SAS® Visual Analytics 7.5: Installation and Configuration Guide (Distributed SAS® LASR™)
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Using This Book

Audience

This book documents the installation and initial configuration of SAS Visual Analytics for a distributed SAS LASR Analytic Server on an analytics cluster for a traditional, on-premises deployment. For information about SAS Visual Analytics in the cloud, see SAS Cloud documentation.


This book covers tasks that are required after you and your SAS representative have decided what software you need and on what machines you will install the software. At this point, you can begin performing some pre-installation tasks, such as creating operating system user accounts and designating the ports that you will use during installation.

Unless you are deploying a non-distributed SAS LASR Analytic Server, you also need to refer to SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

Documentation Conventions

SAS Installation Directory

The phrase SAS installation directory refers to a host path. (The SAS installation directory is sometimes referred to as SAS Home.) For example, C:\Program Files\SASHome.

SAS Configuration Directory

The phrase SAS configuration directory refers to a host path that includes a configuration name and level. For example, C:\SAS\Config\Lev1.

For more information, see “Overview of the Configuration Directory Structure” in SAS Intelligence Platform: System Administration Guide.
What’s New in Installation and Configuration for SAS Visual Analytics 7.5

Overview

The SAS Visual Analytics: Installation and Configuration Guide (Distributed SAS LASR) explains how to install and initially configure SAS Visual Analytics. Installation and configuration has the following changes and enhancements:

- Important information about upgrading SAS Visual Statistics content from earlier releases
- Required task for HDFS browsing
- Support of more fonts for printing to a PDF
- Optional post-deployment task for SAS Web Server

Upgrade SAS Visual Statistics

You cannot directly migrate an earlier release of SAS Visual Statistics to SAS Visual Analytics 7.5.

To migrate the content of an earlier release of SAS Visual Statistics (such as 6.4 or 7.1) to SAS Visual Analytics 7.5:

2. Upgrade explorations to SAS Visual Analytics 7.5.

For more information, see “What about SAS Visual Statistics?” on page 135

Post-Deployment Task for HDFS Browsing

If you have co-located HDFS and a compute tier on Windows, you must perform a post-deployment task to enable the functionality of the HDFS tab.

For more information, see “Post-Deployment Tasks for Co-located HDFS” on page 114.
Support of Additional Fonts

You can add custom fonts for printing to a PDF.

For more information, see “Make More Fonts Available” in SAS Intelligence Platform: Middle-Tier Administration Guide

Post-Deployment Task for SAS Web Server

A header is configured by default for the SAS Web Server in the sas.conf file. This header does not allow a user to embed a SAS Visual Analytics report into other application using an iframe. If the user tries to, an error message is displayed. To enable this functionality, you can perform post-deployment steps for the SAS Web Server. For more information, see “Post-Deployment Tasks for SAS Web Server” on page 118.
What Is SAS Visual Analytics?

SAS Visual Analytics is an easy-to-use, web-based product that leverages SAS High-Performance Analytics technologies. SAS Visual Analytics empowers organizations to explore huge volumes of data very quickly to identify patterns and trends and to identify opportunities for further analysis.

SAS Visual Analytics includes the following:

- A non-distributed SAS LASR Analytic Server or a distributed SAS LASR Analytic Server with SAS High-Performance Analytics environment root node and worker nodes.
- A co-located supported Hadoop data provider.
- A SAS Visual Analytics server tier consisting of the following:
  - SAS LASR Analytic Server monitor (distributed)
  - SAS Visual Analytics High-Performance Configuration
  - SAS Information Retrieval Studio
  - SAS Workspace Servers
  - SAS Pooled Workspace Servers
  - SAS Stored Process Servers
  - SAS/ACCESS Interface to Hadoop
  - SAS High-Performance Computing Management Console (distributed)
A SAS Visual Analytics middle tier consisting of the following:

- SAS Visual Analytics Hub
- SAS Visual Analytics Explorer
- SAS Visual Statistics
- SAS Visual Analytics Designer
- SAS Visual Data Builder
- SAS Visual Analytics Graph Builder
- SAS Visual Analytics Report Viewer
- SAS Visual Analytics Administrator
- SAS LASR Authorization Service
- SAS Visual Analytics Transport Service
- Search Interface to SAS Content
- SAS Remote Services

When you license SAS Visual Analytics with the non-distributed SAS LASR Analytic Server, the SAS High-Performance Analytics environment and the co-located data provider are not provided.

For more information about SAS Visual Analytics, see the following documents:

- *SAS LASR Analytic Server: Reference Guide*
- *SAS Visual Analytics: Administration Guide*
- *SAS Visual Analytics: Overview*
- Help and tutorials integrated into SAS Visual Analytics Apps

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**SAS Visual Statistics Installation Instructions**

If SAS Visual Statistics is part of your order, then when you perform the steps in this document for installing and configuring SAS Visual Analytics, you are also installing and configuring SAS Visual Statistics.

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**Where Do I Locate My Analytics Cluster?**

**Overview of Locating Your Analytics Cluster**

If you are planning to use a distributed SAS LASR Analytic Server, then you need to establish an analytics cluster. An analytics cluster is a high-performance environment that is characterized by massively parallel processing (MPP) used to perform analytic tasks on big data residing in a distributed data storage appliance or in a Hadoop cluster.

You have two options for where you locate your SAS analytics cluster.

- It can be co-located with your supported Hadoop data store.
- It can be remote from your data store.
When the SAS analytics cluster is separated (remote) from your data store, you have two options for data transfer.

- You can perform a serial data transfer using SAS/ACCESS Interface to Hadoop.
- You can perform a parallel data transfer using SAS/ACCESS Interface to Hadoop with SAS Embedded Process.

The topics in this section contain basic diagrams that describe each option for your analytics cluster location.

- co-located with your supported Hadoop data store
- remote from your data store
  - any supported Hadoop (serial connection)
  - any supported Hadoop (parallel connection)

Where you locate your analytics cluster depends on a number of criteria. Your SAS representative knows the latest supported configurations and can help you determine which cluster location works best for your site.

**Co-located with Your Data Store**

The following figure shows the analytics cluster co-located with a supported Hadoop data store:

*Figure 1.1 Analytics Cluster Co-located with a Supported Hadoop Data Store*

*Note:* For deployments that access SASHDAT tables exclusively, SAS/ACCESS Interface to Hadoop and SAS Embedded Process are not required.

If you choose to co-locate SAS Visual Analytics with Hadoop, the following vendors are supported:
- Apache Hadoop
- Cloudera Hadoop
- Hortonworks Data Platform Hadoop
- IBM BigInsights Hadoop
- MapR Hadoop
- Pivotal HD Hadoop

For the complete list of supported Hadoop vendors and their versions, see https://support.sas.com/resources/thirdpartysupport/v94/hadoop/hadoop-distributions.html.

*Note:* To co-locate SAS Visual Analytics with Hadoop, make sure that you select **Hadoop (co-located HDFS)** when running the SAS Deployment Wizard. For more information, see “SAS Visual Analytics Data Provider”.

**Remote from Your Data Store (Serial Connection)**

The serial connection between the analytics cluster and your data store is achieved by using SAS/ACCESS Interface to Hadoop. SAS/ACCESS Interface to Hadoop is orderable in a deployment package that is specific for your data source. For more information, see the *SAS/ACCESS for Relational Databases: Reference*.
The following figure shows the analytics cluster running on a supported Hadoop cluster using a serial connection to your remote data store:

**Figure 1.2  Analytics Cluster Remote from Your Data Store (Serial Connection)**

If you choose to use SAS Visual Analytics with a serial connection to a remote data source, SAS/ACCESS supports the following vendors:

- Data storage appliance vendors:
  - Greenplum
  - HANA
  - Oracle
  - Teradata

- Hadoop vendors:

*Where Do I Locate My Analytics Cluster? 5*
- Cloudera Hadoop
- Hortonworks Data Platform Hadoop

*Note:* Data tables that SAS Visual Analytics loads serially can originate from a variety of sources, not just the ones listed here. If a SAS session can read a table from an ODBC-compliant database, a SAS data set can be read in a serial fashion into an analytics cluster.

*Note:* To use SAS Visual Analytics with a serial connection to a remote data source, make sure that you select your data provider with SAS Embedded Process. If your data provider is not listed, then select **Hadoop (with SAS embedded process)** when running the SAS Deployment Wizard. For more information, see “SAS Visual Analytics Data Provider”.

**Remote from Your Data Store (Parallel Connection)**

Together, SAS/ACCESS Interface to Hadoop and SAS Embedded Process provide a high-speed parallel connection that delivers data from your data source to the SAS High-Performance Analytics environment on the analytics cluster. These products are in a deployment package that is specific for your data source. For more information, see the SAS 9.4 In-Database Products: Administrator’s Guide.
The following figure shows the analytics cluster running on a supported Hadoop cluster using a parallel connection to your remote data store:

**Figure 1.3** Analytics Cluster Remote from Your Data Store (Parallel Connection)

If you choose to use SAS Visual Analytics with a parallel connection to a remote data source, SAS Embedded Process supports the following vendors:

- Data storage appliance vendors:
  - Greenplum
Deploying SAS Visual Analytics

Overview of Deploying SAS Visual Analytics

The following list summarizes the steps required to install and configure SAS Visual Analytics:

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. (Optional) Deploy the SAS High-Performance Analytics infrastructure.
4. Create users and groups and designate ports.
5. Deploy required third-party software.
6. Deploy the servers and middle tier.

Note: To use SAS Visual Analytics with a parallel connection to a remote data source, when running the SAS Deployment Wizard, make sure that you select your data provider with SAS Embedded Process. If you are using HANA or Oracle, make sure that you select Greenplum (with SAS embedded process). If your data provider is not listed, then select Hadoop (with SAS embedded process). After running the SAS Deployment Wizard, you must manually configure your provider. For more information, see “SAS Visual Analytics Data Provider”.

Chapter 2
Creating a SAS Software Depot

Deployment Process Overview: Step One

One prerequisite for deploying SAS is to create a special file system of SAS product and order data—a SAS Software Depot—that the SAS Deployment Wizard then uses to install and configure SAS.

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. (Optional) Deploy the SAS High-Performance Analytics infrastructure.
4. Create users and groups and designate ports.
5. Deploy required third-party software.
6. Deploy the servers and middle tier.

About SAS Software Depots

A SAS Software Depot is a file system that has SAS installation files that represent one or more orders. The depot is organized in a specific format that is meaningful to the SAS Deployment Wizard, which is the tool that installs and initially configures SAS. The depot contains the SAS Deployment Wizard executable, one or more deployment plans, a SAS installation data file per order, order data, and product data.

Figure 2.1 SAS Software Depot File Structure

Before you can install SAS, you must have a SAS Software Depot to install from. During a SAS software download, the SAS Download Manager downloads your order, verifies it, and automatically creates a SAS Software Depot. If you receive your SAS Software Order in the form of physical media, then you must create a depot using the SAS Deployment Wizard.
Benefits of a SAS Software Depot

The main advantage of a SAS Software Depot is realized when it resides on the network at a location that you can share access to. When it is shared, a depot provides a faster and more reliable means of installation compared to traditional removable media (cartridges, CDs, DVDs, and so on).
If you have remote sites running SAS without access to the network on which your depot resides, you can use the SAS Deployment Wizard to create your own SAS media image to write to the removable media of your choice.

Here are some other benefits of using a SAS Software Depot:

- **It centralizes SAS orders.**
  The depot enables you to place multiple SAS orders in one location to simplify initial SAS deployment and future maintenance.

- **It makes applying maintenance and upgrades easier.**
  You need to download only the changed depot files instead of having to download an entire SAS order.

- **It saves disk space.**
  Storing multiple SAS orders in a single depot saves disk space because any content shared between SAS orders is not duplicated, it is shared.
  
  A single depot in SAS 9.4 can store SAS installation data files for more than one operating system, making the single, multi-system SAS 9.4 depot cumulatively smaller than the multiple, single-system depots in older versions of SAS.

