

Best Practices and Approach for Modernizing to SAS[®] Viya[®]

The SAS[®] Viya[®] Advantage

Where time is money, SAS Viya saves you both. With our data and AI platform, you can understand what's happening with your data now, predict how to pivot seamlessly, and make progress faster.

SAS Viya delivers a cloud-native and cloud-agnostic AI and analytics platform. SAS offers a range of cloud deployment options so you can use SAS the way that works best for your business—SAS-managed or self-managed. SAS Viya is designed to scale up or down based on your needs, reducing operational costs.

Moving to SAS Viya provides many benefits, including the ability to:

- Leverage new analytical techniques
- Improve performance
- Move faster and enhance your SAS experience
- Empower productivity with a common user interface
- Build trust and transparency while identifying areas of potential risk

Moving from SAS 9 to SAS Viya is more than a migration—it is a modernization effort. This document outlines recommendations and best practices based on real-world customer experiences.

Customer Experiences and Keys to Success

Several SAS customers spoke at SAS Innovate 2024 about their move to SAS Viya. All the speakers viewed their move to SAS Viya as a modernization project that included a migration. The central themes highlighted the importance of planning and change management.

A successful move from SAS 9.4 to SAS Viya will include the following phases:

1. Planning
2. Deployment
3. Migration
4. Adoption, Operations, and Maintenance

A modernization effort such as this can be transformative and with that comes a lot of change. Change is likely to impact many people and can potentially disrupt business operations. Therefore, it is important to know what and who will be affected and be proactive in change management strategies throughout the entire project.

The remainder of this document focuses on recommendations and best practices based on real-world customer experiences.

Planning

Activities in the planning phase are designed to ensure that a complete picture of your organization's current situation is understood in detail—from the architecture currently in place and its performance to the assets that reside within or are related to your environment.

During this phase of your modernization project, you should first assess your SAS 9.4 environment, perform an environment audit, and then plan several aspects:

- Architecture and infrastructure
- Security requirements
- Software deployment
- Content to migrate
- Migration approach and roadmap
- Enablement and adoption, and operations and maintenance

Throughout your planning phase, the following will help you be successful:

- Identify what you are trying to achieve by moving to SAS Viya.
- Decide what milestones and success criteria you need to go from one phase to the next.
- Assign a project manager/owner for the modernization project to drive the project forward and make decisions.
- Define a process for when changes need to be made during the project.
- Prepare a RACI matrix for the entire modernization project so you have the right people involved as needed.

Planning these in advance will save you time and potential rework.

SAS 9.4 Content Assessment

To prepare for a move to SAS Viya, you first need to understand what your SAS 9.4 environment contains and how it is being used.

[SAS 9 Content Assessment](#) is a free collection of applications designed to help you understand your SAS 9.4 deployment and content, gather and prepare SAS 9.4 content for migration, and import SAS 9.4 content. Specific applications are designed to thoroughly analyze SAS 9.4 content for compatibility, optimization, issues, and modification.

Plan to execute the portions of the Content Assessment that are relevant to your organization during the planning phase. At a minimum, you should run the following:

- Inventory Application
- Profile Application

- Gather SAS Code Application
- Code Check Application
- Publish Application (used to compile results, not assess your environment)

Customers have found it helpful to run the Content Assessment more than once during the modernization as things change. Running the Content Assessment more than once informs you over time about how content will migrate and what is compatible or incompatible. What is incompatible reduces over time as updates to SAS Viya software are released. This may also inform you about how to structure your migration. Some customers made SAS 9.4 processes with incompatibilities a lower priority, and by the time they were ready to migrate them, the incompatibilities no longer existed.

You should use results from the Content Assessment in the following ways:

1. Work with SAS users to decide what content to migrate.
2. Work with SAS users to determine content priority.
3. Decide if and how to phase out the migration (by business unit, project, business project/process, compatibility with SAS Viya, all at once, or some other method).
4. Determine what will need to be remediated (this informs the Adoption phase).

There are different options for viewing the output from the various applications. There are data sets and CSV files created that you can view and analyze on your own, but SAS has developed reports in SAS Visual Analytics to assist with the review and interpretation of the results. If you have SAS Visual Analytics on SAS Viya 3.5 or SAS Viya 4, a SAS administrator can import the SAS Content Assessment output data and pre-built reports. If you do not have SAS Visual Analytics in a SAS Viya environment, you can pass the outputs to your SAS Team, and we will provide visualizations to you for easy consumption.

