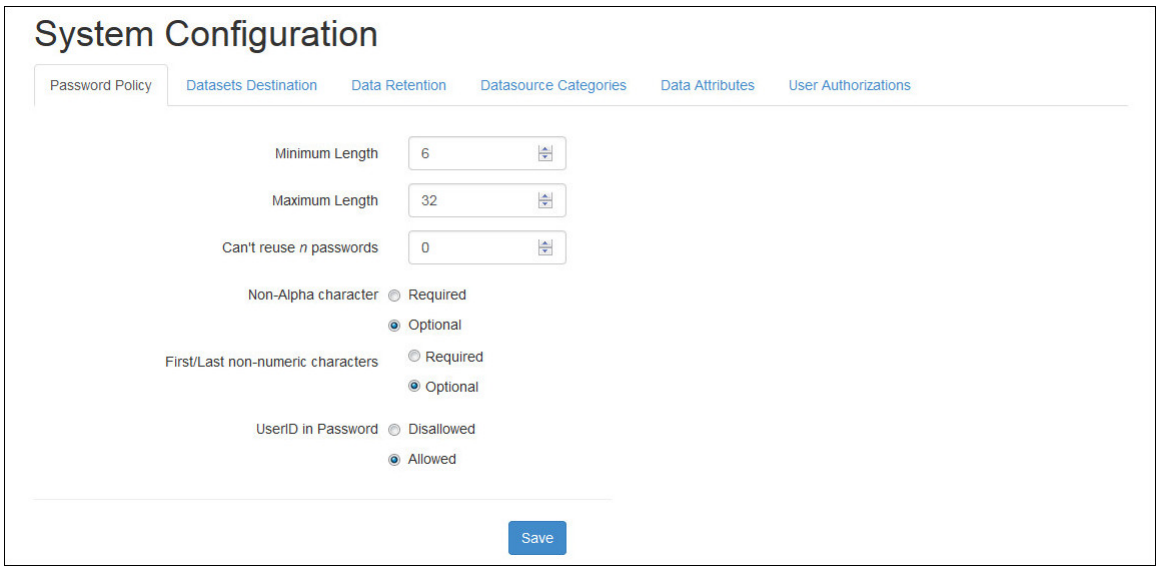
Define a data visibility on the **Data Visibilities** screen of the **System Configuration** page.

Note: Once defined, a data visibility may be neither edited nor deleted. The description may be modified subsequently.

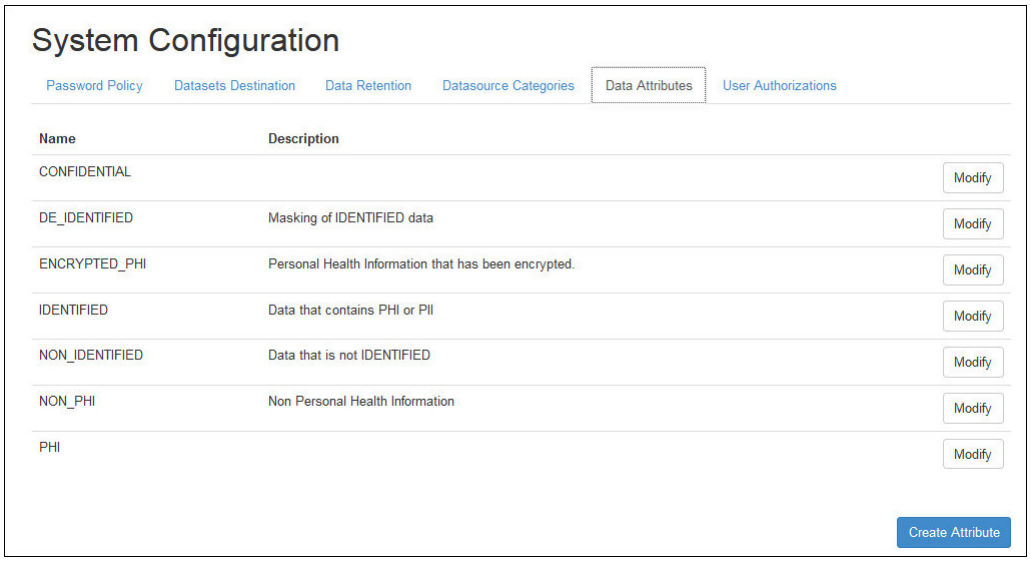
To define data visibilities:

1. Open the **System Configuration** page, by clicking the **System Configuration** icon in the left navigation bar.

   The **System Configuration** page opens on the **Password Policy** screen.



2. Click the **Data Visibilities** tab.
   The **Data Visibilities** screen opens.



3. Click the **Create Visibility** button. The **Create Visibility** screen opens.
4. Enter the visibility information.

Option	Description
Name	Enter a name for the data visibility; for example, "CONFIDENTIAL," "SECRET" or "PII".
Description	Enter a brief description to describe the intention of the visibility.

5. Save the visibility information by clicking the **Create Visibility** button.

Filter Expressions

Filter data in reports, logs, and lists of objects using simple regular expressions.