- **It saves download time.**
  Because there is a shared copy of common files, the single, multi-system depot requires smaller amounts to download.

- **It organizes license keys (also known as SAS installation data files).**
  The depot enables you to place SAS installation data files in a standard location to better associate license keys with their corresponding SAS orders. (These SAS installation data files are stored in the `sid_files` directory, directly under the depot’s root.)

- **It identifies multiple SAS orders.**
The depot supports the SAS Deployment Wizard’s feature that enables you to customize order descriptions and enter notes to better identify multiple SAS orders residing in a single depot.

Because depots contain your personal SAS order, it is important to use best practices for securing and backing up your depot.

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**Best Practices for SAS Software Depots**

For customers who download SAS, their SAS Software Depot is the only copy of their SAS order. The depot contains the files from which SAS is initially installed. For this reason, it is important to use these best practices when managing your depot:

• Keep your depot.

  When you keep your SAS 9.4 depot, applying maintenance and upgrades becomes easier because you have to download only the changed depot files instead of downloading an entire SAS order.

• Locate the depot in an empty directory.

  Create or download your depot into an empty directory that will not be the future location of the SAS installation directory (SASHOME directory).

• Perform routine backups.

  As with your SAS production system, it is important to routinely back up your depot and to verify the integrity of these backups.

  *Note:* Another important reason for securing and backing up your depot is that there are limits on the number of times that you can download your SAS order.

• Secure the depot location.

  Problems such as data loss, virus infection, and file corruption can compromise your investment in SAS. It is imperative that you have a comprehensive security policy in place to protect your depot.

• Store SAS installation data files with your depot.

  The SAS installation data file for your order contains information that is integral to successfully deploying SAS. As you get renewal installation data files from SAS—such as the file that contains your permanent SAS license key—it is important that you store them with your depot in the `sid_files` directory.

  **CAUTION:**

  Be careful to use the correct SAS installation data file that contains the SAS products that you are planning to install. Using an incorrect file can cause failure when installing SAS add-on products or can cause errors later when attempting to run SAS.

• Create a SAS Software Depot administrator.

  Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Separating depot administration from routine depot usage is a best practice that further protects your depot.
Creating SAS Software Depots

Overview of Creating SAS Software Depots

There are two ways that you can create a SAS Software Depot.

• Download SAS software.
  
  When you download a SAS order, the SAS Download Manager automatically creates a SAS Software Depot on your system.

• Run the SAS Deployment Wizard.
  
  Creating a SAS Software Depot is an option on one of the wizard pages.

Prerequisites for Creating a SAS Software Depot

Before you start creating a SAS Software Depot, make sure that you have met the prerequisites.

• Choose a machine that has the following features:
  
  • Internet access
    
    If you are downloading your SAS order, you need a machine that can access the SAS download website. Ideally, this machine should be networked so that you can perform deployments directly from the machine without having to physically relocate the depot to another machine.
  
  • Windowing environment
    
    If you want to run the SAS Download Manager and the SAS Deployment Wizard using a traditional graphical user interface (GUI), then on Linux, make sure that a windowing environment such as the Common Desktop Environment (CDE) or X11 is installed.
    
    To run the deployment wizard on operating systems that do not have a windowing environment, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.
  
  • certain Linux packages and libraries
    
    • The SAS Download Manager on some 64-bit distributions of Linux might require the compat-libstdc++ RPM resource.
    
    • The SAS Download Manager on Red Hat Enterprise Linux 5 or later requires both the 32-bit and 64-bit versions of the libXp.so library to be installed.
    
    For more information, see the SAS Download Manager readme file.

• Designate a target directory.

  Decide where you will create the SAS Software Depot. It is helpful if this directory can be shared on a network and accessible to all of the machines on which you will be installing software from the depot.

  Note: SAS recommends that you do not copy a depot from one location to another. Choose a permanent location before you create the depot.

• Grant required access permissions.
The SAS Installer user must have Write access on the depot target directory.

Windows requires that you run the SAS Download Manager installation program using administrator privileges.

- Check disk space requirements.

  Make sure you have enough free disk space available on the target directory.

Just before creating a depot, the SAS Deployment Wizard and the SAS Download Manager both present you with an estimate for required disk space.

Create a SAS Software Depot Using the SAS Download Manager

You must either manually or automatically create a SAS Software Depot using the SAS Download Manager. Perform one of these steps:

1. Download a SAS order. The SAS Download Manager automatically creates a depot.
2. Download the SAS Download Manager from Downloads & Hot Fixes. Create a depot using the SAS Download Manager.

Although these steps flow one after the other, at the end of each step, you can stop and resume the process later.

Follow these steps to download a SAS order and automatically create a depot using the SAS Download Manager:

1. Locate your software order email (SOE) sent by SAS. In this email, perform the step to download the SAS Download Manager.

   Note: It is very important that you locate your original SOE to get the correct order number and SAS installation key to download the software. You cannot use the renewal order number because it is a license update. If you cannot locate your original (SOE), contact Licensing Support or SAS License Assistance at the following URLs:

   - http://support.sas.com/adminservices/contact.html
   - http://support.sas.com/techsup/license

2. Make sure that you have reviewed the prerequisites in “Prerequisites for Creating a SAS Software Depot” on page 14.

3. Log on to the machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.

4. Launch a web browser and navigate to the URL specified in your SOE.

5. Select the option that enables you to save the file to disk.

6. Save the SAS Download Manager to a path accessible to the machine.

   Click Run to launch SAS Download Manager.

7. Select the language in which the SAS Download Manager displays messages and prompts.
8. At some sites, you might see a page that prompts for proxy information. If so, provide proxy server settings for the SAS Download Manager to access the internet. If needed, contact your site's system administrator for help with these settings.

9. When prompted, enter your order number and SAS installation key.

10. Verify the list of SAS products in your order.

You should add a description for your SAS order (for example, “TS1M3, Rev. 940_15w29”) to distinguish it from other SAS orders. The SAS Deployment Wizard displays this order information during the SAS installation.

Note: Anytime after the download, you can run the SAS Deployment Wizard to add or modify SAS order information. For more information, see “Change Order Information” on page 32.

11. When you are finished adding order information, click Next.

12. Select Include complete order contents if you do not want to subset your order.

SAS Download Manager includes all the software in the order. For more information, see “Subsetting SAS Software Orders” on page 25.

13. Specify a depot location and whether you want to remove duplicate files. The depot location is where you want to download SAS and build the depot. This directory should be empty of any content. The exception is if this directory also contains other depots for the same SAS major release as this order. For more information, see “Prerequisites for Creating a SAS Software Depot” on page 14.

CAUTION:

Make sure that your SAS Software Depot directory is not nested within another depot directory (for example, C:\Depot1\Depot2). Launching your SAS installation from a depot that resides within another depot causes your installation to fail.

Select Remove duplicate files and save space. The SAS Download Manager evaluates and optimizes your depot after downloading your order. This optimization is performed on the entire depot including the latest download. Therefore, all software in the depot—not just the software being downloaded—is optimized.
**Note:** The SAS Deployment Wizard cannot create media from a SAS Software Depot that has been optimized. However, depots that have been optimized can be copied with the SAS Software Depot Copy Utility.

Depots that have been optimized can be added to later, and optimization can be performed on depots to which orders have been added. Optimization can also be performed on depots that have been optimized in the past.

Click **Next**.

14. If the directory that you specify does not exist, the wizard prompts you. If you want it to create the directory for you, click **Yes**.

15. At this point, the SAS Download Manager has finished collecting order input. You have one last opportunity to change any information before downloading the SAS order and writing files to the target directory.

Make one of the following choices:

- Click **Download** to begin downloading the SAS order and writing files to the target directory.
- Click **Back** to navigate to earlier pages to change order information previously entered.
- Click **Cancel** to terminate the SAS Download Manager session. Note that you will lose any order information previously entered.

**Note:** SAS tracks downloads. It counts only a completed download toward your download limit.
Note: The **Disk space required** value that is displayed on the Final Review page will actually be smaller if you selected **Remove duplicate files and save space** on the Specify SAS Software Depot Options page. For more information, see Step 13 on page 16.

The SAS Download Manager begins downloading, uncompressing, and creating a SAS Software Depot for your SAS order.

When you see a page similar to the following with the progress indicator at 100%, the SAS Download Manager is finished. Click **Next** to go to the final page, which describes post-download instructions.
16. Click Finish to close the SAS Download Manager.

17. To continue with the software installation, proceed to Chapter 6, “Deploying Third-Party Software,” on page 61.

After you finish your SAS 9.4 deployment, be sure to keep your SAS Software Depot because it makes applying maintenance and future upgrades easier.

Create a Depot Using the SAS Deployment Wizard

You can use the SAS Deployment Wizard to create a copy of your SAS Software Depot in another directory. If the new depot location is a remote directory on another machine, the directory must be on a shared network drive accessible from the machine running the wizard.

To create a depot on a machine that does not have shared network storage, you must use another mechanism such as SFTP or SCP to copy the depot. (For more information about these mechanisms, see your operating system documentation.)

To create a SAS Software Depot using the SAS Deployment Wizard, follow these steps:

1. Make sure that you have reviewed the prerequisites in “Prerequisites for Creating a SAS Software Depot” on page 14.

2. Log on to the machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.

3. Start the SAS Deployment Wizard using one of two methods:
   • If you are starting the wizard from physical media, proceed as follows depending on your operating system:
- Windows:
  The **setup.exe** program starts automatically when the media is inserted into the drive.

  *Note:* If the SAS Deployment Wizard does not start automatically, open Windows Explorer, navigate to the media’s root directory, and double-click **setup.exe**.

- Linux:
  Navigate to the media’s root directory, and enter **./setup.sh** at a command prompt.

- If you are starting the wizard from an existing SAS Software Depot, proceed as follows depending on your operating system:
  Navigate to the depot’s root directory, and do one of the following:

  - Windows:
    Double-click **setup.exe**.

  - Linux:
    Enter **./setup.sh** at a command prompt.

4. Select the language in which the SAS Deployment Wizard displays messages and prompts.

5. Select **Create or Add to a SAS Software Depot**. Do not select **Install SAS software**.

6. Verify the list of SAS products in your order.

   You should update the description for your SAS order to distinguish it from other SAS orders. The SAS Deployment Wizard displays order information during the SAS installation.
7. If you have multiple orders in your depot, you must select the order in which you want to create a depot. (Creating unique order descriptions helps you select the correct order.)

8. When you are finished adding order information, click Next.

9. Select Include complete order contents if you do not want to subset your order. This selection causes the SAS Deployment Wizard to include all software in the order. For more information, see “Subsetting SAS Software Orders” on page 25.

Note: At any time after the download, you can rerun the SAS Deployment Wizard to add or modify SAS order information. For more information, see “Change Order Information” on page 32.
10. Specify a location where you want to download SAS and build the depot. (This location can be shared storage that physically resides on another machine.)

This directory should be empty of any content. The exception is if this directory also contains other depots for the same SAS major release as this order.

**CAUTION:**

Make sure that your SAS Software Depot directory is not nested within another depot directory (for example, C:\Depot1\Depot2). Launching your SAS installation from a depot that resides within another depot causes your installation to fail.

For more information, see “Prerequisites for Creating a SAS Software Depot” on page 14.

11. If the directory that you specify does not exist, the wizard prompts you. If you want it to create the directory for you, click **Yes**.

12. At this point, the SAS Deployment Wizard has finished collecting order input. You have one last opportunity to change any information before downloading the SAS order and writing files to the target directory.

Make one of the following choices:

- Click **Start** to begin downloading the SAS order and writing files to the target directory.
- Click **Back** to navigate to earlier pages to change order information previously entered.
- Click **Cancel** to terminate the SAS Deployment Wizard session. Note that you will lose any order information previously entered.
13. If you are running the SAS Deployment Wizard from physical media, the SAS Deployment Wizard prompts you for media. Continue to provide media as prompted.

**Note:** If you are working on a Linux system without an automounter, mount the device. For information about the privileges required to mount a device and the syntax of the `mount` command for your system, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

The SAS Deployment Wizard begins creating a SAS Software Depot for your SAS order.