Architecture and Infrastructure

To determine your architecture and infrastructure needs, work with your Account Executive and Sales Engineer on these essential activities:

- Conduct business interviews to identify and understand all critical business processes that utilize SAS 9.4.
 - Do you need to use open-source languages like Python or R?
 - What open-source packages need to be installed?
 - Will you execute your open-source code from inside or outside of SAS Viya?
 - Do you need to integrate Microsoft Access?
 - Do you need to integrate Office 365?
 - Do you plan to integrate SAS Enterprise Guide?
 - Do you plan to integrate Git?
 - Should your SAS Viya environment be open to the internet (e.g., for making API calls to download data or other content)?
 - Do you need the public to be able to access any SAS content, such as dashboards?

- What types of statistical models are in use? (Some models may impact the hardware required.)
- To ensure the design of your SAS Viya environment will be fit for purpose, conduct a criticality assessment of business processes that use SAS.
- Determine where SAS Viya software will reside (Microsoft Azure, Amazon Web Services, SAS Cloud, or on-premises). For more details, see the [Cloud Migration Considerations](#) section.
- Determine how many SAS Viya environments you need.
 - A general best practice when making changes in any environment or with any application is to have at least two separate environments: Development (DEV) and Production (PROD).
 - You may also want a Test (TEST) environment that mirrors PROD where User Acceptance Testing (UAT), Internal Acceptance Testing (IAT), and Quality Assurance (QA) can be performed without the risk of damaging the development version or your final production version.
- What are your data sources? Will you move data to the cloud?
- Decide where SAS data sets and other SAS content will be stored.
- Conduct a sizing exercise to ensure your new Viya environment is fit for its purpose:
 - Determine how many GB or TB of data you have in SAS data sets and, if possible, the growth rate.
 - What is the largest input and output data set for advanced analytics, such as forecasting, modeling, cluster analysis, etc.?
 - Determine the number of SAS users who are doing advanced analyses, such as forecasting, modeling, cluster analysis, etc.
 - Determine the number of SAS users who are doing standard (i.e., not advanced analytics) SAS programming.
 - Determine the number of users who are simply consuming the output from SAS processes.

Cloud Migration Considerations

SAS only provides part of the solution for modernization. Customer skills and existing cloud infrastructure needs should also be considered, as well as data architecture related to Kubernetes and an overall data strategy.

For government agencies, most major public cloud platform providers (Microsoft Azure, Amazon Web Services) have recognized unique needs to operate within government-specific ecosystems. This has been addressed by building government-dedicated operational regions in-country. These government cloud (aka GovCloud) regions ensure full government certification (i.e., FedRAMP, Impact Level) of the services within as each service is migrated intra-region.

SAS also recognized the wave of microservice cloud deployments moving to containerized fashions and, more specifically, to Kubernetes. Kubernetes is to proper containerized infrastructure as SAS Viya is to proven analytics. Kubernetes is an open-source container orchestration platform that brings a series of benefits to application deployments: self-healing, zero downtime maintenance, and autoscaling automation, among others.

Kubernetes can be hosted in a variety of ways. Public cloud (Azure AKS or AWS EKS) managed services significantly reduce the complexity of managing/administering the components of a Kubernetes cluster. These public cloud services also offer a suite of monitoring/maintenance/security features native to the public cloud platform. Other options include RedHat OpenShift and an organically built Kubernetes cluster.

An organization’s Kubernetes administration experience is paramount for successfully maintaining a deployment of the latest releases of SAS Viya. A sound understanding of Kubernetes components such as pods, services, deployments, ingress, policies, DNS, networking, storage, and security is necessary. Beyond Kubernetes, an understanding of containerized application deployment needs to be within an organization’s personnel skillset. Maintenance requirements depend on the style of Kubernetes cluster deployment; therefore, there must be a thorough platform-specific understanding of proper Kubernetes maintenance as well. (See the Deployment section for more notes regarding the necessary skills to deploy, update, and manage SAS Viya software.)

Notes for Non-SAS Hosted Environments

If your SAS Viya environment will be SAS-hosted, the notes in this section do not apply, as SAS’s hosting division will be responsible for provisioning the infrastructure.