Regular expressions used to filter information in PHEMI Central must be compatible with both the Java and the Python programming languages.

The simple regular expressions described in this section are supported by the system. More complicated regular expressions may succeed, but are not guaranteed to succeed.

Character Classes

Generally, the allowed character classes include lowercase letters, uppercase letters, numbers (decimal digits), and the underscore character ("_"). Taken together, these characters comprise the "word" character class.

To match a specific string of letters, numbers, punctuation, or a mix, simply enter the string. For example entering the string `2014` matches any entry containing the string "2014". A blank space is entered simply as a blank space.

To make more flexible expressions, use *metacharacters* and *escape sequences*.

Metacharacters

Metacharacters are characters that are not matched themselves, but indicate how a filter expression should be interpreted.

Character(s)	Description
[ ]	Square brackets. Matches any single character within the brackets. For example, `[abc]` matches any of the characters "a", "b", or "c". Backslash escapes are not allowed within square brackets. To filter on a sequence of more than one character inside brackets, delimit the expressions using a single quote; for example, ['11"12"13'] A closing square bracket may be included in the bracket expression if it is the first character of the set (or the first character after the carat), as in `[]abc]`.
-	Hyphen. When within square brackets, specifies a range of values. For example, `[a-z]` matches any lowercase letter from "a" through "z". The expression `[a-d]` is equivalent to `[abcd]`. The hyphen is treated as a literal character if it is the first or last character inside square brackets, as in `[abc-]` or if it is the first character after the carat inside square brackets.
[^]	Matches the negation or complement of the characters within the brackets. For example, `[^abc]` matches any character that is neither an "a" nor a "b" nor a "c", while `[^a-z]` matches any character that is not a lowercase alphabetic character. When outside square brackets, the carat is matched as an ordinary character.
^	Matches the starting position of the string or line.
$	Matches the ending position of a string or line, or the position immediately preceding the newline character.
\	The escape character. When followed by an ordinary character, the escape character signals a special sequence; for example, `\n` indicates a newline character. When followed by a metacharacter, the metacharacter loses its special meaning and is matched in the same way as an ordinary character.

Character(s)	Description
.	Dot, or period. Matches any single character, except newline (\n). For example, `.at` matches "bat", "cat", "hat", "mat", and so on. Within a bracket expression, the dot matches a literal dot. Therefore, while `.at` matches "bat", "cat", and so on, `[.at]` matches "." or "a" or "t".

Escape Sequences

There are certain characters that take on a new meaning when they are preceded by the escape character, the backslash.

Escape Sequence	Description
\n	Newline.
\r	Carriage return.
\t	Horizontal tab.
\x0B	Vertical tab.
\f	Form feed.
\d	A digit. Equivalent to [0-9].
\D	A non-digit. Equivalent to [^0-9].
\s	A whitespace character. Equivalent to [\t\n\r\x0B\f].
\S	A non-whitespace character. Equivalent to [^\s].
\w	A member of the word character class. Equivalent to [a-zA-Z_0-9].
\W	A non-word character. Equivalent to [^\w].

Glossary of Terms and Concepts

access policy

An access policy is a set of logical rules that determines how users can consume data stored in PHEMI Central. The access policy specifies what user authorizations are required to interact with data tagged with specified sensitivity, or visibility. Access policies can be applied to data collections and datasets.

authorizations

User authorizations are configurable attributes you can assign to PHEMI Central users. Authorizations are defined in PHEMI Central by the PHEMI Administrator, who sets them in accordance with the organization's governance policies.

cell (field)

A cell, or field, is the smallest unit of data storage in PHEMI Central. A cell is a single data item, which can range from a single byte up to gigabytes, plus the metadata associated with the data item. Any piece of raw data, regardless of size, is stored in a single cell. Elements of derived data (transformed from the raw data) are also each stored individually in cells. Any cell can be protected by applying data visibilities.For derived data, each derived item can be individually assigned a visibility (which may be different than that configured for the data collection) by the DPF performing the processing.

code library

A code library is a package of executable code that is included in a DPF archive. Whether the code is source or compiled depends on the coding language. Code libraries must be portable and self-contained; that is, all dependencies required for the DPF to function must be bundled inside the library, in the appropriate way, for whatever language is being used.

dataset

A dataset is a view, or map, of an underlying set of data. Data items in a dataset can be selected from across multiple data collections. The dataset is a view, or map, to the underlying data. The actual content of the dataset (that is, the dataset's data) is generated when the dataset is executed or when it is queried against.

data category

Data categories are a way to classify data into broader groupings. Examples of data categories are "Research Reports," "X-Rays," and "Prescriptions."