14. When you see a page similar to the following with the progress indicator at 100%, the SAS Deployment Wizard is finished. Click **Next** to go to the final page, which describes post-download instructions.
15. Click the *depotsummary.html* link to review the QuickStart Guide.

16. Click **Finish** to close the SAS Deployment Wizard.

17. If you are using physical media on a Linux system with an automounter, use the `eject` command to remove the media. On a Linux system without an automounter, you must unmount the device using the `umount` command, and then manually open the drive. For information about the `umount` command to unmount a device on your system, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

18. To continue with the software installation, proceed to Chapter 6, “Deploying Third-Party Software,” on page 61.
After you finish your SAS 9.4 deployment, be sure to keep your SAS Software Depot because it makes applying maintenance and future upgrades easier.

Subsetting SAS Software Orders

Overview of Subsetting SAS Software Orders

The SAS Deployment Wizard enables you to break up—or subset—your SAS software order. Subsetting your order makes it easier to provision individual SAS clients and conserves download time and disk space.

When you subset your depot, you are creating a copy of your original depot with only those products that you designate.

![Specify Subset Options Page](image)

The SAS Deployment Wizard enables you to create a list of the contents of your subsetted order. For more information, see “List Contents of Subsetted Orders” on page 30.

Subset an Order

The SAS Deployment Wizard enables you to subset your SAS order based on operating system, product type, and language.

*Note:* Because of its large size, the **utilities** subdirectory is *not* included in a subsetted depot.
To subset an order, follow these steps:

1. Log on to the machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   *Note:* Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.

2. Start the SAS Deployment Wizard by navigating to the depot’s root directory, and running one of the following commands, depending on your operating system:
   - Windows: Double-click `setup.exe`.
   - Linux: Enter `./setup.sh` at a command prompt.

3. Select the language in which the SAS Deployment Wizard displays messages and prompts.

4. Select **Create or Add to a SAS Software Depot**.

5. If you have multiple orders in your depot, select the order that you want to subset, and then click **Next**.

6. You should update the description for your SAS order to distinguish it from other SAS orders. The SAS Deployment Wizard displays this order information during the SAS installation.
7. When you are finished adding order information, click **Next**.

8. Select **Subset order contents**, and click **Next**.

9. On the Specify Subset Options page, select one or more of the following options, and click **Next**.

   - Select **By product platform/operating system** to choose SAS products based on the operating systems on which the products will run.
   - Select **By product languages** to choose SAS products by the language in which they will be installed.
   - Select **By products** to choose SAS products by name that you want to include in the SAS Software Depot.

   If you select **By products**, the drop-down list is activated, enabling you to further refine the products to subset.

   - Select **SAS Foundation products** to include products (and their prerequisites) that are installed only with Base SAS.
   - Select **Client products** to include products that are not SAS Foundation and are intended to be installed on client machines.
   - Select **SAS Foundation and client products** to include both types of products (and their prerequisites). One example is a depot with Base SAS and SAS Enterprise Guide.

   **Note:** If you select **By products**, you cannot deploy the subsetted products using a deployment plan file. Typically, client products do not require a deployment plan file so this restriction should not affect deploying them. If you select **By products**, the SAS Migration Utility is not included in the subsetted depot.
10. (This page appears if you chose By products in Step 9.)

Select one or more SAS products to add to your new depot, and click Next.

Note: The page that appears is based on which type of products you chose: SAS Foundation products, client products, or SAS Foundation and client products. (The page shown here is for SAS Foundation products.)

11. (This page appears if you chose By product platform/operating system in Step 9.)

Select operating systems on which the SAS products run to add these products to your new depot, and click Next.
12. (This page appears if you chose **By product languages** in Step 9.)

Select languages in which the SAS products are installed to add these products to your new depot, and click **Next**.

13. Specify a location where the deployment wizard creates your depot, and click **Next**.

**CAUTION:**

Make sure that your SAS Software Depot directory is not nested within another depot directory (for example, C:\Depot1\Depot2). Launching your SAS installation from a depot that resides within another depot causes your installation to fail.
14. Review the Final Review page. If you are satisfied, click **Start**. Otherwise, click **Back**, and make changes.

15. After the depot has been created, click **Finish** to close the SAS Deployment Wizard.

**List Contents of Subsetted Orders**

It is helpful to know exactly which SAS products are in an order that has been subsetted. The SAS Deployment Wizard enables you to create a list of the contents of your subsetted order. You generate this list by submitting a command.
For example, a command on Linux might resemble the following:

```
./setup.sh -listdepot /mydata/order_contents.txt
```

The deployment wizard executable resides in your depot’s root directory.

The list resembles the following:

```
Date: 2013 Dec 12 10:02:56
Depot: /nfs/mymachine/vol/vol7/sas_software_depot

Order: 099SPS
+ Base SAS [base__94ts1m0__mvs__ne__sp0__1]
+ Base SAS [base__94ts1m0__mvs__w0__sp0__1]
+ Base SAS Help and Documentation [basedoc__94110__prt__xx__sp0__1]
+ Base SAS JAR Files [basejars__94110__prt__xx__sp0__1]
<...>

Order: 099SQ2_2011-12-01-12.27.01
+ Advanced Analytics Common Components [aacomp__94110__wx6__en__sp0__1]
+ DATA Step to DS2 Translator [accelmva__94160__wx6__en__sp0__1]
+ Microsoft Office Access Database Engine 2010 [ace__94112__prt__xx__sp0__1]
- SAS/GRAPH ActiveX Control [activexgraph__94230__win__de__sp0__1]
+ SAS/GRAPH ActiveX Control [activexgraph__94230__win__en__sp0__1]
- SAS/GRAPH ActiveX Control [activexgraph__94230__win__es__sp0__1]
```

The character at the beginning of a line indicates how to interpret the output.

Here are details:

- The line with the order number has `Order:` at the beginning.
- A plus sign (+) indicates that the product is in the order.
- A minus sign (-) indicates that the product is in the depot, but it is not in the specified order.

For more information, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

### Managing SAS Orders

#### Overview of Managing SAS Orders

Using the SAS Deployment Wizard, you can do the following with your SAS order:

- “Change Order Information” on page 32
- “Delete an Order” on page 34
- “Create a Disc Image of Your Order” on page 36
Change Order Information

Being able to identify a SAS order is important, especially when your SAS Software Depot contains multiple orders. To change the information about a SAS order, follow these steps:

1. Log on to the depot machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.

2. Start the SAS Deployment Wizard. Navigate to the depot's root directory, and do one of the following depending on your operating system:
   - Windows: Double-click setup.exe.
   - Linux: Enter ./setup.sh at a command prompt.

3. Select the language in which the SAS Deployment Wizard displays messages and prompts.

4. Select Manage this SAS Software Depot. Click Next.

5. Select Manage SAS Software Depot. Click Next.
6. Select the order for which you want to change information, and then click **Change Details**.

7. You can update the description for your SAS order to distinguish it from other SAS orders. You can add notes. The SAS Deployment Wizard displays this order information during the SAS installation.
8. When you are finished, click **OK**.

9. Click **Finish** to close the SAS Deployment Wizard.

**Delete an Order**

**CAUTION:**

It is a best practice to always make sure that you have backed up the SAS Software Depot before deleting an order. Keep in mind that there are limits on the number of times that you can download an order from SAS.

To delete a SAS order, follow these steps:

1. Log on to the depot machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   *Note:* Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.

2. Start the SAS Deployment Wizard. Navigate to the depot’s root directory, and do one of the following depending on your operating system:
   
   - Windows:
     
     Double-click `setup.exe`
   
   - Linux:
     
     Enter `./setup.sh` at a command prompt.

3. Select the language in which the SAS Deployment Wizard displays messages and prompts.

4. Select **Manage this SAS Software Depot**. Click **Next**.
5. Select **Manage SAS Software Depot**. Click **Next**.

6. Select the order that you want to delete, and then click **Delete Order**.
7. Confirm that you want to delete the order by clicking **Yes**.

The SAS Deployment Wizard begins to delete your order. When all of the order’s files have been deleted, the Manage SAS Software Depot page appears again without the deleted order listed.

8. Select **Finish** to close the SAS Deployment Wizard.

**Create a Disc Image of Your Order**

If you have SAS running at a remote site that does not have access to the network on which your SAS Software Depot resides, you can use the SAS Deployment Wizard to create a disc image of your order. The process creates folders, subfolders, and files. You can use third-party software such as ImgBurn to create ISO files. You can write the ISO files to the physical media format that you specify (either CD or DVD).

You can create a disc image on a per-order basis only. If your SAS Software Depot has more than one order, then you have to make a disc image of each order.

To create a disc image of your SAS order, follow these steps:

1. Log on to the machine as a SAS Software Depot administrator or a user with depot Read, Write, and Execute privileges.

   **Note:** Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run SAS Download Manager using administrator privileges.
2. Start the SAS Deployment Wizard. Navigate to the depot’s root directory, and do one of the following depending on your operating system:
   • Windows:
     Double-click setup.exe.
   • Linux:
     Enter ./setup.sh at a command prompt.

3. Select the language in which the SAS Deployment Wizard displays messages and prompts.

4. Select Manage this SAS Software Depot. Click Next.

5. Select Manage SAS Software Depot. Click Next.
6. Select the order for which you want to create a disc image, and then click Create Media-Ready Image.

7. Select the type of media (CD or DVD) for which you want to create a disc image of your order. Provide the target directory where you want the SAS Deployment Wizard to write this image. Click Start.
The SAS Deployment Wizard begins writing SAS order files to the target directory.

8. When the progress indicator displays 100%, the image is completed. Click OK.

9. Click Finish to close the SAS Deployment Wizard.

The file system that the SAS Deployment Wizard creates is a disc image of your SAS order that is logically arranged into directories. Each directory contains a summary to enable you to maintain media labels.

10. Using third-party software such as ImgBurn, you can create ISO files from each folder.

Note: For more information such as how to use the labels.txt file, see “Creating Media from SAS Software Depots” in the SAS Deployment Wizard and SAS Deployment Manager User's Guide.

---

Checking Your SAS Software Depot

**Overview of Checking Your SAS Software Depot**

SAS provides a utility that can verify the integrity of your SAS Software Depot. The SAS Software Depot Check Utility scans your depot and assembles a list of the files in the depot. The depot check utility identifies any missing files. For each file that it finds, the depot check utility attempts to validate its size, checksum, and date-and-time stamp. The depot check utility attempts to fix any problems and lists the results of its various validation tests. You have the option of printing the results or viewing them in a web browser.

**Check Your SAS Software Depot**

To run the SAS Software Depot Check Utility, follow these steps:
Note: You should use the same user account with which the SAS Software Depot was created to run the SAS Software Depot Check Utility.

1. In your SAS Software Depot, locate the utilities/depotchecker directory.

2. Depending on your operating system, do one of the following:

   Table 2.1  Start-Up Commands for the SAS Deployment Wizard

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>SASDepotCheck.exe</td>
</tr>
<tr>
<td>Linux</td>
<td>SASDepotCheck.sh</td>
</tr>
<tr>
<td>z/OS</td>
<td>SASDepotCheck.rexx</td>
</tr>
</tbody>
</table>

3. On the Ready to Execute page, click Run.

   The depot check utility initializes.

4. Select the language in which the depot check utility displays text, and click OK.

   A welcome page is displayed.

5. Specify the location of your SAS Software Depot (for example, C:\SAS Software Depot).

The depot check utility begins scanning your depot. The time required to complete the scan depends on the size of your depot.

When the scan is completed, you see a page similar to the following:

7. Select one of the following options, and then click **Finish**:
   - **Save Report** writes the results of the depot check utility scan to a text file.
   - **View in Browser** launches a web browser and displays the results of the depot check utility scan.
   - **Print Report** prints the results of the depot check utility scan.

8. Click **Finish**.
Chapter 3
Checking for Documentation Updates

Deployment Process Overview: Step Two

Overview of Checking for Documentation Updates
Checking for documentation updated is the second task required to install and configure SAS Visual Analytics.