If you are using your own cloud provider or installing on-premises, you will be responsible for the provisioning, management, and maintenance of your infrastructure. The table below outlines the high-level topics you will need to consider. We highly recommend you view the system requirements in the [SAS Viya Platform Operations](#) documentation online.

Table 1: High-level Topics for Non-SAS Hosted Environments

System Requirements	Included Information
Virtual Infrastructure Requirements	Cluster requirements: <ul style="list-style-type: none"> • Virtual Private Cloud and network • Kubernetes cluster • Kubernetes client machine • Nodes • Cluster ingress • Load balancers • Proxy environment Firewall ports
Platform-Specific Requirements	Cluster requirements for Azure, AWS, Google Cloud, Red Hat OpenShift, and Open-Source Kubernetes
Hardware and Resource Requirements	Storage requirements: <ul style="list-style-type: none"> • I/O throughput • Disk space • Persistent storage volumes • Persistent volumes for applications • CAS server and Programming Runtime Environment • File system/shared storage

System Requirements	Included Information
	Encrypted file systems GPU
Sizing	Recommendations for Azure, AWS, Google Cloud, OpenShift, and Open-Source Kubernetes. (We recommend going through a sizing exercise with SAS to get customized sizing requirements.)
Data Source Requirements	Requirements for Kubernetes customization for supported data sources.
Security Requirements	SAS Viya Security: <ul style="list-style-type: none"> • TLS • Pod standards Identity provider and authentication: <ul style="list-style-type: none"> • Supported methods • Host authentication • LDAP requirements • SCIM requirements • Kerberos requirements
Requirements for User Accounts and Services	Cluster resources and roles User accounts Service accounts
PostgreSQL Requirements	Internal vs external PostgreSQL Storage requirements Common data store requirements
OpenSearch Requirements	Internal vs external OpenSearch instances Virtual memory resource modifications Storage Configuration requirements
Product-Specific Requirements	SAS software and platform compatibility GPU capabilities Microsoft 365 Requirements for various SAS software
Requirements for Optional Features	Logging and monitoring Integrating Open Source Command-Line Interface SMTP server

Authorization Model

During the planning phase, it is critical to design and document the authorization model for SAS Viya applications, the SAS Content folders, external file storage (NFS, Azure BLOB, etc.), and data libraries. This will set you up for success and mitigate delays in moving SAS users into the SAS Viya environment.

SAS Viya has two types of authorization systems: General authorization and CAS authorization.

- General authorization is used to manage access to content in SAS Viya (e.g., folders and reports) and functionality (e.g., SAS Viya applications, features, and services).
- CAS authorization is used to manage access to caslibs and data tables.

As you design your authorization model, there is a key question you will need to answer before deployment. This involves how various CAS actions, such as deleting a table from memory or running a batch job, are performed. **By default, all CAS actions are taken by a CAS service account.** If this is not sufficient for audit purposes and you need CAS actions to be taken by the individual user account, you will need the CASHostAccountRequired custom group to be enabled. When you enable the CASHostAccountRequired custom group for users who are members of the CASHostAccountRequired group, the CAS server process runs under the requesting user's individual host account rather than under the shared CAS service account.

It is best practice to plan for who will assist with testing security and data access. You will need to include people who have the appropriate access. It is recommended that SAS superusers/champions be identified for early access and testing assistance.

Deployment

If your SAS Viya environment is going to be SAS-hosted, the notes in this section and subsections do not apply, as SAS's hosting division will be responsible for deploying the software.

If you are using your own cloud provider and are performing your own software deployment, the notes in this section highlight some important items for your deployment planning activities.

