Data Administration: Overview

This document provides instructions for administrative tasks such as adding caslibs and loading data. This document assumes that you are familiar with the data and caslib concepts that are explained in SAS Cloud Analytic Services: Fundamentals.

Use the interface that best meets your needs. Here are suggestions:

- To manage caslibs and CAS tables interactively, use the Data area in SAS Environment Manager. See Data Administration: How to (SAS Environment Manager) on page 2.

- If SAS Environment Manager is not deployed, use CAS Server Monitor to manage caslibs interactively. See Data Administration: How to (CAS Server Monitor) on page 7.

- To programmatically manage CAS data, use the Tables action set. To get started, see SAS Viya Quick Start.

An in-memory table is loaded from the physical source that is associated with a caslib. Each in-memory table should always be loaded from the same corresponding physical source file, in the same caslib. Loading data from one caslib into another can introduce ambiguity about the physical source for an in-memory table, yielding unexpected results in SAS Visual Analytics.

Note: If you use SAS Environment Manager exclusively to load data, this requirement is met automatically.
Data Administration: How to (SAS Environment Manager)

Introduction
The SAS Environment Manager Data area enables you to view and manage tables, caslibs, and SAS Viya servers. With the Data area you can perform the following tasks:

- examine available caslibs and the loaded tables that are assigned to each caslib
- add new caslibs
- load and unload tables
- delete loaded and unloaded tables and caslibs
- examine the properties for a server and which libraries are assigned to a server, including library tables and columns.

Depending on user permissions and privileges, assignments can be viewed and managed for the different tables, caslibs, and servers.

The following instructions explain how to manage caslibs and tables using SAS Environment Manager.

Navigation
From the side menu ( ), under SAS Environment Manager, select Data.

At the top of the Data page, from the View drop-down list, select one of the following views:

Loaded tables
lists all in-memory, global-scope tables that you are authorized to see. This view of tables does not include unloaded tables. In this area you can view the column information for each table, unload a table, delete a table, or view the table properties. Specific actions are granted based on permission settings.

Libraries
lists all global and personal caslibs that you are authorized to see. Use this view to add and manage caslibs.

In this area you can create a new library or edit an existing library. You can view tables, import tables into the library, delete a library, and view library properties. You can also manage authorization settings.

You can drill into a caslib to see its tables, both loaded and unloaded. You can perform table-specific tasks, such as load and unload tables, view column information for a loaded table, delete a table, or view the tables properties. Specific actions are granted based on permission settings.

For information about the different types of predefined caslibs, see Predefined Caslibs on page 9.

Servers
lists all CAS servers. In this area you can view the state of a server, the content with respect to libraries and tables, and the server properties.

Properties enable you to understand what privileges are allowed including the Paths List, Superuser Role Membership, and Caslib Management Privileges. This view is relevant to data administration if you need to assume Superuser status.

When you select a table, caslib, or server, available options for that item are accessible from a pop-up menu or from the icon task menu. You can also double-click to open a table, caslib, or server.

Here are some additional navigation features:
You can modify the display and sort order of columns in the display by right-clicking a column heading and selecting from the available sort options. You can also reorder columns by selecting and dragging a column to the left or right.

You can customize which columns are displayed in the Data area by selecting and selecting **Columns**. The Columns panel contains all available columns for the currently selected table, caslib, or server. From here you can choose to display or hide columns in the Data area. On this panel you assign table columns to the **Hidden columns** list or to the **Displayed columns** list.

These preferences persist until the end of your SAS Environment Manager login session.

You can filter the current displayed list. On the **Filter By** drop-down list, select **Table**, **Library**, **Server**, or **Source Table Name**. You can also enter filter text in the search field.

You can refresh the current view by selecting **. Refresh** updates the display of your current user session. Changes made by other users are not dynamically updated.

**Manage Tables**

In the Data area, you can view the different columns for a table, table properties, and authorization settings for users. You can also import data, load or unload tables, and delete tables when needed.

