Elements of SAS Viya

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Elements of SAS Viya

Introduction

This section provides a concise summary for new administrators.

Here are related topics:

- To get started with SAS Viya administration, see SAS Viya Administration: Getting Started.
- To learn about benefits of SAS Viya, see SAS Viya on the SAS website.
Key Components

Here are software components that might be of particular interest to administrators.

- The analytics engine to SAS Viya: SAS Cloud Analytic Services: Fundamentals
- A modular set of supporting services: SAS Viya Administration: General Servers and Services
- A web application for basic administration: SAS Viya Administration: Using CAS Server Monitor
- A web application for enterprise administration: SAS Viya Administration: Using SAS Environment Manager
- A web application for writing and submitting code: Getting Started with Programming in SAS Studio
- A web application for visual reporting, exploration, and modeling: SAS Visual Analytics: Overview
- Multiple application programming interfaces: http://developer.sas.com

For information about other components, search the SAS Viya administration documentation.

Cumulative Functionality

Among some of the products on SAS Viya, available functionality is cumulative.

- SAS Visual Analytics provides baseline functionality, including reporting and basic analytics.
- SAS Visual Statistics provides an additional set of advanced analytic functions.
- SAS Visual Data Mining and Machine Learning provides a second additional set of advanced analytic functions.

Note: All of the preceding products offer both programming and visual interfaces.

Selective Deployment (Optional)

By default, all of your software is deployed. As a convenience for special circumstances, it is possible to deploy only a subset of components. A programming-only deployment excludes general services and visual interfaces. For example, a programming-only deployment of SAS Visual Analytics does not include the SAS Visual Analytics web application.
Note: SAS supplies two versions of SAS Studio: SAS Studio 5.2 (Basic) and SAS Studio 5.2 (Enterprise). SAS Viya programming-only deployments use SAS Studio 5.2 (Basic). For a comparison of the two SAS Studio versions, see “SAS Studio 5.2” in What’s New in SAS 9.4 and SAS Viya.

Diagrams by Deployment Type

Full Deployment (Native Operating Systems)

The following diagram shows the components in a SAS Viya full deployment:

Programming-Only Deployment (Native Operating Systems)

The following diagram shows the components in a SAS Viya programming-only deployment:
Security in SAS Viya

Authentication

*Authentication* is the aspect of security that verifies the identity of a user or service account.

When you sign in, one of the following authentication patterns is used:
<table>
<thead>
<tr>
<th>Pattern</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
</table>
| Host authentication    | Requests are sent to the appropriate host and processed by any authentication mechanism supported by that host. Programming-only deployments use this pattern exclusively. Other deployments use dual authentication for access to CAS from SAS Studio 5.2 (Basic).  
**Note:** You can configure the host to use pluggable authentication modules (PAM). SAS provides starter PAM configuration files for CAS and SAS Studio 5.2 (Basic). You can create an authinfo file for use with PAM in command-line access and batch processing programs to CAS. Credentials for the user ID that runs the program are supplied from the authinfo file. | When you sign in to SAS Studio 5.2 (Basic) from a URL that is similar to https://reverse-proxy-server/SASSudio/, you are prompted for a user ID and password. The associated object spawner asks its host (which is also the host of the SAS Studio 5.2 (Basic) web application) to validate your credentials. That validation enables the object spawner to launch a workspace server for you.  
When you access CAS from SAS Studio 5.2 (Basic), you must authenticate to the host of the target CAS server.  
When you sign in to CAS Server Monitor, you must authenticate to the host of the target CAS server. |
| Direct LDAP authentication | Requests are sent to and processed by your designated direct LDAP provider, unless you configure front-end single sign-on using Kerberos, Open Authorization (OAuth), or Security Assertion Markup Language (SAML).  
Kerberos, OAuth, and SAML are alternate mechanisms for identity verification by the logon service, not alternate sources of user and group information for the identities service.  
**Note:** User and group information is always obtained from your designated direct LDAP provider. | SAS Drive enables you to access the visual interfaces, for example, SAS Visual Analytics or SAS Environment Manager. When you sign in to SAS Drive from a URL that is similar to https://reverse-proxy-server/SASDrive/, a user ID and password are required to authenticate to SAS Logon Manager, using this pattern.  
Before you can submit a command-line request to a general service (for example, the backup service or the transfer service), you must authenticate using this pattern. |
<table>
<thead>
<tr>
<th>Pattern</th>
<th>Description</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host and direct LDAP authentication</td>
<td>Requests are authenticated using both host authentication and direct LDAP authentication. If the <code>servicesBaseUrl</code> option is specified, CAS requires dual authentication.</td>
<td>In a full deployment, dual authentication occurs for access to CAS from SAS Studio 5.2 (Enterprise).</td>
</tr>
<tr>
<td></td>
<td>To facilitate this pattern, use one of these approaches:</td>
<td>In a programming-only deployment, CAS Server Monitor provides a web-based interface for administration.</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that all requests are ultimately processed by the same authentication provider. For example, configure the SAS Studio 5.2 (Enterprise) and CAS hosts to use the same LDAP provider that is designated for direct LDAP authentication requests in your deployment.</td>
<td><strong>Note:</strong> When you access CAS from a web application such as SAS Visual Analytics or SAS Environment Manager, your OAuth token is validated.</td>
</tr>
<tr>
<td></td>
<td>▪ Ensure that each affected user has a single set of credentials that are valid for all applicable authentication providers.</td>
<td></td>
</tr>
</tbody>
</table>