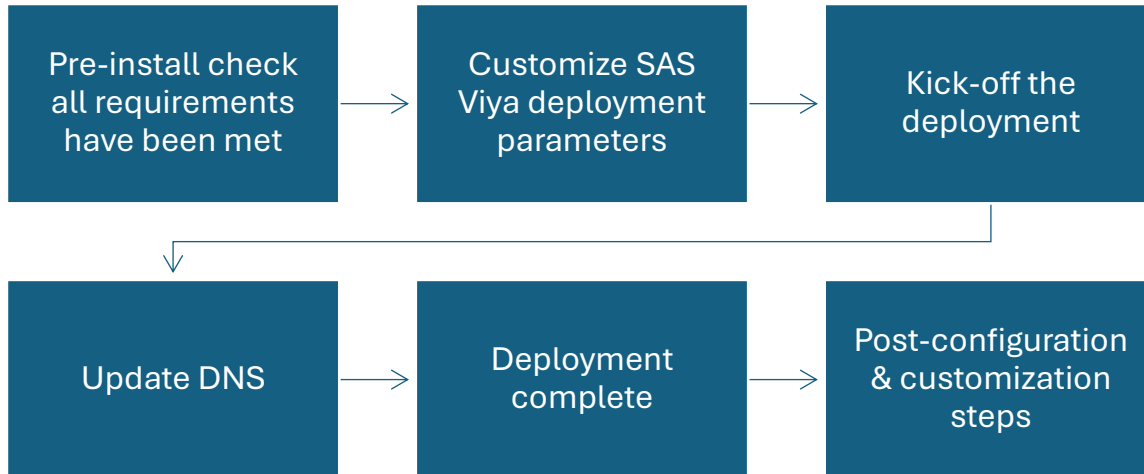
To successfully deploy, update, and manage SAS Viya software, you will need staff with experience or knowledge of the following:

- Experience with the cloud provider and its associated managed Kubernetes technology (AKS, EKS, GKE, etc.) that your site is using to deploy SAS Viya 4
- Experience with Linux commands and administration
- Experience with the following Kubernetes concepts and tasks:
 - Declarative deployments by using manifests and kubectl
 - Using kustomize and kustomization file to customize your deployment
 - Kubectl commands to perform operations: kubectl apply, kubectl label, kubectl taint, etc.
- Depending on the deployment method that you use, experience with the following technologies:
 - Docker
 - Kubernetes operator and custom resource definition
 - Ansible/Terraform

There are Infrastructure as Code (IaC) projects on GitHub (see the [Additional Resources](#) section for links) that can automatically provision required infrastructure to deploy SAS Viya in Azure, AWS, GCP and open-source Kubernetes (not available for Red Hat OpenShift or GKE on VMware).

The high-level deployment process that occurs after the infrastructure is ready is shown in the figure below.

Figure 1: High-Level Deployment Process



There are four different ways to deploy the SAS Viya software:

1. Manual (very customizable, but high effort)
2. SAS Viya 4 Deployment as Code (DaC) content in GitHub
3. SAS Viya Platform Deployment Operator
4. SAS-Orchestration Command (uses Docker images and can be run outside of the SAS Viya cluster. Useful when automating multiple deployments.)

See the [Documentation](#) section for links to documentation regarding deploying SAS Viya.

Post-Deployment Customization and Configuration

After the software is deployed, post-installation configuration tasks must be performed. You should review the [Installation](#) section and the [Post-Installation Tasks](#) section of the SAS Viya Platform Operations documentation online for current information to help you plan the software deployment.

Required customizations include:

- TLS
- Host and port for cluster ingress
- CAS
- PostgreSQL
- OpenSearch
- Persistent volume claims

Optional customizations include:

- Using a mirror registry (highly recommended)
- Configuring OpenShift
- Forward proxy settings (post-configuration steps are required if you are using a forward proxy)
- Container security
- SAS image staging
- Configuring high-availability
- SAS/CONNECT settings
- Configure SAS Programming Run-Time Environment
- Configure SAS Workload Orchestrator
- Set default locale and encoding
- Configure open-source integration points
- Configure SAS/ACCESS

Required post-installation configuration tasks include:

- Configure identities (LDAP or SCIM)
- Configure files service
- Configure log and metric monitoring
- Configure CAS

There are also required configurations that correspond to various SAS software solutions, Microsoft 365, open-source software, and Guest access (i.e., access to any SAS Visual Analytics dashboards or reports that will be open to the public).

Before performing a migration, you should also configure data access and implement the authorization model for SAS Content folders, NFS/external storage folders, and software application access.

Log and Metric Monitoring

You can use your preferred monitoring technology to monitor your SAS Viya platform deployment. If you do not have a preferred technology, SAS provides solutions for monitoring and logging that are based on widely used open-source monitoring technologies, including Prometheus, Grafana, and OpenSearch. (See the [Additional Resources](#) section for a link to GitHub.)

Migration Approach and Roadmap

This section highlights some key considerations for planning your migration, but we highly recommend you read through the official documentation on [content migration](#).