**Import a Table**

1. In the **Libraries** view, select a caslib.
2. Right-click, and select **Import**. Or select from the taskbar.
3. In the Import Data To CAS Library window, specify one or more files to import, and click **OK**.

   For details, see *SAS Viya: Self-Service Import*.

The ability to import a table in SAS Environment Manager is affected by two factors:

- Whether you have Read permission on the /casManagement_capabilities/importData object URI in the **Security** ⇒ **Rules** area of SAS Environment Manager. You must have Read permission granted in order to import tables. If you do not have Read permission granted, the **Import** function is disabled. In the initial configuration, all authenticated users have the necessary access. For information about restricting the ability to import tables in SAS Environment Manager, SAS Visual Analytics, or SAS Visual Data Builder, see *Adjust Rules for Access to Functionality*.

- Whether you have the necessary access to the target caslib. For information about specific requirements, see “Compound Tasks” in SAS Viya Administration: Cloud Analytic Services Authorization.

**Load a Table**

1. In the **Libraries** view, select a caslib.
2. Right-click, and select **Tables**. Or select from the taskbar.
3. Select the table that you want to load.
4. Right-click, and select **Load**. Or select from the taskbar.

   **Note:** In the **Tables** view for a caslib, loaded tables are identified with a green circle in the **State** column.
Unload a Table

1 In the Loaded tables or Libraries view, select a table.
2 Right-click, and select Unload. Or select from the taskbar.
3 In the Confirmation window, click OK.

Note: In the Tables view for a caslib, unloaded tables are identified with a red square in the State column.

Delete a Table

1 Select a table.
2 Right-click, and select Delete. Or select from the taskbar.
3 In the Confirmation window, indicate whether you want to also delete any direct access controls for the table.
4 Click OK.

View Table Properties

1 Select a table.
2 Right-click, and select Properties. Or select from the taskbar. Read-only information is displayed.

View Column Properties

1 Select a loaded table.
2 Right-click, and select Columns. You can also double click on a table row or select from the taskbar. A list of columns is displayed.
3 To view the properties of a column, select the column, right-click, and select Properties. Read-only information is displayed.

Manage Caslibs

In the Data area, you can examine available caslibs and the assigned tables for each caslib. You can add a new caslib, modify path and description settings for the caslib, view caslib properties, view assigned tables, and delete a caslib. You can also import tables to a caslib.

Add a Caslib

1 In the Libraries view, click .
2 In the New CAS Library window, specify general settings as follows:

| Server | Select a server. Only servers to which you are authorized to add a global caslib are listed. See “Caslib Management Privileges” in SAS Viya Administration: SAS Cloud Analytic Services. |
Data source type  Select the type of data source. The Data Source area automatically displays the settings for the selected data source.

Path  Specify data source-specific information for the caslib.

Name  Specify a name for the caslib.

3 Depending on the data source type that you selected, different settings are available on the Data Source area. Below are the different data sources that you can select.

- PATH
- HDFS
- DNFS
- LASR
- Oracle
- Teradata
- Hadoop
- Postgres
- Impala

For further information about these data sources and the specific parameters for each data source, see “Add caslib” in SAS Viya: System Programming Guide.

4 After you have entered all of the parameter settings, click Save. The new caslib will be listed in the Libraries display.

 Modify a Caslib

1 In the Libraries view, select a global caslib.

2 Right-click, and select Edit. Or select ☐ from the taskbar.

3 In the Edit CAS Library window, change the caslib path or description as needed.

4 Click Save.

When editing a caslib, the following restrictions apply:

- Only Path and Description fields can be edited.
- Personal caslibs are created for each user and have specific meaning which does not allow them to be edited.

 View Caslib Properties

1 In the Libraries view, select a caslib.

2 Right-click, and select Properties. Or select ☐ from the taskbar. Read-only information is displayed.
View Tables for a Caslib
1  In the Libraries view, select a caslib.
2  Right-click, and select Tables. You can also double-click a caslib row or select from the taskbar.
   A list of the tables that are assigned to the caslib is displayed.

Delete a Caslib
CAUTION! When you delete a caslib, all associated in-memory tables are immediately unloaded.