1. Create a SAS Software Depot.

2. Check for documentation updates.

3. Deploy the SAS High-Performance Analytics infrastructure.

4. Create users and groups and designate ports.

5. Deploy required third-party software.

6. Deploy the servers and middle tier.

Step 2: Check for Documentation Updates
It is very important to check for late-breaking installation information in SAS Notes and to review the system requirements for your SAS software.

• Samples & SAS Notes

• System Requirements—SAS Visual Analytics 7.5 (Distributed or Non-distributed LASR)

• System Requirements—SAS Visual Analytics 7.5 and SAS Visual Statistics 7.5
Chapter 4
Deploying the SAS High-Performance Analytics Infrastructure

Deployment Process Overview: Step Three

Overview of Deploying the SAS High-Performance Analytics Infrastructure checking for documentation updated is the third task required to install and configure SAS Visual Analytics.

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. **Deploy the SAS High-Performance Analytics infrastructure.**
4. Create users and groups and designate ports.
5. Deploy required third-party software.
6. Deploy the servers and middle tier.

Step 3: Deploy the SAS High-Performance Analytics Infrastructure

You can deploy the SAS High-Performance Analytics infrastructure with SAS Visual Analytics. This is an optional step and is based on your computing needs and requirements.

*Note:* SAS Visual Analytics requires that you use SAS High-Performance Analytics environment 2.9 or higher.

The SAS High-Performance Analytics infrastructure consists of the following:

- SAS High-Performance Analytics environment
  is the foundation for SAS LASR Analytic Server. A root node is deployed on the grid host and worker nodes are deployed on each remaining machine in the Hadoop cluster.
- SAS High-Performance Computing Management Console (optional)
is a web application tool that eases the administrative burden on multiple machines in a distributed computing environment.

- SAS Plug-ins for Hadoop (optional)
  is a group of JAR files and executables that enable SAS LASR Analytic Server to work with SASHDAT files in a co-located HDFS.
Chapter 5
Setting Up Users, Groups, and Ports

Deployment Process Overview: Step Four

Before you begin installing and configuring your software, you must create required users and groups at the operating-system level. You must designate a set of TCP/IP ports for the servers to use. Creating users and groups and designating ports is the fourth task required to install and configure SAS Visual Analytics.

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. Deploy the SAS High-Performance Analytics infrastructure.
4. Create users and groups and designate ports.
5. Deploy required third-party software.
6. Deploy the servers and middle tier.
Defining User Accounts

Overview of Defining User Accounts

There are two types of user accounts when deploying SAS:

- **Internal user accounts** are accounts known only to SAS. They are created and authenticated internally in SAS metadata rather than externally.

- **External user accounts** are accounts created outside of SAS metadata. These accounts are local to a machine or they are defined in a network directory service of which the machine is a member, such as LDAP.

The following sections describe the user accounts that SAS and third-party software require. These sections help you answer the following questions:

- What are internal and external user accounts?
- What user rights does each account have and to what groups must each account be assigned?
- Should I create local or network directory service accounts?
- What password policies should I enforce?

Controlling User Access to Hosts

SAS Visual Analytics uses passwordless secure shell (SSH) for access to the machines in the analytics cluster. The following list identifies some of the requirements for configuring passwordless SSH to enable access:

- Data administrators must configure their user accounts for passwordless SSH to start and stop SAS LASR Analytic Server instances. Passwordless SSH is also needed to load and unload tables to server instances. For more information, see the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

- User accounts that are used as shared logins for group access to data must be configured for passwordless SSH. For more information, see the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

To reduce the number of operating system (external user) accounts, use the SAS Installer account for running SAS LASR Analytic Server monitor. Although not required, it is useful to create a First User (sasdemo) account to do a simple validation of your deployment after installation and initial configuration.

Internal User Accounts

SAS identifies internal user accounts by appending a special string to the user ID. This string begins with an at sign (@) and contains saspw (for example, @saspw). For two of the required user accounts—the SAS Administrator and the SAS Trusted User—the SAS Deployment Wizard prompts you by default to create internal user accounts.

The following table shows the default internal user accounts required by SAS. (SAS internal user accounts are authenticated on the SAS Metadata Server.)
### Table 5.1  SAS Internal User Accounts

<table>
<thead>
<tr>
<th>Description</th>
<th>User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Administrator</td>
<td>sasadm@saspw</td>
</tr>
<tr>
<td>This user account has privileges associated with the Metadata Server: Unrestricted role.</td>
<td></td>
</tr>
<tr>
<td>SAS Trusted User</td>
<td>sastrust@saspw</td>
</tr>
<tr>
<td>This user account can impersonate other users on connections to the SAS Metadata Server. Some SAS processes use this account to communicate with the metadata server on a client's behalf.</td>
<td></td>
</tr>
<tr>
<td>Search Interface to SAS Content User</td>
<td>sassearch@saspw</td>
</tr>
<tr>
<td>This user account permits access to SAS content that is supplied to SAS Information Retrieval Studio for indexing.</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager Service</td>
<td>sasevs@saspw</td>
</tr>
<tr>
<td>This user account is used by the SAS Environment Manager Server and its agent to communicate while monitoring the processes in your SAS deployment. This internal user account has unrestricted administrative access rights to the SAS Metadata Server.</td>
<td></td>
</tr>
<tr>
<td>SAS Anonymous Web User</td>
<td>webanon@saspw</td>
</tr>
<tr>
<td>This user account is an optional user account that is used to grant web clients access to applicable SAS Web Infrastructure Platform components. When web clients request access to web services, they are not prompted for credentials. Instead, they are granted access under this user account.</td>
<td></td>
</tr>
</tbody>
</table>

The following table shows additional internal user accounts:

### Table 5.2  Additional SAS Internal User Accounts

<table>
<thead>
<tr>
<th>Description</th>
<th>User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>dbmsowner</td>
<td>dbmsowner</td>
</tr>
<tr>
<td>This is the user ID and password for accessing the SAS Web Infrastructure Platform Data Server. This is the owner of all databases.</td>
<td></td>
</tr>
<tr>
<td>tdam</td>
<td>tdam</td>
</tr>
<tr>
<td>This is the user ID and password for accessing the database used with SAS Application Themes.</td>
<td></td>
</tr>
<tr>
<td>SharedServices</td>
<td>SharedServices</td>
</tr>
<tr>
<td>This is the user ID and password for accessing the SharedServices database used by the SAS Web Infrastructure Platform.</td>
<td></td>
</tr>
</tbody>
</table>
adminowner
This is the user ID and password for accessing the Administration database used by the SAS Environment Manager.

sasevdb
This is the user ID and password for the Environment Manager Enablement Kit Database.

EVManger
This is the user ID and password for accessing the EVManger database used by the SAS Environment Manager.

vatadm
This is the user ID and password for accessing the database used with SAS Visual Analytics Services.

vdadm
This is the user ID and password for accessing the database used with SAS Visual Data Builder.

For more information about SAS internal user accounts and their purposes, see “Understanding the State of Your System” in SAS Intelligence Platform: System Administration Guide.

Here are some benefits of internal user accounts:

• less maintenance
  The account is defined only once in SAS. You do not define this account externally using the authentication provider.

• isolation from the host machine security policy
  The SAS Administrator and the SAS Trusted User credentials are referenced in many locations within SAS. For example, forcing a recurring password change (a common security policy) might make unnecessary work for the person administering SAS.

• independence from IT
  You can create additional SAS unrestricted user and administrative user accounts for metadata management without involvement from your IT department.

• reduced “headless” external user accounts
  The SAS Trusted User is an account used for SAS inter-process communication. It will not be mistaken for a human user.

• minimal security exposure to your enterprise
  The SAS Administrator and the SAS Trusted User are highly privileged accounts and provide access only to SAS—not to operating system resources.

**Required External User Accounts for SAS**

SAS requires specific external user accounts for two purposes: installing and running certain SAS server processes.
During installation and configuration, the SAS Deployment Wizard must run under an external user account with the necessary privileges on the target machine to write SAS program and log files. To run servers such as the SAS Stored Process Server and the SAS Pooled Workspace Server, SAS requires an external user account to be the server process owner. For more information about SAS external user accounts and their purposes, see “About the Initial User Accounts” in SAS Intelligence Platform: System Administration Guide.

Although it is not required, you might find it useful to create a First User account. You can use this account to test a typical user’s ability to access various SAS applications and to validate your deployment. (A First User account is sometimes referred to as the sasdemo account.) The SAS Deployment Wizard asks you if you want to create a First User account in SAS metadata, and you must have an external operating system account available for this purpose. After the wizard finishes, remember that you must add this SAS user to the Visual Analytics Data Administrators Group. For more information, see “Create SAS Users and Groups” on page 52.

As you set up external user accounts, remember to use different external accounts for the First User account and the SAS Spawned Servers Account. Otherwise, your configuration ends in errors and the SAS Pooled Workspace Server is not functional.

As you create these external user accounts, record information about them in the “Pre-installation Checklist for External User Accounts for SAS Visual Analytics” on page 52. You will need this information when you run the SAS Deployment Wizard later.

The following table shows external user accounts required by SAS, the recommended user ID, and the machines on which they are authenticated.

### Table 5.3 Required External User Accounts

<table>
<thead>
<tr>
<th>Description</th>
<th>Recommended User ID</th>
<th>Machine On Which It Is Authenticated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installer</td>
<td>sas</td>
<td>Every machine</td>
</tr>
<tr>
<td>This user account installs SAS and starts the SAS LASR Analytic Server monitor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Spawned Servers Account</td>
<td>sassrv</td>
<td>SAS Stored Process Server</td>
</tr>
<tr>
<td>This user account is the process owner for SAS Stored Process Servers and SAS Pooled Workspace Servers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAS Pooled Workspace Server</td>
</tr>
</tbody>
</table>

**Note:**

- For information about the user rights that each external account requires, see “Rights Required by SAS External User Accounts” on page 52.
- The Installer generally overrides the default configuration directory with the site’s preferred location (for example, /opt/sas/config). The Installer must have Write permission on this path.
- Do not use root for the Installer user ID.

**Tip** To understand the user accounts required by the SAS analytics cluster, see “Preparing Your System to Deploy the SAS High-Performance Analytics Infrastructure” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.
Rights Required by SAS External User Accounts

Operating systems require that you assign certain rights to the external user accounts used to deploy and to run SAS.

The following table describes the user rights needed by the required external user accounts:

Table 5.4 Rights Required by External User Accounts

<table>
<thead>
<tr>
<th>External User Account</th>
<th>User Rights Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installer</td>
<td>The group that you designate as the primary group for the Installer must contain the SAS Spawned Servers Account.</td>
</tr>
<tr>
<td>SAS Spawned Servers Account</td>
<td>Member of the primary group for the Installer. (This group does not have to be the primary group for the SAS Spawned Servers Account.)</td>
</tr>
</tbody>
</table>

Password Policies

Note: This section addresses passwords for external user accounts that SAS requires, not passwords for regular users of the system.

When you create passwords for your SAS external user accounts, it is highly recommended that these passwords do not have to be reset when a user first logs on. If it is required that you create passwords that have to be reset, you will have to log on using each account and reset the password before you install and configure your software. And, you will need to know the changed password for each account.

By default, passwords for internal user accounts are set not to expire. When passwords for user accounts change, you must use SAS Deployment Manager to update configuration files and some metadata objects. SAS provides instructions for updating these files and metadata objects.

For more information, see “Update a Managed Password” in SAS Intelligence Platform: Security Administration Guide.

Pre-installation Checklist for External User Accounts for SAS Visual Analytics

Use the following pre-installation checklist to create the necessary external user accounts to deploy and run SAS Visual Analytics.

Note: A more complete and up-to-date checklist is available at http://support.sas.com/installcenter/plans.

Table 5.5 Pre-installation Checklist for External User Accounts for SAS Visual Analytics

<table>
<thead>
<tr>
<th>Account</th>
<th>Recommended User ID</th>
<th>Actual User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installer</td>
<td>sas</td>
<td></td>
</tr>
</tbody>
</table>
CAUTION: Do not use root as the Installer account.