When you migrate from SAS 9.4 to SAS Viya 4, you can certainly bring in all your legacy SAS 9.4 content, but you may want to take this opportunity to determine what content is essential for current business processes. Customers have found it useful to work with the SAS users to assess and prioritize existing SAS content when determining what to migrate.

Table 2 lists some key considerations when planning a migration.

Table 2: Key Considerations for Migration Planning

Item to Consider	Notes
Number of SAS Users	If you have a large SAS user base, some customers find it helpful to do an initial migration with a small group of users, such as one business unit, one project, or one set of superusers/champions. This will help you learn as you go and inform the subsequent migration(s) with additional/remaining SAS users.
Order of Operations	<p>The order of operations matters:</p> <ol style="list-style-type: none"> 1. System information 2. Data libraries (You may not want to simply migrate. Caslib names must be unique, and best practice is to use 8 characters or less for caslib names. If you have repeated library names or librefs in SAS 9.4 or have libraries with long names, you may want to create caslibs directly in SAS Viya and not migrate.) 3. Data tables 4. SAS programs, SAS Stored Processes, reports, and other content
Migrating Data	If you are moving data, plan how and when. Take into consideration how validation will occur and if you will need to re-sync data between your SAS 9.4 and SAS Viya environments so analysts can run analyses in both environments and compare results.
Staging SAS Content	<p>You should plan an area for staging the SAS content that will be migrated (note this does not include SAS data sets).</p> <p>By copying your SAS content to a staging area, you facilitate running the Modify SAS Code application of SAS Content Assessment during your migration. The Modify SAS Code application modifies hard-coded paths in SAS code. To run the application, you point it to a location where the SAS code resides. Having the SAS code in one location (there can be subfolders) makes this process simpler.</p>
Modify SAS Code Application and Mapping Target File Paths	<p>Since you are moving to a new environment and SAS Viya will not be able to read local network drives, many of the hard-coded paths in SAS code will need to be remediated. The Modify SAS Code application, which is part of SAS Content Assessment, was developed to assist in this process by automating the update of hard-coded paths in SAS code. This reduces the remediation effort needed by SAS programmers/developers.</p> <p>Knowing the target paths for the new environment is a key prerequisite for running the Modify SAS Code application. As part of this process, you will need to develop a mapping file that lists the old path and the new path, so include this effort in your migration plan.</p>
Encoding of SAS Data Sets	SAS Viya requires SAS data sets to be in UTF-8. If you are migrating SAS data sets that are not in UTF-8, you should include time to change the encoding. (On average, it takes approximately 14 hours to transcode 1 TB of data. Note that this is an estimate based on our experience. It may take more or less time in your migration.)

Item to Consider	Notes
SAS Catalogs	<p>SAS Catalogs can contain several types of SAS file types, not all of which can be migrated to SAS Viya. SAS <i>Format</i> catalogs can be exported and imported. SAS <i>Macro</i> catalogs and SAS <i>Source</i> catalogs must be rebuilt in SAS Viya.</p> <p>SAS Content Assessment counts all the SAS catalogs it finds, regardless of what entry types the catalogs contain. If your Content Assessment reveals that you have many SAS Catalogs, you will need to work with the SAS users to better understand what is contained in the catalogs and what will migrate versus what will need to be rebuilt.</p>
Knowledge Transfer User Acceptance Testing, and Code Remediation	<p>To support user acceptance testing (UAT), you should plan the following:</p> <ul style="list-style-type: none"> • How you will launch the new SAS Viya environment to SAS users (by business unit, project, migrated content owners, all at once, etc.) • Develop a “How to Access the SAS Viya Environment” document for all SAS users (current and future) • A reference of some sort to show users where to find their content. For example, an Excel file that lists the inventory of content migrated, who owns what, the original source location, and the target location in the new environment. • What do you consider UAT: <ul style="list-style-type: none"> ○ Simply verify content was migrated. ○ Verify that migrated content runs successfully in the new environment. ○ How long should SAS users have to adjust their SAS code to run successfully in the new environment if that is part of UAT? • How will SAS users communicate issues to the migration team? <p>Some SAS code will need to be updated to run in SAS Viya. In addition to hard-coded paths, Content Assessment results will inform you about what code is incompatible and will need to be remediated.</p> <ul style="list-style-type: none"> • How many incompatibilities are there? • Who will train the SAS users on what and how to modify? • How will training be conducted?
Job/Flow Scheduling	Include time in your migration plan for scheduling batch jobs/flows.
Validation	As part of your planning process, you should consider how long you might want to run SAS 9.4 and SAS Viya side by side to ensure that all critical business processes have been moved over to SAS Viya and are running.
Post-Migration Support	After migrating content, provide a period of support for SAS users.