Note: Deleting a caslib does not affect persisted files in the corresponding data source.
Note: You cannot delete a personal caslib.
1  In the Libraries view, select a caslib.
2  Right-click, and select Delete. Or select from the taskbar.
3  In the confirmation window, click Yes.

Authorization
You can view and modify authorization settings for tables or libraries by selecting from the taskbar. You can also right-click on a table or library and select Authorization. The Authorization pane opens. From here you can view and modify permissions for different users of the selected table or library.

For further information about managing access, see SAS Viya Administration: General Authorization and SAS Viya Administration: Cloud Analytic Services Authorization.

Manage Servers
To manage server properties, see “View and Modify Server Properties” in SAS Viya Administration: SAS Cloud Analytic Services.

View Caslibs for a Server
1  In the Servers view, select a server.
2  Right-click, and select Libraries. You can also double click a server row or select from the taskbar.
   A list of the libraries that are assigned to the server is displayed. You can continue to drill down into tables and columns.

View Properties for a Server
1  In the Servers view, select a server.
2  Right-click, and select Properties. Or select from the taskbar. The following properties are displayed:
   - Basic Properties displays information such as the type, host, and port.
   - Superuser Role Membership displays users who are members of the Superuser role. For more information about the Superuser role, see CAS Server Roles.
- **Caslib Management Privileges** - displays directly granted privileges for different users. For more information, see *Adjust Caslib Management Privileges*.

If you are a member of the SAS Administrators group, you can assume the Superuser role and see additional server properties.

1. In the **Servers** view, select a server.
2. Right-click, and select **Assume the Superuser role**.
3. Right-click, and select **Properties**. Or select 🤔 from the taskbar. In addition to the standard properties, the **Path List** properties are displayed. The **Path List** displays **Black List** or **White List** paths.
   - Only users who assume the Superuser role for a server can see and manage that server’s paths list.

### Data Encryption

When you add a caslib with the **New CAS Library** function, you can choose to encrypt the data for that caslib. On the **New CAS Library** pane, select **Enable encryption**. Select a domain from the list of available domains or create a new domain by selecting 📋. You can also view the encryption status for individual tables in a caslib.

See *View Tables for a Caslib* on page 6.

In the Data area, the **Encryption** column is hidden by default.

For more information about encrypting data, see *Encryption in SAS Viya: Data at Rest*.

### Data Administration: How to (CAS Server Monitor)

**Introduction**

CAS Server Monitor enables you to monitor and administer your CAS server. Within CAS Server Monitor, the **System State** view contains various CAS server properties and settings, including the **Global Caslibs** table. This table displays the global caslibs for your environment. From here you can add and delete global caslibs and modify access controls for users and groups.

These instructions explain how to manage global caslibs using **CAS Server Monitor**.

**Add a Global Caslib**

1. On the **System State** page, select **Global Caslibs**.
2. Click **Add**.

   **TIP** If the **Add** button is disabled, you are not authorized to add a global caslib. See “Caslib Management Privileges” in SAS Viya Administration: SAS Cloud Analytic Services.

3. On the Add Global Caslib pane, specify general settings as follows:

<p>| Caslib | Enter a caslib name. |</p>
<table>
<thead>
<tr>
<th>Description</th>
<th>Enter a description for the caslib.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path</td>
<td>Enter data source-specific information.</td>
</tr>
<tr>
<td>Subdirectories</td>
<td>For a path-based caslib, specifies whether tables and files in subdirectories of the specified path are accessible from the caslib.</td>
</tr>
<tr>
<td>Create directory</td>
<td>For a path-based caslib, creates the host directory that you specify in the Path field, if that directory does not already exist.</td>
</tr>
<tr>
<td>Permission</td>
<td>For a path-based caslib, sets host-layer permissions on the directory. See “Using CAS to Modify Host Access” in SAS Viya Administration: Cloud Analytic Services Authorization.</td>
</tr>
<tr>
<td>Active on add</td>
<td>Specifies whether the new caslib becomes the active caslib in your current session.</td>
</tr>
<tr>
<td>Data source</td>
<td>Specifies the type of source data for the caslib.</td>
</tr>
<tr>
<td>Data encryption password</td>
<td>Specifies the encryption password for the caslib.</td>
</tr>
<tr>
<td>Encryption domain</td>
<td>Specifies the encryption domain for the caslib.</td>
</tr>
</tbody>
</table>

4 Specify additional settings as needed. For information about caslib properties, see the documentation for the CAS action “Add caslib” in SAS Viya: System Programming Guide.