Data Processing Function, DPF

A Data Processing Function, or DPF, is an executable piece of code that supplies the instructions for processing raw data (for example, a log message or medical report) to extract from heterogeneous data collections meaningful, context-specific information (such as a temperature reading or blood glucose measurement) that can be queried or exported for analysis. The code is executed by the PHEMI Central DPF Engine, which uses it to direct curation of the data. The input to a DPF is the raw binary data ingested into the system. The output of a DPF is a set of structured elements, each of which includes a type property (for example, INT or STRING) and can specify data visibilities (for example, SECRET or IDENTIFIABLE) on a per-field basis. The data elements output by a DPF are called derived data. The collection of derived data produced by a DPF is automatically indexed in PHEMI Central.

data collection

In PHEMI Central, a data collection is the set of management and governance rules and policies that will be applied to a collection of data. A data collection configuration should be defined for each set of data that is to be stored and managed according to the same retention, legal, and governance rules.

data visibilities

See visibilities.

derived data

Derived data is data that has been parsed, extracted, or otherwise enriched or processed by running a DPF on stored raw data. The set of derived data items can be searched, queried, further processed, or exported from the system.

digital asset

A digital asset is any piece of data stored with metadata in the system. This may be raw data that has had metadata applied on collection, or it may be derived data that has been parsed, indexed, catalogued, and/or enriched with additional metadata.

DPF archive

The set of code that makes up a DPF is called a DPF archive. A DPF archive is delivered as a ZIP file archive. It consists of two parts: a manifest file and a code library. To associate a DPF with a data collection, the DPF archive is ``registered`` with the data collection by uploading the archive during data collection configuration.

ETL

Extract, transform, and load. In databases, a set of tools or processes that extracts data from sources, transforms the format or structure for storage, query, and analysis, and loads it into the receiving or consuming system.

ingestion

Ingestion is the process by which data is brought into in PHEMI Central. The sending system (the data source) submits the data to PHEMI Central, which listens for the data using a web service. Data can also be ingested manually, by using the PHEMI Central Management and Governance Console. The specific characteristics of data ingestion can be specified per data collection as part of the data collection configuration.

JSON

JSON stands for JavaScript Object Notation. JSON is a lightweight data-interchange format that is easy for humans to read and write and easy for machines to parse and generate. JSON is used in the body of several REST requests in the PHEMI RESTful API. PHEMI Central also includes a system DPF that can create derived data from JSON objects, providing the objects conform to PHEMI's JSON specification.

key-value pairs

A key-value pair is a set of two linked data items: a key which uniquely identifies some item of data, and the data itself. PHEMI Central uses key-value store to efficiently store, process, and retrieve data.

M2M

M2M is a way of referring to machine-to-machine interfaces, used in machine-to-machine communication.

manifest file

A manifest file is a JSON file that specifies the output of a DPF. With the code library, the manifest file makes up the DPF archive that is uploaded to register the DPF with a data collection. The manifest file should include the properties of the DPF along with the details of each derived data item to be generated.

metadata

Metadata is information about a piece of data. In PHEMI Central, metadata is information about how a given piece of data is to be managed. When a piece of raw data is ingested into PHEMI Central, information from the connection (for example, the timestamp) together with policy information configured for the data collection (for example, the data visibility) and some derived information (for example, a "time to live," as derived from the timestamp and the data retention policy) is used to create metadata properties that are stored with the data. Further, PHEMI Central also automatically indexes and catalogues all stored data, whether raw or derived; the indexes and catalogues can also be considered a kind of metadata.

PII

Personally Identifiable Information, or PII, is a legal concept used in US privacy law and information security to mean information that can be used on its own or with other information to identify, contact, or locate a single person or to identify an individual in context. When thinking about PII, it is important to distinguish legal

requirements to remove attributes uniquely identify an individual from a general technical ability to identify individuals. Because of the versatility and power of modern re-identification algorithms, together with the amount of information freely available from all sources, the absence of PII data does not guarantee that de-identified data cannot be used, perhaps in combination with other data, to identify individuals.

privacy-level visibilities

Privacy-level visibilities are data visibilities that characterize the privacy level of a data item. PHEMI Central includes predefined privacy-level visibilities designed to apply to data domains where privacy is important.

- **IDENTIFIED**. The data contains Personally Identifying Information that potentially identifies an individual. Examples of information of this type include name, Social Insurance Number, and date of birth.
- **DE-IDENTIFIED**. The data contains IDENTIFIED information that has been masked or encrypted.
- **NON-IDENTIFIED**. The data is not identifying in and of itself. Examples of this type of information include weight or favorite food.

Although privacy-level visibilities are preconfigured, their descriptions can be modified by configuration.

raw data

In PHEMI Central, raw data items are files, objects, records, images, and so on that are submitted for ingestion into the system. Raw data is stored exactly as received, along with the metadata generated for it on ingestion.

REST, RESTful API

Representational Statement Transfer (REST) is an architectural style that uses HTTP requests and associated methods (POST, PUT, GET, and DELETE) to create, update, read, and delete data. A RESTful API is an application programming interface (API) based on REST.

visibilities

All raw data and derived data stored in PHEMI Central can be tagged with labels that provide information about the data's sensitivity. This sensitivity is described in terms of the visibility the data should have to different system users. The visibility tags you define for your data should reflect the sensitivity of the data as identified by your organization.