Adoption, Operations, and Maintenance

After the software has been installed and configured and the content has been migrated, the next steps are to focus on adoption, operations, and maintenance.

Enablement and Adoption

It is important to plan for enablement and adoption before you get to the migration step. In general, your initial must-have objectives are to ensure that your SAS users know how to use SAS Viya (including working with data in CAS) and that all critical SAS business processes are running in SAS Viya.

Beyond that, you should consider what you are trying to achieve by moving to SAS Viya. During this planning phase, think through what will be needed to meet those goals:

- Optimization of specific SAS processes
- Training for SAS administrators to effectively manage and maintain your new SAS Viya environment
- Training for data engineers on programming in SAS Viya and working with data in memory
- Training for business analysts/report developers on SAS Visual Analytics to streamline reporting processes
- Training for data scientists or machine learning engineers to leverage new analytical techniques

Also, think about what constitutes success and how you might measure that.

SAS provides several resources (Table 3) to enable your SAS users to take full advantage of SAS Viya.

Table 3: SAS Resources

Resource	Description
Live Product Overview Sessions	Introductory knowledge transfer sessions to increase familiarity of core SAS Viya capabilities, from intuitive graphical interfaces to programming. Available live or remote.
Virtual Learning Center	Your SAS license includes access to continuously updated content to access when needed. Includes e-Learning, web tutorials, resources, and documentation. Available on-demand via web portal.
Office Hours	An opportunity to meet with a SAS expert to ask questions in an informal setting. Scheduled as needed.
Adoption Workshops*	Bridge the gap between the class and the office. Reinforce concepts learned using the context of use cases. Can be delivered in your SAS Viya environment.
Formal Education Courses*	Immersive web-based learning with a live instructor to help you accelerate your ability to use SAS. Deeper dive than product overview sessions.

Resource	Description
User Coaching*	A one-on-one opportunity to ask questions and work with a SAS expert.
Additional Resources	SAS Webinars SAS Communities SAS Blogs SAS on YouTube SAS Technical Support
* May be recommended based on skill gap and may incur additional costs	

Operations and Maintenance

When planning for operations and maintenance, you should develop a plan for keeping up to date with supported SAS Viya software and Kubernetes versions on both the Cloud provider and SAS Viya.

SAS Viya provides two release cadences: Stable Releases and Long-term Support (LTS). Talk with your SAS sales team about choosing the right release cadence for you.

Artifacts

Throughout your modernization project, it is best practice to have a minimum set of documents to support the various activities and implementation, many of which build upon each other, starting with requirements:

1. Requirements from business/SAS users (including all databases, websites, etc. from which data are extracted or to which data are written)
2. Architecture design
3. Data connection details
4. Authorization model for SAS Content folder, Caslibs, NFS mount/external file storage
5. Migration inventory, including target paths and file names
6. Test plan and log for test results
7. Training and enablement:
 - a. How users access the SAS Viya environment and where they save work.
 - b. How users connect to the data.
 - c. What code remediation is expected (informed by incompatibilities in Content Assessment)?

Change Management

Change management is another key part of modernizing to SAS Viya. We recommend a structured, methodical approach to change management, ensuring changes to your environment have been thoroughly assessed, communicated, and agreed to throughout your organization. It is best to establish, in advance, who is authorized to initiate a change request, who can receive change

requests, and who can authorize change requests after a thorough analysis of impacts on the project environment.

As part of your change management process, regular communication with the SAS user community helps decrease uncertainty and improve collaboration and trust. To feel engaged, people need to understand “why” the changes are happening and understand how it will positively affect their work. Once people understand the reasons behind a change, they are more likely to support the transition.

Communication between organizations and their internal stakeholders should also occur before migration planning begins and continue through the entire framework. Intraorganizational communication should include asking users and administrators about their goals and concerns before engaging with the SAS Team, as well as throughout the framework phases through internal touchpoints.