Consider these important items:

- During deployment, the Installer user must have Write permission to `/etc/opt/vmware` to configure VMware license files on all SAS middle tier machines.

- For information about the user rights that each external account requires, see “Rights Required by SAS External User Accounts” on page 52.

- The SAS Deployment Wizard prompts you for the Installer account and the SAS Spawned Servers Account information. You cannot complete the installation without providing it.

- Prior to configuration, the SAS Deployment Wizard prompts you for the root (or `sudo`) password. Certain SAS products and features use functionality that requires SAS to check user ID authentication and file access authorizations. This means that certain files within your SAS installation must have setuid permissions and be owned by root.

- If your system uses an authentication method other than `/etc/passwd` or `/etc/shadow`, then you must configure authentication before you begin your SAS software deployment or SAS Visual Analytics will not function properly. For more information, see the Configuration Guide for SAS 9.4 Foundation for UNIX Environments.

### Defining Groups

**Define the sas Group**

To deploy SAS Visual Analytics, you should create an operating system group called sas and make it the primary group for the Installer user. The SAS Spawned Servers Account should be made a member of the sas group. (Members of this group are given access to certain directories and files created by the SAS Deployment Wizard.)

For information about creating groups and adding user accounts, see your Linux documentation.

**Pre-installation Checklist for Groups for SAS Visual Analytics**

Use the following pre-installation checklist to make sure that you have created the necessary groups to deploy and run SAS Visual Analytics.

*Note: A more complete and up-to-date checklist is available at [http://support.sas.com/installcenter/plans](http://support.sas.com/installcenter/plans).*
Table 5.6  Pre-installation Checklist for Groups for SAS Visual Analytics

<table>
<thead>
<tr>
<th>Recommended Group Name</th>
<th>Group Members</th>
<th>Purpose</th>
<th>Actual Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>sas*</td>
<td>Installer</td>
<td>This is the primary group for the Installer user. It enables the SAS Deployment Wizard to create the necessary SAS log and configuration directories.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SAS Spawned Servers Account</td>
<td>Through group membership, this group grants Write permission to the SAS Spawned Servers Account for modifying specific SAS log and configuration directories.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Admin user First User Any other users</td>
<td>This group owns the LASRMonitor process. It enables Data Admin user to load data (or to create server signature files in /opt/VADP/var).</td>
<td></td>
</tr>
</tbody>
</table>

* Limit membership because this privileged group has operating system access to certain configuration files.

Pre-installation Checklist for Groups for Third-Party Software

Use the following pre-installation checklist to create the necessary groups to deploy and run third-party software.

Note: A more complete and up-to-date checklist is available at http://support.sas.com/installcenter/plans.

Table 5.7  Pre-installation Checklist for Groups for Third-Party Software

<table>
<thead>
<tr>
<th>Recommended Group Name</th>
<th>Group Members</th>
<th>Operating System and Purpose</th>
<th>Actual Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>sas</td>
<td>Installer (sas)</td>
<td>This is the suggested method for assigning required permissions to write to certain installation directories.</td>
<td></td>
</tr>
</tbody>
</table>

Configuring Machine Access

For the SAS LASR Analytic Server monitor process to be able to show the tables that are in-memory on a server instance, network name resolution might need to be modified on the machine that runs the SAS Visual Analytics middle-tier machine.

For deployments that use SAS High-Performance Deployment of Hadoop as a co-located data provider, the middle-tier machine typically has network name resolution without additional modification. However, if the machines in the cluster use multiple network interfaces, then make sure that network name resolution works. For /etc/
Designating Ports and Multicast Addresses

About Ports and Multicast Addresses

While you are creating operating system user accounts and groups, you need to review the ports that the SAS servers, third-party servers, and spawners in your system use by default. If any of these ports is unavailable, select an alternate port, and record the new port in the following pre-installation checklist “Pre-installation Checklist for Ports for SAS” on page 56.

You need to plan for designating Internet Protocol (IP) multicast addresses for all machines in your SAS deployment. Multicasting simplifies the ongoing management and deployment of SAS web applications by providing the flexibility to customize the SAS middle tier and to distribute SAS web components to implement load balancing.

Multicast Address Considerations

By default, multicasting is not used in the typical SAS deployment and SAS Remote Services is turned off. If you created a custom application that uses SAS Remote Services, you can use multicasting and enable SAS Remote Services.

The SAS Deployment Wizard prompts you to supply a multicast address for intermachine communication. The wizard provides you with a default multicast address that it generates based on the machine's IP address and the Admin-Local scope that is recommended in RFC 3171 (IPv4) or RFC 4291 (IPv6).

A multicast group communication protocol is used to communicate among middle-tier SAS applications in a single SAS deployment (the SAS applications connected to the same SAS Metadata Server). The combination of multicast IP address and multicast UDP port should be different for each SAS deployment and different from combinations used by other multicast applications at your site.

The IP multicast address must be valid for IP multicasting. It should be in the range 224.0.0.0 to 239.255.255.255 for IPv4 or have the prefix ff00::/8 for IPv6. Typically, the chosen IP multicast address is in the Admin-Local scope block, which corresponds to 239/8 for IPv4 and ff14::/8 for IPv6. The sample address provided by the SAS Deployment Wizard during configuration conforms to these standards. The address should be unique to SAS applications for the subnet that they are installed on.

The IP multicast UDP port should be open and usable on any machine on which a middle-tier application is to be installed. It should not conflict with any previous TCP port definitions such as the SAS Metadata Server. The multicast group communication is intended to be used only within your data center environment. Many sites keep their data center network separated from users via a firewall that automatically isolates the multicast protocol. Alternatively, the time to live (TTL) parameter can be used to restrict the scope of multicast communication. Your network administrator can suggest a TTL setting to limit the scope of multicast. The TTL parameter and the authentication token option both have security implications.
The multicast TTL parameter (default = 1, range = 0–255) affects the number of network hops a multicast packet can take before being dropped. The TTL value must be greater than or equal to the highest number of hops between any two servers containing SAS products. In addition, some network router documentation recommends that multicast datagrams with initial TTL=0 are restricted to the same host, multicast datagrams with initial TTL=1 are restricted to the same subnet, and multicast datagrams with initial TTL=32 are restricted to the same site. Consult your network router documentation or your network administrator to determine the correct values for your environment.

Note: Make sure that all of the machines in your SAS 9.4 deployment are members of the same subnet or be sure to set the default TTL value to a number higher than 1. The SAS Deployment Wizard lets you set the TTL value during SAS 9.4 deployment. For information about how to change this parameter after deployment, see “Administer Multicast Options” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Because the multicast protocol conveys credentials, it is protected via encryption. By default, the multicast group communication is protected only with a fixed encryption key that is built into the software. If your middle tier is running in an environment that is not well-isolated from user access, then you might want better protection against eavesdroppers and unauthorized group participants. In this case, choose an authentication token known only to your SAS middle-tier administrative users. The authentication token is a password-like string needed to connect to the multicast group and create a site-specific encryption key.

The SAS Deployment Wizard default simplifies configuration by using the authentication token that is built into the software. This option is best used in development and other low-security environments. It might be appropriate in higher-security environments where the multicast group communication is isolated from the user community (either via a firewall or the TTL parameter) and where all data center administrative users and operational users have sufficient security approval.

If your multicast group communication is not within a well-isolated data center environment or if the security procedures at your site require protection for administrative users and operational users in various roles, you should specify an authentication token that is known only to the administrators of the SAS environment. The same token must be supplied on each tier in the configuration.

By default, there is a code-level authentication token shared between all SAS middle-tier applications to prevent access to the multicast group from unauthorized listeners. If you choose to use a customized authentication token, use the SAS Deployment Wizard to enter an authentication token value that meets your organization's security guidelines. In a multi-tier configuration, a prompt appears on each tier that has an application participating in the SAS multicast group. You must provide the same authentication token to each tier in the same SAS deployment (that is, each tier associated with the same SAS Metadata Server).

**Pre-installation Checklist for Ports for SAS**

Use the following pre-installation checklist to see what ports are used for SAS by default and to record the port numbers that you are actually using.

Note: The SAS Deployment Wizard prompts you for this information. You cannot complete the installation without it.

The last digit of the default port number reflects the configuration level that you select in the SAS Deployment Wizard. For example, when you select **Lev1**, the default port for the SAS Metadata Server is 8561. If you select another level, such as **Lev2**, the wizard changes the default port to 8562.
Note: A more complete and up-to-date checklist is available at [http://support.sas.com/installcenter/plans](http://support.sas.com/installcenter/plans). Consult the pre-installation checklist provided by your SAS representative for a complete list of ports that you must designate.

### Table 5.8 Pre-installation Checklist for Ports

<table>
<thead>
<tr>
<th>Server or Spawner</th>
<th>Default Port</th>
<th>Data Direction</th>
<th>Actual Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail Server</td>
<td>25</td>
<td>Outbound</td>
<td></td>
</tr>
<tr>
<td>HTTP Server</td>
<td>80 (Windows)</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7980 (UNIX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTTP Server (Secure Port)</td>
<td>443 (Windows)</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8343 (UNIX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Remote Services Application</td>
<td>5091</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS OLAP Server</td>
<td>5451</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent</td>
<td>5660</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Event Broker Administration</td>
<td>6051</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Web Application Server: JMX Port</td>
<td>6969</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager HTTP Port</td>
<td>7080</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager HTTPS Secure Port</td>
<td>7443</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS/CONNECT Server and Spawner</td>
<td>7551</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Web Report Studio: In-Process Scheduling UDP Port 1</td>
<td>7570</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Web Report Studio: In-Process Scheduling UDP Port 2</td>
<td>7571</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Web Report Studio: In-Process Scheduling UDP Port 3</td>
<td>7572</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Event Broker HTTP</td>
<td>8111</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Operating System Services Scheduling Server</td>
<td>8451</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Server or Spawner</td>
<td>Default Port</td>
<td>Data Direction</td>
<td>Actual Port</td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>--------------</td>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SAS/SHARE Server</td>
<td>8551</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>IP Multicast (UDP Port)</td>
<td>8561</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Metadata Server</td>
<td>8561</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Object Spawner: Operator Port</td>
<td>8581</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Workspace Server</td>
<td>8591</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: Bridge Port</td>
<td>8601</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Stored Process Server: Load Balancing Connection 1 (MultiBridge)</td>
<td>8611</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Stored Process Server: Load Balancing Connection 2 (MultiBridge)</td>
<td>8621</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Stored Process Server: Load Balancing Connection 3 (MultiBridge)</td>
<td>8631</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Pooled Workspace Server</td>
<td>8701</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Object Spawner: SAS Pooled Workspace Server Port Bank 1</td>
<td>8801</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Object Spawner: SAS Pooled Workspace Server Port Bank 2</td>
<td>8811</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Object Spawner: SAS Pooled Workspace Server Port Bank 3</td>
<td>8821</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: Load Balancing Connection 3 (MultiBridge)</td>
<td>8631</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database Server</td>
<td>9432</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS LASR Analytic Server Monitor RMI Port</td>
<td>9971</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS High-Performance Analytics Environment Port</td>
<td>10010</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS High-Performance Computing Management Console Server</td>
<td>10020</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Tester Server</td>
<td>10021</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Server or Spawner</td>
<td>Default Port</td>
<td>Data Direction</td>
<td>Actual Port</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SAS Visual Analytics (Autoload)</td>
<td>10031</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio</td>
<td>10651</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Proxy Server</td>
<td>10661</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Proxy Server Admin</td>
<td>10671</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Proxy Server Web Admin</td>
<td>10681</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Pipeline Server</td>
<td>10691</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Pipeline Server Admin</td>
<td>10701</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Pipeline Server Web Admin</td>
<td>10711</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Index Builder</td>
<td>10721</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio Query Server</td>
<td>10731</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>TCP Port for Middle-Tier Cache Communications*</td>
<td>0–65535</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Plug-ins for Hadoop NameNode Service</td>
<td>15452</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Plug-ins for Hadoop DataNode Service</td>
<td>15453</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Cache Locator Port</td>
<td>41415</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Cache Locator Membership Port Range** (TCP/UDP Port Range)</td>
<td>1024–65535</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
</tbody>
</table>
### Server or Spawner | Default Port | Data Direction | Actual Port
---|---|---|---
JMS Server Port | 61616 | Inbound and outbound |

* If the default port is set to zero, the operating system selects an available port. Each process on a machine must have its own TCP port. Some operating systems restrict the range of ports usable by non-privileged users and using restricted port numbers can cause run-time errors in GemFire start-up.