5 Make sure your settings are as intended. In CAS Server Monitor, caslib properties are not editable.

6 Click OK.

**Delete a Global Caslib**

**CAUTION!** When you delete a caslib, all associated in-memory tables are immediately dropped.

Note: Deleting a caslib does not affect persisted files in the corresponding data source.

1 On the **System State** page, click **Global Caslibs**.

2 At the end of the row for the caslib, click •, and select **Drop Caslib**.

**Manage Access to a Global Caslib**

1 On the **System State** page, click **Global Caslibs**.

2 At the end of the row for the caslib, click •, and select **Edit Access Controls**. The Edit Access Controls - AppData window appears. From here you can grant or deny permission settings to different users.

See *SAS Viya Administration: Cloud Analytic Services Authorization*. 
# Data Administration: Reference

## Predefined Caslibs

The following caslibs are automatically created during deployment. Each caslib has a default assignment and specifications.

<table>
<thead>
<tr>
<th>Caslib</th>
<th>Path</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AppData*</td>
<td>/opt/sas/viya/config/data/cas/default/appData/</td>
<td>Stores data that specific applications use for internal purposes.</td>
</tr>
<tr>
<td>Formats</td>
<td>/opt/sas/viya/config/data/cas/default/formats/</td>
<td>A shared location for user-defined formats. All users can read. Administrators can read and write.</td>
</tr>
<tr>
<td>Models*</td>
<td>/opt/sas/viya/config/data/cas/default/models/</td>
<td>Stores models created by SAS Visual Analytics for use in other analytics or SAS Studio.</td>
</tr>
<tr>
<td>Public</td>
<td>/opt/sas/viya/config/data/cas/default/public/</td>
<td>A shared location for data. All users can read and write.</td>
</tr>
<tr>
<td>ReferenceData*</td>
<td>/opt/sas/viya/config/data/cas/default/referenceData/</td>
<td>Stores per-server data that specific applications use for internal purposes.</td>
</tr>
<tr>
<td>SystemData*</td>
<td>/opt/sas/viya/config/data/cas/default/sysData/</td>
<td>Stores application-generated data that is used for general reporting.</td>
</tr>
</tbody>
</table>

* Not included in a programming-only deployment.

**Note:** Some predefined caslibs are hidden or have limited access. For more information about hidden caslibs, see “Reduced Visibility: Hidden Caslibs” in SAS Viya Administration: Cloud Analytic Services Authorization.

## User-Defined Formats

If you are working with user-defined formats, and you would like to access formats that you have created with SAS 9.3 or later, you can promote your formats with either SAS Studio or with the `FORMAT` procedure. For
further information about SAS Studio, see SAS Studio:User’s Guide. If you are working with SAS, there are some preliminary steps that you must complete:

1 Create your data set in a permanent library and store your user-defined formats in a format catalog in a permanent library.

2 Convert the format catalog to an item store and move the item store to a location accessible to CAS.

3 Import the user-defined formats and data set into CAS.

   Note: If you already have a data set and formats defined, you can convert the format catalog to an item store. See Step 3 on page 12 in the following example.

Your CAS server must have a caslib that is named Formats. In addition, you must set the following options for the Formats caslib:

```
cas.fmtcaslib="Formats"
cas.addfmtlib="userformats1.sashdat userformats2.sashdat userformats3.sashdat userformats4.sashdat userformats5.sashdat"
```

These options tell the CAS server to look for a series of format libraries at start-up. It then sets the format search path with those libraries for every session that is invoked. Even though the format libraries are empty at start-up, CAS puts them in the search path. When you load user-defined formats to the CAS server, they immediately become available the next time a session is started.