The following high-level conceptual drawings illustrate key points from the preceding table:
**Figure 1** Authentication from SAS Studio or CAS Server Monitor to CAS

Host Authentication

SAS Studio or CAS Server Monitor → Cloud Analytic Services → Host PAM

Dual Authentication: Shared Provider

SAS Studio or CAS Server Monitor → Cloud Analytic Services with servicesBaseUrl → Host PAM

Dual Authentication: Different Providers

SAS Studio or CAS Server Monitor → Cloud Analytic Services with servicesBaseUrl → Host PAM

**Figure 2** Authentication from Other Applications

Default: Direct LDAP

SAS Logon Manager and Identities Service → The direct LDAP provider

Alternative: Front-End Single Sign-On

SAML, OAuth, or Kerberos → SAS Logon Manager and Identities Service → The direct LDAP provider

After you sign in, you have seamless access to SAS Viya and, in some contexts, to external data sources.

For more information, see the following documents:

*SAS Viya Administration: Authentication*

*SAS Viya Administration: Identity Management*
Authorization

Authorization is the aspect of security that determines which resources are available to which users. The SAS Viya authorization layer consists of two authorization systems:

- CAS authorization system
- general authorization system

Each system uses a distinct model to protect a distinct class of resources. The general authorization system is not applicable in a programming-only deployment.

Initial and default access are restrictive:

- Any access that is not granted is implicitly disallowed.
- Predefined objects are protected by predefined rules or access controls.
- Only members of special groups or roles have access to privileged administrative functionality.
- Access to objects that users add is managed by inheritance, other influencing rules, and any direct settings.
- Regular users have limited Write access. They can write to their personal folder, the shared Public folder, and the shared Public caslib.

For more information, see the following documents:

- SAS Viya Administration: Orientation to Authorization
- SAS® Viya Administration: CAS Authorization
- SAS Viya Administration: General Authorization
- SAS Viya Administration: Identity Management

Encryption

Encryption is the aspect of security that protects data by converting it into an unintelligible form in transmission or in storage.

For data in motion,

- In a SAS Viya full deployment, TLS security is provided by default and follows the highest standards. At installation SAS Viya provides self-signed certificates to provide HTTPS access to SAS Drive out of the box. You can increase the encryption strength and coverage by completing additional configuration.
In a SAS Viya Linux programming-only deployment and a Windows deployment, security artifacts are provided to configure TLS security. You can increase the encryption strength and coverage by completing additional configuration.

For data at rest in a new deployment, encryption is not automatically enabled. You can configure encryption of data that is added to PATH, HDFS, and DNFS caslibs.