Customers found the following to be extremely helpful:

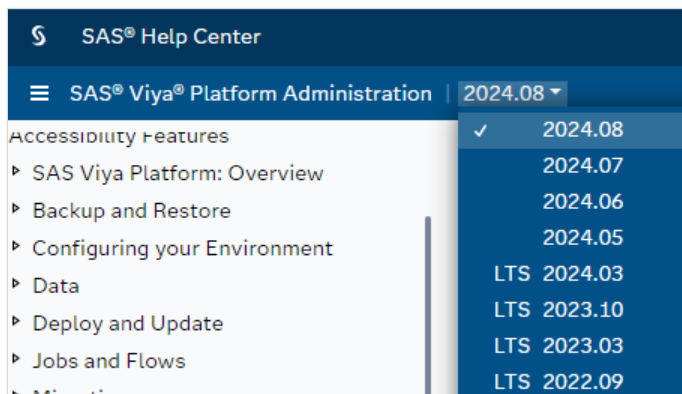
- **Initiate early engagement with SAS users**, whether through the development of an internal SAS User Group or the identification of a set of superusers/champions.
- **Meet regularly with the SAS user community** once or twice a month.
- **Provide familiarization training** and demos of the software by engaging with SAS through SAS Education or Customer Success.
- **Utilize a temporary SAS Viya environment** using SAS’s Pay-as-you-go offering to enable SAS users to learn the features and get an early view of the software.
- **Establish a feedback loop** for SAS users by evaluating their business needs and collecting feedback about the software to send back to SAS.

Additional Resources

Documentation

When viewing documentation for SAS Viya, check the version and change as needed.

Figure 2: Viya Documentation Version



Assessment and Planning

SAS 9 Content Assessment: [SAS Help Center: SAS 9 Content Assessment](#)

Migration: [SAS Help Center: Migrating from SAS 9.4](#)

System requirements and software deployment: [SAS Viya Install Center | SAS Support](#)

Monitoring and Logging: [SAS Help Center: Welcome to SAS Viya Monitoring for Kubernetes](#)

Deployment

System requirements and software deployment: [SAS Viya Install Center | SAS Support](#)

Infrastructure as Code (IaC) GitHub projects:

- [IaC for AWS](#)
- [IaC for Azure](#)
- [IaC for GCP](#)
- [IaC for Open Source Kubernetes](#)

Deployment as Code (DaC) GitHub project: [GitHub - sassoftware/SAS Viya4-deployment](#)

Deployment: [SAS Help Center: SAS Viya Platform: Deployment Guide](#)

Post-Installation Required Customizations: [SAS Help Center: Required Customizations](#)

Post-Installation Optional Customizations: [SAS Help Center: Optional Customizations](#)

Post-Installation Tasks: [SAS Help Center: Post-Installation Tasks](#)

Open-source monitoring stack: <https://github.com/sassoftware/viya4-monitoring-kubernetes>

Security in SAS Viya: [SAS Help Center: Security Administration](#)

CAS Authorization Host Access: [SAS Help Center: CAS Authorization: Host Access](#)

CASHostAccountRequired Custom Group: [SAS Help Center: Identity Management Reference](#)

Migration

Modifying hard-coded paths in SAS content: [SAS Help Center: Executing the Modify SAS Code Application](#)

Migration: [SAS Help Center: Migrating from SAS 9.4](#)

SAS Professional Services

Expert-led services from SAS US Professional Services can assist with some or all of your modernization effort.

Plan

- Execute SAS Content Assessment applications, analyze results
- Make recommendations for and design architecture and infrastructure

Deploy

- Install and configure SAS Viya
- Gather requirements for and design authorization model
- Implement authorization model for SAS Viya
- Configure data access
- Provide ongoing SAS Viya administration, monitoring, and tuning support

Migrate

- Make recommendations for and plan migration approach
- Execute the migration plan
- Provide UAT support

Adopt

- Identify use cases to leverage CAS
- Provide hands-on user support for code adjustments and optimization
- Provide knowledge transfer for SAS Users and administrators
- Schedule batch job processes
- Partner with SAS Customer Success to drive SAS user enablement and adoption

Engage with your SAS Account Executive or Customer Success Manager to discuss opportunities to work with SAS US Professional Services.