** The range of ephemeral ports available for unicast UDP messaging and for TCP failure detection in the peer-to-peer distributed system. These ephemeral ports are created from available ports in a system.
Chapter 6
Deploying Third-Party Software

Deployment Process Overview: Step Five
Installing required third-party software is the fifth of six tasks required to install and configure SAS Visual Analytics.

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. Deploy the SAS High-Performance Analytics infrastructure.
4. Create operating system users and groups and designate ports.
5. Deploy required third-party software.
6. Deploy the servers and middle tier.

About Installing Third-Party Products
SAS Visual Analytics requires the following third-party products:
Obtaining Third-Party Software

Overview of Obtaining Third-Party Software

SAS provides you with two ways to obtain required third-party software:

- SAS Software Depot: third_party Directory
- SAS Third-Party Software Website

SAS Software Depot: third_party Directory

Some third-party products are provided with SAS 9.4. Product installation files and documentation are located in the SAS Software Depot in the `third_party` directory.

Platform Suite for SAS is an example of a third-party product that might have been provided. To determine whether any third-party software is included with your order, refer to your SAS Software Summary in your SAS Software Depot in the `order_number` directory under `install_doc`. For example:

C:\SAS Software Depot\install_doc\order_number\ordersummary.html

Some third-party software can be obtained online from SAS. For more information, see “SAS Third-Party Software Website”.

For more information, see System Requirements--SAS Visual Analytics 7.5 (Distributed or Non-distributed LASR) or System Requirements--SAS Visual Analytics 7.5 and SAS Visual Statistics 7.5.
**SAS Third-Party Software Website**

SAS maintains a third-party software website to help you do the following tasks:

- determine what version of the product to install
- obtain some products if you do not already have them
- find installation instructions
- learn about any patches required

The SAS third-party website is located at [http://support.sas.com/resources/thirdpartysupport/](http://support.sas.com/resources/thirdpartysupport/).

---

**About the Java Runtime Environment**

SAS Java applications require the Java Runtime Environment (JRE), which includes a Java Virtual Machine (JVM) that executes the application and standard Java class libraries. On Windows, UNIX, and Linux, the SAS Deployment Wizard installs the default version of the JRE with which SAS has been tested.

If a different supported version of the JRE is required, it can be obtained from the appropriate vendor’s website.

---

**Pre-installation Checklists for Third-Party Products**

**Overview of Pre-installation Checklists for Third-Party Products**

As you install third-party products, print and complete the available and appropriate third-party software checklists.

*Note:* You must have the necessary third-party software installed on the current machine. If you do not, the SAS Deployment Wizard will not let you complete your deployment.

**PowerShell**

Microsoft PowerShell is a task-based command-line shell and scripting language built on .NET. PowerShell is required to deploy the SAS middle tier on Windows. The SAS Deployment Wizard uses PowerShell to run configuration scripts that modify path information. During installation, the deployment wizard prompts you to specify the PowerShell installation location.

Table 6.1  PowerShell

<table>
<thead>
<tr>
<th>Description</th>
<th>Default Values</th>
<th>Actual Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerShell location</td>
<td><code>/Windows\System32\WindowsPowerShell/v1.0</code></td>
<td></td>
</tr>
<tr>
<td>Product version</td>
<td>2.2</td>
<td></td>
</tr>
</tbody>
</table>

Python

Python is an open-source, high-level general purpose programming language required for SAS Information Retrieval Studio on the SAS Visual Analytics middle tier. During installation, the deployment wizard prompts you to specify the Python installation location.

For more information about Python version requirements and a download link, go to [http://support.sas.com/resources/thirdpartysupport/v94/othersw.html](http://support.sas.com/resources/thirdpartysupport/v94/othersw.html).

Table 6.2  Python

<table>
<thead>
<tr>
<th>Description</th>
<th>Default Values</th>
<th>Actual Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Python location</td>
<td><code>/Python26</code></td>
<td></td>
</tr>
<tr>
<td>Product version</td>
<td>2.6</td>
<td></td>
</tr>
</tbody>
</table>

JUnit

JUnit is an open-source testing framework for Java and the de facto standard for writing unit and regression tests. Some of the validation tests provided with SAS products run under the SAS Deployment Tester framework and require JUnit. During SAS installation, the SAS Deployment Wizard prompts you to specify the location of the JUnit JAR file.

For more information about JUnit version requirements and a download link, go to [SAS Support for Other Third-Party Software Products](https://support.sas.com/resources/thirdpartysupport/v94/othersw.html).

Table 6.3  JUnit

<table>
<thead>
<tr>
<th>Description</th>
<th>Default Values</th>
<th>Actual Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUnit JAR file location</td>
<td><code>/Program Files\JUnit</code></td>
<td></td>
</tr>
<tr>
<td></td>
<td><code>/usr/local/junit</code></td>
<td></td>
</tr>
<tr>
<td>Product version</td>
<td>4.8.1</td>
<td></td>
</tr>
</tbody>
</table>
Java Access Bridge

The Java Access Bridge is a prerequisite for JAWS, the Windows accessibility solution. The Java Access Bridge is shipped with SAS 9.4. For more information, see SAS Support for Other Third-Party Software Products.

Platform Suite for SAS

If you plan to use products from Platform Computing for scheduling or for grid computing, you must install products from the Platform Suite for SAS offering. Platform Suite for SAS includes three products:

• Platform Process Manager
  
  provides scheduling capabilities. Platform Process Manager submits jobs to Platform LSF and manages dependencies between jobs. (When you install Platform Process Manager, Platform LSF is also installed.)

• Platform LSF (Load Sharing Facility)
  
  manages resource requirements and provides for load balancing.

• Platform Grid Management Service
  
  includes a monitoring daemon that enables administrators to monitor the load on machines running Platform LSF.

  If you are using Platform Suite for SAS for grid computing, you must install Platform LSF and Platform Grid Management Service. If you want to schedule jobs to run on the grid, you must also install Platform Process Manager.

For more information about where to install each of these products, see “SAS Grid Topology” in Grid Computing in SAS.

Platform Suite for SAS is distributed with SAS in the depot `third_party` directory.

You can also find Platform Suite for SAS documentation in the Scalability & Performance focus area at http://support.sas.com/rnd/scalability/platform/index.html.

### Table 6.4 Platform Suite for SAS

<table>
<thead>
<tr>
<th>Description</th>
<th>Default Values</th>
<th>Actual Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform Process Manager Port</td>
<td>1966 (inbound)</td>
<td></td>
</tr>
<tr>
<td>Product Version</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>Platform LSF Ports</td>
<td>6878, 6881, 6882, 7869, 7870, 7871, 7872 (inbound)</td>
<td></td>
</tr>
<tr>
<td>Product Version</td>
<td>7.06</td>
<td></td>
</tr>
<tr>
<td>Platform Grid Management Service Port</td>
<td>1976 (inbound)</td>
<td></td>
</tr>
<tr>
<td>Product Version</td>
<td>7.11</td>
<td></td>
</tr>
</tbody>
</table>
Deployment Process Overview: Step Six

Deploying SAS Visual Analytics is the sixth and final task required to install and configure SAS Visual Analytics.

1. Create a SAS Software Depot.
2. Check for documentation updates.
3. Deploy the SAS High-Performance Analytics infrastructure.
4. Create users and groups and designate ports.
5. Deploy required third-party software.
6. **Deploy the servers and middle tier.**

Components of SAS Visual Analytics

Deploying the SAS Visual Analytics server tier consists of installing and configuring the following components on the server-tier machine:

- SAS LASR Analytic Server Monitor
- SAS Workspace Servers
- SAS Pooled Workspace Servers
- SAS Stored Process Servers

Deploying the SAS Visual Analytics middle tier consists of installing and configuring the following components on the middle-tier machine:

- SAS Visual Analytics
- SAS Visual Statistics
- SAS Visual Data Builder
- SAS Visual Analytics Viewer
- SAS LASR Authorization Service
- SAS Visual Analytics Transport Service
- Search Interface to SAS Content
- SAS Remote Services
Preparing to Deploy SAS Visual Analytics

Which SAS LASR Analytic Server Mode?

SAS LASR Analytic Server was originally developed to operate in a distributed computing environment and to perform analytic tasks on data that is loaded in memory. This is referred to as running the server in distributed mode.

The server can also run on a single machine or in non-distributed mode.

SAS enables you to license SAS LASR Analytic Server to run in distributed mode, non-distributed mode, or both modes. The mode that you deploy and run is driven by the license that accompanies your order. For more information, consult with your SAS representative.

Deploy the SAS High-Performance Analytics Environment

If SAS Visual Analytics uses SAS LASR Analytic Server to run in distributed mode, it is dependent on the SAS High-Performance Analytics environment. Before you proceed, make sure that you have reviewed the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Deployment Wizard Options

The SAS Deployment Wizard is a cross-platform utility that installs and configures many SAS products. Using a SAS installation data file and a deployment plan for its initial input, the wizard is designed to prompt the user for the remaining input at the start of the session so that the user does not have to monitor the entire deployment.

About Deployment Plans

A deployment plan is an XML file that is used as input to the SAS Deployment Wizard. It describes the topology of SAS Visual Analytics. The plan instructs the SAS Deployment Wizard what software to install and configure on each machine in a SAS Visual Analytics deployment. The plan is created by a SAS representative specifically for a site.

- A SAS representative has created a custom deployment plan for you (an XML file or a ZIP file containing an XML file). It has been emailed to your site.
- Your deployment plan must be a valid SAS 9.4 deployment plan. The SAS Deployment Wizard does not accept plans from earlier SAS releases.

At the end of the deployment, the SAS Deployment Wizard makes a copy of the deployment plan that it used. This copy of the deployment plan can be helpful when you want to add a SAS product or change your SAS configuration. The wizard stores a copy of the deployment plan in the SAS configuration directory in the Utilities directory. It appends a date and time stamp to the deployment plan filename. Here is an example:

/opt/SAS/config/Level1/Utilities/plan.2015-04-23-13.10.xml
Reducing the Number of Password Prompts

In SAS 9.4M3, the SAS Deployment Wizard enables you to reduce the number of password prompts for the required, SAS internal, metadata-based server accounts and SAS Web Infrastructure Platform Data Server accounts.

When you select the Set passwords using the Unrestricted Administrator password check box on the SAS Internal Account: Unrestricted Administrator page, the SAS Deployment Wizard reuses this password for the following accounts:

- SAS Internal Account: Trusted User (sastrust@saspw)
- SAS Internal Account: Anonymous Web User (webanon@saspw)
- SAS Web Infrastructure Platform Data Server (dbmsowner)
- SAS Environment Manager: Administration Database Configuration (adminowner)
- SAS Internal Account: SAS Environment Manager Service Account (sasevs@saspw)
- SAS Environment Manager: Database Configuration (EVManager)
- SAS Environment Manager Enablement Kit Database Credentials User (sasevdb)
- SAS Visual Analytics Services Database User (vatadm)

When you select the Express prompting level for the SAS Deployment Wizard, you are not prompted for the required, SAS internal, metadata-based server accounts and SAS Web Infrastructure Platform Data Server accounts. When you select the Typical or Custom prompting levels, you do see password prompts for these accounts. However, their password fields are pre-populated with the SAS Internal Account: Unrestricted Administrator password.