For more information, see the following documents:

* Encryption in SAS Viya: Data in Motion
* Encryption in SAS Viya: Data at Rest

Web Security

Web security is the aspect of security that deals with securing against certain types of attacks on web applications and utilizing the security features that are available in modern web browsers.

SAS Viya provides properties that are configured, by default, to protect against the web security risks that are listed below. You can disable or change the properties, based on your environment. For example, you might have to configure Cross-Origin Resource Sharing (CORS) to allow origins in your company’s domain. This allows SAS web pages to be included in other web pages inside your company’s network.

For more information about the SAS Viya configuration properties, see the following:

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
<th>Default Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-Origin Resource Sharing</td>
<td>Technique for relaxing the browser same-origin policy, allowing Javascript on a web page to consume a REST API served from a different origin.</td>
<td>The following cross-origin requests are configured:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n User credentials are used</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n All HTTP headers are allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n All HTTP methods are allowed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n Same origins are allowed</td>
</tr>
<tr>
<td>Cross-Site Request Forgery (CSRF)</td>
<td>Prevents attacks that force a user to execute unwanted actions on a web application in which they are currently authenticated.</td>
<td>The following options are configured:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n All requests that use an authenticated HTTP session, except GET and HEAD requests, must pass a CSRF token specified by the server.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n Referrers internal to the deployment are allowed</td>
</tr>
<tr>
<td>Property</td>
<td>Description</td>
<td>Default Settings</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>X-Frame-Options</td>
<td>Avoids clickjacking attacks by making sure that your content is not embedded in other sites.</td>
<td>Same origin</td>
</tr>
<tr>
<td>Content-Security-Policy</td>
<td>Exposes and reduces the risk of data injection and cross-site scripting (XSS) attacks.</td>
<td>default-src 'self'; script-src 'self' 'unsafe-inline' 'unsafe-eval'; img-src 'self' *.sas.com blob: data:; style-src 'self' 'unsafe-inline'; child-src 'self' blob: data: mailto;;</td>
</tr>
<tr>
<td>X-Content-Type-Options</td>
<td>Prevents the browser from interpreting files as something other than what is declared by the content type in the HTTP headers (content sniffing).</td>
<td>nosniff</td>
</tr>
<tr>
<td>X-XSS-Protection</td>
<td>Stops web browser from loading pages when XSS attacks are detected.</td>
<td>1; mode=block</td>
</tr>
</tbody>
</table>

For information about these web attacks, see the following OWASP pages:
- Category:Attack
- OWASP Secure Headers Project
- Cross-Site Request Forgery (CSRF)
- Cross-Origin Resource Sharing

### SAS 9 and SAS Viya

#### Summary

SAS 9 customers continue to benefit from their investment in SAS 9 as they begin to make use of SAS Viya functionality and features. From within familiar SAS 9 interfaces, projects, and code, customers can access the performance enhancements that SAS Viya provides.

- On most hosts, SAS 9.4M5 is tightly integrated with SAS Viya. See [SAS 9.4M5 Integration with SAS Viya](https://support.sas.com/documentation/newinbase/pdf/sas_9_4m5_base.pdf) in *What’s New in Base SAS: Details*. (The exceptions are z/OS and 32–bit Windows.)
- SAS Viya visual web applications share a single sign-on and logout with the SAS 9 environment.
Here are some of the methods for accessing SAS 9 data from SAS Viya:

- In SAS Environment Manager, interactively load data. See [Data Administration: How to (SAS Environment Manager) in SAS Viya Administration: Data](#).
- In SAS Enterprise Guide or SAS Add-In for Microsoft Office (7.13 or later), move data from SAS 9 to CAS. See the topic "Configure Your Environment to Use the Upload to CAS Task" in the [SAS Enterprise Guide or SAS Add-In for Microsoft Office chapter in SAS Intelligence Platform: Desktop Application Administration](#).
- Write code to load data. See [Load Data to a Caslib](#) in [An Introduction to SAS Viya Programming](#).
- If a more seamless method is not available, use SAS/CONNECT for SAS 9 and SAS Viya to move and share data. See the appendix [Sharing Data Between SAS 9 and SAS Viya using SAS/CONNECT in SAS/CONNECT for SAS Viya User’s Guide](#).