   Note: In order to convert a format catalog to an item store, you must be running SAS 9.4M3 or a later release. Earlier releases of SAS do not include this ability.

Below is an example that shows creating and loading user-defined formats. In this example, an existing data set is used and new columns are created with the FORMAT procedure.

1 Create your user-defined formats and save them to a permanent library. In the following example, new columns that are based on existing columns, are created. The user-defined formats are created using the FORMAT procedure and saved to a catalog entry in a permanent library:

```
1 libname udf "d:\snoatf\public\udf" ;
NOTE: Libref UDF was successfully assigned as follows:
Engine:        V9
Physical Name: d:\snoatf\public\udf
2
3 proc format library=udf.userformats1 ;
4 value $mfgCountry
5   "Acura" = "Japan"
6   "Audi"  = "Germany"
7   "BMW"  = "Germany"
8   "Buick" = "USA"
9   "Cadillac" = "USA"
10  "Chevrolet" = "USA"
11  "Chrysler" = "USA"
12  "Dodge"  = "USA"
13  "Ford"   = "USA"
14  "GMC"   = "USA"
15  "Honda"  = "Japan"
16  "Hyundai" = "Korea"
17  "Infiniti" = "Japan"
18  "Isuzu"  = "Japan"
19  "Jaguar" = "United Kingdom"
20  "Jeep"   = "USA"
21  "Kia"    = "Korea"
22  "Land Rover" = "United Kingdom"
```
Create the data set with the user-defined formats that are associated with the new columns. Save the data set to the same permanent library as the user-defined formats.

```
2 options fmtsearch=(udf.userformats1)
3 data udf.cars_format_test(keep=make model mfgCountry type MSRP msrp_range mpg mfgAvail);
4 attrib  make       length=$13
5 model    length=$40
6 type     length=$8
```
set sashelp.cars (keep=make model type MSRP mpg_city mpg_highway) ;
mfgCountry = make ;
msrp_range = MSRP ;
mfgAvail = make ;
mpg = ((.55*mpg_city) + (.45*mpg_highway)) ;
run ;

NOTE: There were 428 observations read from the data set SASHHELP.CARS.
NOTE: The data set UDF.CARS_FORMAT_TEST has 428 observations and 8 variables.
NOTE: DATA statement used (Total process time):
real time 0.04 seconds
cpu time 0.01 seconds

3 Convert the format catalog to an item store.

proc format catalog=(udf.userformats1) print locale
      itemstore="d:\snoatf\public\udf\va_fmts_itemstore" ;
run ;

opening catalog: UDF.USERFORMATS1
name=PRICERANGE type=FORMAT
Member name for itemstore: pricerange
name=MFGCOUNTRY type=FORMATC
Member name for itemstore: $mfgcountry
name=MFGCURRENT type=FORMATC
Member name for itemstore: $mfgcurrent

NOTE: PROCEDURE FORMAT used (Total process time):
real time 0.00 seconds
cpu time 0.00 seconds

4 Move the item store to a location that is accessible by the CAS server.

You must place the item store file on a disk in a directory that is accessible by the CAS server. The controller
node must be able to see the path.

5 Import the user-defined format catalog to the Formats caslib that you created. Place the user-defined formats
in the search path so that all sessions can access them.

In order to import the user-defined format catalog from SAS 9.4, a script has been provided for you that
simplifies this process. The copyformats.sh script is available to download at http://support.sas.com/kb/60/136.html.

The user-defined formats are now loaded on to the CAS server, are global in scope, and are in the format
search path. The order in which you import the user-defined formats and the data set is important. You
should import the user-defined formats before you import the data set to CAS. You will not be able to open
the associated data set if you do not import the user-defined formats first.

6 Import the data set to CAS. In the SAS Environment Manager, Data area, select Libraries from the View
drop-down list. Select a library, right-click and select Import.
The Import Data To CAS Library panel opens. Open the Local drop-down menu. Select SAS Data Set. Click Choose Files. Select the data set. Click OK.