Re-entry Feature of the Deployment Wizard

In SAS 9.4M3, a re-entry feature was added to the SAS Deployment Wizard.
If the SAS Deployment Wizard is interrupted during the installation phase, when the wizard is restarted, it installs only those SAS products that it has not already installed successfully.

The SAS Deployment Wizard works in a similar way if it is interrupted during the configuration phase. However, the wizard does not retry any skipped configuration steps (in other words, configuration steps that failed and then the user intentionally directed the wizard to skip them and continue).

In the past, if the SAS Deployment Wizard was interrupted, it would attempt to install and configure all of the products in a SAS order when it was restarted. (The wizard behaved in this manner because it kept no record of which products had errors during installation or configuration or of the point in the installation or configuration at which the user terminated the wizard.)

Note: When you restart the SAS Deployment Wizard in re-entry mode, the wizard assumes that you want to deploy SAS. Therefore, the wizard ignores any non-deployment arguments that you might have previously provided, such as -RECORD.

**SAS Visual Analytics Configuration Options**

To provide values specific to installing and configuring SAS Visual Analytics, choose the wizard’s **Typical** or **Custom** prompting level.

*Figure 7.1 Select Configuration Prompting Level Page*

**SAS Deployment Agents**

The SAS Deployment Agent and its remote clients are required for deployments that run remote processes. SAS uses the SAS Deployment Agent to copy content and to perform configuration management operations associated with creating new servers and clustering. It is also used for server administration tasks such as deployment backups.
SAS Metadata Server Clustering

A metadata server cluster is a group of three or more host machines (nodes) that have been configured as identical metadata servers. Each node runs its own server process, and has its own server configuration information, journal file, and copy of the repository data sets. In addition, each node maintains a complete in-memory copy of the SAS Metadata Repository. The nodes work together as if they were a single metadata server.

Note: If you are configuring metadata server clustering, and if your server tier or middle tier includes one or more Windows hosts, then the SAS Deployment Wizard should prompt you for the SAS Deployment Backup and Recovery Tool: User Account. This external account, also referred to as the backup user, is used to run the SAS Deployment Backup and Recovery Tool. The account must meet the requirements that are specified in “What Is a Backup User?” in the SAS Intelligence Platform: System Administration Guide. If this prompt does not appear, then you must configure the user manually after the deployment is completed. For instructions, see “Specifying a Backup User Manually” in the SAS Intelligence Platform: System Administration Guide.

Clustering provides redundancy and high availability of the SAS Metadata Server. Client applications and users interact with the cluster in the same way that they would interact with a SAS Metadata Server that is not clustered. A load-balancing process automatically distributes work among the nodes. If a node ceases to operate, the metadata server continues to be available using the remaining nodes.

On Windows, you need an external, Windows domain-based user account that will start all of the nodes. The suggested user ID for this service login is myWindowsDomain\ sassvlign. On Linux, the nodes are started by the Installer account. For more information, see “Prerequisites for Cluster Configuration” in the SAS Intelligence Platform: System Administration Guide.

All of the nodes in the metadata server cluster must be on the same operating system.

You deploy your metadata server cluster by installing an initial SAS Metadata Server, and then moving to another machine and running the SAS Deployment Wizard to deploy a metadata server node. You indicate which type of metadata server you want to deploy by choosing the appropriate step on the deployment wizard’s Select Deployment Step and Products to Install page.
Server and Middle Tier Topology Constraint Removed in Release 7.1

Starting with SAS Visual Analytics 7.1, if the server tier and middle tier are deployed on separate machines, these machines no longer must use operating systems in the same operating system family. (For example, Red Hat Enterprise Linux 6.1, x86, 64-bit, and SUSE Linux Enterprise 11 Service Pack 1, x86, 64-bit, are both in the same operating system family.) The SAS Visual Analytics 7.1 server tier and middle tier—like the SAS Metadata Server and SAS Web Infrastructure Platform—can be deployed on machines that use different operating system families.

For example, the SAS Visual Analytics server tier can reside on a Windows machine and the SAS Visual Analytics middle tier can reside on a Linux x86 machine.

SAS Web Application Servers

SAS supports multiple SAS Web Application Servers on the middle-tier machine.

SAS Web Application Server Clustering

Server clustering provides redundancy and high availability and enhances performance. In SAS 9.4, the deployment model has been enhanced to better support clustering of SAS Web Application Servers. You can easily configure vertical cluster members (additional server instances on the same machine) and horizontal cluster members (servers on additional machines). Combining vertical and horizontal clustering is also supported and can be configured easily.

For more information, see the SAS Intelligence Platform: Middle-Tier Administration Guide.
**Installation Rules for Multiple-Machine Deployments**

Be aware that if you are deploying SAS on a multiple-machine distributed system, you must install software on your machines in a particular order.

1. Always install SAS software on the SAS Metadata Server machine first.

2. If you are implementing metadata server clusters, install the metadata server nodes next.

3. Install the SAS application servers (such as the SAS Workspace Server or SAS Stored Process Server) on machines other than the SAS Metadata Server machine.

4. If your deployment plan separates SAS Web Server from SAS Web Application Server, install SAS Web Server first.

5. Install the middle tier.

6. For SAS deployments where the SAS Metadata Server and middle tier reside on the same machine, remember that the SAS server tier (the compute tier) must be configured after the SAS Metadata Server and before the middle tier.

7. If you are implementing SAS Web Application Server clusters, install the SAS Web Application Server nodes next.

8. Install software on machines that host only clients last.

---

**SAS Metadata Server Recommendation**

You should deploy the SAS Metadata Server on a dedicated server machine. A machine running only the metadata server greatly simplifies tuning, management, and diagnostics.

For more recommendations, see information about the SAS Metadata Server in the system requirements for your SAS product.

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**SAS Metadata Repository Considerations**

Your metadata repositories should reside either on a local file system or on a high-performance, high-availability network file system. For more information about metadata repositories, see “About SAS Metadata Repositories” in *SAS Intelligence Platform: System Administration Guide*.

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**Locale and Encoding Considerations**

**Locale and Encoding Preparation**

Before you invoke the SAS Deployment Wizard, your operating system must match the locale and encoding that you plan to select on the Select Regional Settings page of the deployment wizard.
On Windows, the Windows system locale must match your selection on the Select Regional Settings page. For more information, see your Windows documentation.

On UNIX and Linux, the LANG environment variable setting must match the locale and encoding you plan to select for SAS Foundation and SAS Metadata Server.

In addition, if you plan to select **Configure as a Unicode server**, you must use UTF-8 as your operating system encoding.

For example, on Linux, if you plan to choose the locale **Japanese (Japan)** and the default encoding on the Select Regional Settings page, you would enter the following command:

```bash
$ LANG=ja_JP.eucjp; export LANG
```

On UNIX and Linux, there are differences in the spelling and case of language-encoding pairs. For this reason, you should run the `locale` command to check the current locale and to verify the spelling of locale values. A misspelling causes the LANG environment variable to be improperly set and interferes with propagation to other locale-related environment variables. For example, consider the case and spelling differences across Linux and UNIX for US English, UTF8:

- On Linux and Solaris:
  ```bash
  en_US.UTF-8
  ```
- On AIX:
  ```bash
  EN_US.UTF-8
  ```
- On HP-UX:
  ```bash
  en_US.utf8
  ```
Locale and Encoding Settings in the SAS Deployment Wizard

The SAS Deployment Wizard enables you to select the default locale and languages for the deployment wizard and for SAS 9.4. (A separate tool, the SAS Deployment Manager, enables you to configure the locale of SAS Java clients. For more information, see “Change Locale for SAS” in SAS Intelligence Platform: Installation and Configuration Guide.)

One of the first dialog boxes in the deployment wizard is the Choose Language dialog box.

The language that you select in the Choose Language dialog box specifies the language that the deployment wizard uses to display text.

You can also set the languages that your SAS 9.4 products use.

Figure 7.4  Select Language Support Page

The deployment wizard also prompts you for your locale setting.
Figure 7.5  Select Regional Settings Page

The locale setting controls how SAS 9.4 displays the following:

- text
- numbers
- currencies
- dates
- times
- data (sorting)

The locale setting specifies the language that the SAS Metadata Server uses to store objects in its repository.

On Windows and Linux machines, you can choose to configure SAS 9.4 as a Unicode server. Unicode can be particularly useful when your SAS deployment supports multiple languages. Choosing to configure SAS 9.4 as a Unicode server means that SAS reads and writes all of its data sets, catalogs, and text files in UTF-8 encoding. UTF-8 encoding supports characters from all of the world’s languages, including characters found in both single- and double-byte character sets. However, UTF-8 can make data sharing with SAS sites that use default encodings problematic.

If configuring SAS 9.4 as a Unicode server is not a viable option for your deployment, you can implement a more advanced deployment that requires adding a server configuration to support a separate encoding. This separate server configuration can be used by the SAS Customer Intelligence system only. For more information, see Adding Additional SAS Workspace Servers to Support Multiple Encodings.

**CAUTION:**

The SAS automated deployment tools do not support changing locale after SAS is initially deployed. For example, you cannot initially deploy SAS as English (US), and then reconfigure SAS with the SAS Deployment Manager and change the locale to French.
For single-byte character set languages, the chosen locale is set in the configuration file that matches the default language. It is also set in the English configuration file. For example, if you choose fr_FR as your locale, this value is added to both the French and English configuration files.

For double-byte character set languages, the chosen locale is set in the configuration file that matches the default language. English (US) is set as the default locale for English (SBCS), with some exceptions.

When a locale is set, a default encoding is used for that locale and the operating system.

For more information about how SAS supports locales and encodings, see the SAS National Language Support (NLS): Reference Guide.

A Note about Host Names

The SAS Deployment Wizard follows the Internet Host Table Specification and does not allow the underscore character (_) in host names. For more information about what constitutes a valid host name, see RFC 952 at http://www.rfc-base.org/txt/rfc-952.txt.

How the SAS Deployment Wizard Names SAS Web Application Servers

The deployment wizard creates multiple SAS Web Application Servers as needed based on the products in your SAS order. By default, each SAS Web Application Server is assigned to a specific server for deployment. This distribution helps balance the load on each server and defines a recommended number of servers based on the products in each configuration.

Most of the time, the deployment wizard numbers these servers sequentially (for example, SASserver1, SASserver2, and SASserver3). However, depending on your particular SAS product order, the default names for the SAS Web Application Servers might not be sequential.

If you use the default names (for example, SASserver) in your configuration, then you should maintain the default numbering scheme.

Reviewing Third-Party Database Requirements

The SAS 9.4 middle-tier software and certain SAS solutions use the SAS Web Infrastructure Platform Data Server to store transactions. The data server relies on PostgreSQL 9.1.9 and is configured specifically to support SAS 9.4 software.

Make sure that you follow these general hardware requirements for Postgres:

• In postgresql.conf, make sure that fsync=on.

  (The storage device hosting Postgres must support its operating system FSYNC() call.)

• The storage device should use ECC (error-correcting code) physical memory (RAM).

• As specified by Postgres, do not use regular shared storage that is mapped to a network drive (Windows) or mounted as an NFS drive (Linux).

For more information, see PostgreSQL documentation.

Note: The database used by SAS Environment Manager, the SAS Deployment Backup and Recovery Tool, and certain SAS solutions such as SAS Visual Analytics is
PostgreSQL regardless of the database that you choose for the SAS Web Infrastructure Platform.

SAS enables you to use a database management system other than the SAS Web Infrastructure Platform Data Server for storing transactional data for the SAS middle tier and certain SAS solutions. (The deployment wizard asks you about this if you choose the Custom prompting level.) In SAS 9.4, the following third-party databases are supported:

- DB2
- MySQL
- Oracle
- PostgreSQL
- SQL Server

Third-party databases often have particular requirements that you need to know about, such as database name limits, minimum tablespace sizes, and so on. If you have not already done so, make sure that you review “Configuring an Alternate Database for SAS Web Infrastructure Platform Data Server” in the SAS Intelligence Platform: Installation and Configuration Guide.