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**Note:** Not all deployments and releases include all products and support all methods.

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**Note:** Your site must license and install SAS Viya to access SAS Viya functionality. By default, when you order SAS Viya, you receive SAS Visual Analytics. All analytical procedures are separate licenses: SAS Econometrics Procedures, SAS Optimization Procedures, SAS Forecasting Procedures, SAS Visual Data Mining and Machine Learning Procedures, SAS Statistics Procedures, and SAS Viya Procedures.

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### Considerations: Interacting with SAS 9 Data

#### Manage User-Defined Formats

If you access SAS 9 data from SAS Viya, you must make any user-defined formats available to your CAS session. See [SAS Cloud Analytic Services: User-Defined Formats](#).

### Considerations: Accessing CAS from SAS 9.4M5

#### Find CAS

If a SAS 9.4M5 client session cannot find CAS, make information about the host and port of the CAS server available. For example, add the following line to your SAS Application Server sasv9_usermods.cfg or appserver_autoexec_usermods.sas file:

```
CASHOST={"primary-controller-host-name" "backup-controller-host-name"} CASPORT=port;
```

Here is an example with a CAS backup controller:

```
CASHOST={"mysrv01" "mysrv02"} CASPORT=5570;
```

Here is an example without a CAS backup controller:

```
CASHOST={"mysrv01"} CASPORT=5570;
```

For more information, see [CASHOST= System Option](#).
Authenticate to CAS

If a SAS 9.4M5 client session cannot authenticate to CAS, create an authinfo file, store CAS credentials in the SAS 9 metadata, or use a different authentication mechanism. See *SAS Viya Administration: Authentication*.

Conform to CAS Encryption Requirements

If a SAS 9.4M5 client session does not meet the encryption standards of the CAS server, make an appropriate certificate available. See “Configure SAS 9.4 Clients to Work with SAS Viya” in *Encryption in SAS Viya: Data in Motion*.

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### SAS Visual Analytics Administration

#### Tasks

SAS Viya Administration documentation is applicable to SAS Visual Analytics. Links to specific SAS Visual Analytics topics that deserve special attention are included here:

- Promoting data and report content
- Granting guest access
- Managing user-defined formats
- Loading geographic polygon data as a CAS table
- Loading data for reports
- Making data available to CAS
- Using the reports alert service
- Using the report data service
- Using the report packages service
- Using the report renderer service
- Understanding identity management concepts
- Modifying rules that affect access to functionality
- Using the Maps service to obtain polygon information

#### Samples

Sample data and reports are provided to help you get started.

The sample data is located by default in the `/opt/sas/viya/config/cas/default/samples/`. Access it on the **Data Sources** tab of the Open Data Source window. Double-click on cas-shared-default (or the name of your default CAS server), and double-click on **Samples**.
The six sample data sets are:

COSTCHANGE.sashdat
-provides historical data on vehicle maintenance, to monitor changes in costs

PROMO_EFFECTIVENESS_X_EFFECTS_2.sashdat
-provides data on the impact of a 25% discount on dog food sales

RAND RETAILDEMO.sashdat
-provides retail sales information for customer purchases across multiple sales departments and stores

SW LAKE RT SENSOR WATERQUALITY.sashdat
-provides a wide range of water-quality metrics for lake water

WARRANTY CLAIMS 0117.sashdat
-provides data on warranty claims for car repairs

WATER CLUSTER.sashdat
-provides data on home water consumption

The sample reports are based on some of the sample data. Access these reports by selecting Open from the Menu, and expand: Products SAS Visual Analytics Samples. The three sample reports are:

Retail Insights
-report generated for the RAND RETAILDEMO.sashdat and PROMO_EFFECTIVENESS_X_EFFECTS_2.sashdat sample data

Warranty Analysis
-report generated for the COSTCHANGE.sashdat and WARRANTY CLAIMS 0117.sashdat sample data

Water Consumption and Monitoring
-report generated for the SW LAKE RT SENSOR WATERQUALITY.sashdat and WATER CLUSTER.sashdat sample data