It is important to note that specific permissions are required to import data. For further information, see “Permissions by Task” in SAS Viya Administration: Cloud Analytic Services Authorization.

For further information about user-defined formats, see the following topics:

Access to SAS 9.4 Data

If you are moving data from SAS 9.4 to SAS Viya, you will need to consider some preliminary information:

- You can move and you can share data between SAS 9 and SAS Viya environments using SAS/CONNECT.
- SAS Viya operates with UTF-8 encoded data. If your SAS 9 installation is not UTF-8 compliant, you might need to re-create your data sets.

See the following topics for more information:
- Comparing SAS 9 and SAS Viya
- SAS 9 and SAS Viya
- Sharing Data Between SAS 9 and SAS Viya using SAS/CONNECT
- Migrating Data to UTF-8 for SAS Viya 3.2

Access to Third-Party Data

To support access to third-party data, complete the configuration steps for your data sources. For instructions, see the appropriate topic in SAS Viya: Deployment Guide as follows:

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Reference or Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hive and Hadoop (serial)</td>
<td>See Configure SAS/ACCESS to Hadoop and SAS Data Connector to Hadoop.</td>
</tr>
<tr>
<td>Hive (parallel)</td>
<td>See Deploy the SAS Embedded Process for Hadoop for Parallel Processing.</td>
</tr>
<tr>
<td>Impala</td>
<td>For a manual configuration see: Configure the SAS Data Connector to Impala.</td>
</tr>
<tr>
<td></td>
<td>If you are deploying with Yum see: Configure the SAS Data Connector to Impala.</td>
</tr>
<tr>
<td>Microsoft Excel</td>
<td>Use the SAS Data Connector to PC Files to import data from .xlsx or .xls file types.*</td>
</tr>
<tr>
<td>ODBC</td>
<td>For a manual configuration see: Configure the SAS Data Connector to ODBC.</td>
</tr>
<tr>
<td></td>
<td>If you are deploying with Yum see: Configure the SAS Data Connector to ODBC.</td>
</tr>
<tr>
<td>Oracle</td>
<td>For a manual configuration see: Configure the SAS Data Connector to Oracle.</td>
</tr>
<tr>
<td></td>
<td>If you are deploying with Yum see: Configure the SAS Data Connector to Oracle.</td>
</tr>
<tr>
<td>PostgreSQL</td>
<td>For a manual configuration see: Configure the SAS Data Connector to PostgreSQL.</td>
</tr>
<tr>
<td></td>
<td>If you are deploying with Yum see: Configure the SAS Data Connector to PostgreSQL.</td>
</tr>
</tbody>
</table>
Data Source | Reference or Instruction
---|---
Teradata | Use the SAS Data Connector to Teradata to access data.
  - See: Configure the SAS Data Connector to Teradata.
  - For a SAS in-database deployment see: SAS In-Database Deployment: Configuring SAS Viya to Access Teradata.

* No additional configuration is required.

For information about storing connection information, see SAS Viya Administration: External Credentials.

Data Administration: Interfaces

All CAS data management requirements and constraints are always fully enforced. Not all interfaces enable you to see and interact with all CAS data management features.

In the following table, the shaded part of each circle is an approximation of the amount of CAS data management functionality that a particular interface exposes.

**Interfaces to Data Administration**

<table>
<thead>
<tr>
<th>Interface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tables Action Set</td>
<td>A programmatic interface for CASL (the CAS procedure), Python, and Lua.</td>
</tr>
<tr>
<td>SAS Environment Manager</td>
<td>The enterprise graphical web application for administration.</td>
</tr>
<tr>
<td>CAS Server Monitor</td>
<td>A graphical web application that is embedded in the CAS server. Supports adding and deleting global caslibs.</td>
</tr>
<tr>
<td>CASLIB statement</td>
<td>A programmatic interface for adding caslibs. See CASLIB statement.</td>
</tr>
</tbody>
</table>