If you want to use a third-party database, you must deselect Use SAS Web Infrastructure Platform Data Server on the SAS Web Infrastructure Platform Database: Data Server page during SAS installation and configuration.

Figure 7.6  SAS Web Infrastructure Platform Database: Data Server

On the SAS Web Infrastructure Platform: Database Type page, select the database type for the database that you plan to use.
The deployment wizard prompts you for additional information about your database, including a database name, user ID and password. The user ID that you specify must have permission to insert, update, and delete database records.

**Note:** If your site uses network-attached storage (NAS) or storage area network (SAN) systems that have been verified for use with database systems (such as Oracle and DB2), follow your storage provider’s instructions for configuration.

### Deploying SAS Home on a Separate Machine

Starting SAS Visual Analytics 7.2, SAS Home can be deployed in SAS solutions that do not include SAS Visual Analytics or SAS Visual Analytics Administration and Reporting. In addition, you can deploy SAS Home on a machine that does not contain the SAS Visual Analytics middle tier.

If you are deploying SAS Home on a machine that does not contain the SAS Visual Analytics middle tier, note the following:

- SAS Home must be configured before the SAS Visual Analytics applications can be configured.
- The search function is no longer required for SAS Home.

For more information, see “The SAS Visual Analytics Home Page” in *SAS Intelligence Platform: Web Application Administration Guide*.

### SAS Visual Analytics Sample Data

Starting with SAS Visual Analytics 7.3, sample objects are provided. During installation, the SAS Deployment Wizard prompts you to include sample reports by default.
After a successful initial configuration of SAS Visual Analytics Administrator, you should see **SAS Visual Analytics Sample** in the **Visual Analytics Samples** section of **SAS Home**.

When you load the SAS data set containing the samples, full reports are available and visible. If the administrator is not configured, no sample data is available.

For more information, see “Sample Objects” in **SAS Visual Analytics: Administration Guide**.

---

**Deploying SAS Visual Analytics Interactively**

Installing and configuring SAS Visual Analytics interactively with the deployment wizard consists of two main phases.

- Providing installation information such as the following:
  - deployment type (planned or unplanned)
  - deployment plan location (if planned)
  - machine type (single machine, server machine, and so on)
  - SAS components to be installed on the machine
  - valid paths to any required, pre-installed, third-party software

- Providing configuration information such as the following:
  - prompting level (Express, Typical, or Custom)
  - SAS components to be configured on the machine
  - configuration directory name
  - single sign-on preference (Windows only)
  - required user account credentials
  - server port numbers

This section describes the installation pages and some of the more important configuration pages that you encounter during the configuration phase of a SAS Visual Analytics deployment. The type and number of configuration pages that you get depend on the prompting level and the contents of your SAS Visual Analytics custom order.

To install and configure SAS Visual Analytics interactively, complete these steps:

1. If you are using HTTPS self-signed or site-signed certificates, you must deploy SAS Visual Analytics in the following way:
      Run the SAS Deployment Wizard in install mode.
   b. Add your self-signed and site-signed certificates to the trusted CA bundle.
      Use the trusted CA bundle tasks in the SAS Deployment Manager.
      Run the SAS Deployment Wizard in configure mode.

2. Make sure that you have reviewed all of the documents.

3. Verify that you have performed the previous required steps.
Note: A few pages into the SAS installation, the deployment wizard prompts you for paths to the required third-party software. The required third-party software must be installed on the current machine or the deployment wizard will not let you continue with the installation. In this situation, you need to end the deployment wizard session and install the required third-party software before you can continue.

4. If you are adding on SAS Visual Analytics or SAS Visual Analytics Administration and Reporting to an existing SAS 9.4 deployment, make sure that you first review “Add on SAS Visual Analytics Administration and Reporting” on page 151.

5. If you are deploying SAS LASR Analytic Server in non-distributed mode, you get fewer configuration prompts. You do not see any prompts about data providers and SAS High-Performance Computing Management Console.

6. If you use any garbage execution scripts, temporarily suspend these scripts during deployment. If any wizard temporary files are deleted during wizard execution, configuration failures can occur.

7. Review information about where to source certain SAS content repositories described in “SAS Metadata Repository Considerations” on page 74.

8. Log on to the machine on which you plan to install the SAS Visual Analytics server tier and middle tier (blade 0). Do not use root.

9. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot, and use the command appropriate for your operating system.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>setup.exe</td>
</tr>
<tr>
<td>Linux</td>
<td>setup.sh</td>
</tr>
</tbody>
</table>

Note: In SAS Visual Analytics 7.2 and later, the SAS Deployment Wizard automatically records your responses, regardless of whether you run the wizard with the -record option. This record of your wizard input is written to a file named ResponseRecord_yyyy-mm-dd-hh.mm.ss.log in one of the following locations: `C:\Users\SAS-Installer\AppData\Local\SAS \SASDeploymentWizard` (Windows) or `home-directory/.SASAppData/SASDeploymentWizard` (Linux).

You should see a welcome page.

10. Choose Language

Select the language for the deployment wizard, and click OK.

- From the drop-down list, select the language that you want the deployment wizard to use when it displays text.

  For more information, see “Locale and Encoding Considerations” on page 74.

11. If you have more than one SAS software order in your depot, the wizard prompts you to select the order in which you want to deploy. When you are finished, click Next.

12. Select Deployment Task
Select the deployment task that you want to perform, and click Next.

- Select Install SAS Software.

13. (UNIX) Specify SAS Home

Specify the location where you want to install SAS, and click Next.

- If you want to specify a different location other than the default, enter the location in SAS Home. Click Next.

**CAUTION:**
The directory path for the SAS installation directory (SAS Home) cannot contain parentheses. Using parentheses causes SAS Environment Manager scripts to fail.

Although your SAS installation directory (which the wizard refers to as SAS Home) and SAS configuration directories can share the same parent directory, one directory cannot reside inside another. Also, the SAS installation directory should not be a directory within your SAS Software Depot.

**CAUTION:**
*There should be one SAS installation directory (SAS Home) per SAS deployment. Therefore, when deploying multiple tiers on the same machine, the SAS installation directory should always be shared. By contrast, when deploying different versions of SAS on the same machine, there should be a unique SAS installation directory for each SAS version.*

*Note:* On Windows, the deployment wizard prompts you for the SAS installation directory (SAS Home) the first time you run the wizard. In any subsequent wizard sessions on the same machine, the wizard uses the previously specified location for SAS Home.

14. Select Deployment Type

Specify the type of deployment that you want to perform. Click Next.

- Confirm that Perform a Planned Deployment, Install SAS Software, and Configure SAS Software are all selected unless you are providing your own TLS certificates.
15. Specify Deployment Plan

Specify the type of deployment plan that you are using, and click Next.

- customized deployment plan

  Choose Specify the full path to a customized deployment plan, and click Browse to navigate to the plan file (plan.xml).

- standard deployment plan

  Select Select a standard deployment plan and the appropriate plan in the drop-down menu.

For more information, see “About Deployment Plans” on page 69.
16. Select Deployment Step and Products to Install

Select the machine on which you are installing software, and select the SAS products that you want to install. When you are finished, click **Next**.

- From the **Deployment Step** drop-down menu, select the machine on which you are installing software.

  **Note:** If you are deploying SAS on multiple machines, make sure that you are following the process described in “Installation Order Rules for Multiple Machine Deployments” in *SAS Intelligence Platform: Installation and Configuration Guide*.

  **Note:** When a machine has multiple deployment steps, the deployment wizard attempts to default to the correct step. In some cases, this can be difficult for the wizard to determine. Therefore, always be careful to choose the correct step and avoid merely choosing the default step.

For information about SAS Web Parts for Microsoft SharePoint, see “Deploying SAS Web Parts for Microsoft SharePoint” in *SAS Intelligence Platform: Installation and Configuration Guide*.

  **Note:** Starting with SAS Visual Analytics 7.1, if the server tier and middle tier are deployed on separate machines, these machines are no longer required to use operating systems in the same operating system family (for example, Red Hat Enterprise Linux 6.1, x86, 64-bit, and SUSE Linux Enterprise System 11 SP1, x86, 64-bit, are both in the same operating system family). The SAS Visual Analytics 7.1 server tier and middle tier—such as the SAS Metadata Server and the SAS Web Infrastructure Platform—can be located on machines that use different operating systems. For example, the SAS Visual Analytics server tier could reside on a Windows machine, and the SAS Visual Analytics middle tier could reside on a Linux x86 machine.

- All products in the table are installed by default. Deselect any products that you do not want to install. When you are finished, click **Next**.
Note: Included in your SAS 9.4 order are procedures that enable you to take advantage of additional functionality that is provided by SAS Viya. You must have a SAS Viya license to use the OPTNETWORK procedure and the procedures for these products:

- SAS Visual Data Mining and Machine Learning
- SAS Visual Statistics
- SAS Econometrics
- SAS Visual Forecasting

Note: If you are deploying a middle-tier node machine, make sure that SAS Web Application Server is selected.

Note: If you are deploying a SAS Data Management product, you should select a SAS Quality Knowledge Base product.

17. Specify SAS Installation Data File

Specify the path to your SAS installation data file, and click Next.

- Click Browse and locate your SAS installation data file.

The SAS installation data file contains information about the software that you have licensed for the current machine.

CAUTION:

Be careful to use the correct SAS installation data file that contains the SAS products that you are planning to install. Using an incorrect file can cause installation failure for SAS add-on products or other errors later when attempting to run SAS. For multiple machine deployments, during the clients step, choose the SAS installation data file for the server machine that is associated with the clients being installed.

18. Select Language Support
Select the languages for your SAS software to support, and click Next.

- Add additional languages that you want SAS software to support.

By default, SAS attempts to support all languages for which your machine’s operating system is configured.

19. Select Regional Settings

Select the language, region, and locale setting that affect how SAS displays text, numbers, currencies, dates, and times, and specify how SAS sorts data. Click Next.

- Accept the default value of English (United States) or select a different language, region, and locale in Language (Region) [Locale].

- Select Configure as a Unicode server if you want to configure SAS as a Unicode server.

For more information, see “Locale and Encoding Considerations” on page 74.

20. (UNIX) Select Authentication Type

(UNIX) Specify the type of authentication for this machine, and click Next.

- Select Use PAM Authentication if your system uses pluggable authentication modules (PAM).

In addition, you might need to update your PAM configuration files for SAS 9.4 to use PAM authentication. For more information, see the Configuration Guide for SAS Foundation for UNIX Environments.

If you are uncertain whether your system uses PAM for authentication, contact your system administrator.

Note: Do not select PAM authentication if you know that your system uses /etc/password or /etc/shadow authentication.

21. Specify Remote Communication Configuration

Specify the configuration for communication with the SAS Deployment Agent, and click Next.

- If you want to change the default port (5660) for communication with the SAS Deployment Agent, enter the new port in Port.

For more information, see “SAS Deployment Agents” on page 71.

- In Specify how to secure the remote connection, choose one of the following selections:
  - Select Generate credentials to secure the connection if you want the deployment wizard to create a self-signed certificate, generate a keystore, and import the certificate into the keystore.
  - Select Specify existing credentials to secure the connection if you have already implemented CA-signed, site-signed, or self-signed certificates. On the next page, the wizard prompts you for the keystore location and password.
  - Select Do not secure the connection if you do not want to secure SAS Deployment Agent communication or you have not yet implemented certificates.

You can set up certificates later on your own or by using the SAS Deployment Manager. Do not start the SAS Deployment Agent until you have completed the manual security configuration.
For more information, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.

22. (UNIX) Specify SAS Deployment Agent Truststore Credentials

23. The deployment wizard scans your machine to determine whether any SAS files are locked or do not have Write permission. If no action is required, click **Next**.
   
   - If the wizard lists any files in the text box, then while the wizard is still running, quit SAS, and add Write permission to each file listed. When you are finished, click **Next**.

24. If you use a third-party database, and SAS/ACCESS is a part of your order, select the software version for the third-party database.

   The wizard uses your selection to configure SAS/ACCESS for the correct version of the third-party database.

   Make sure that you perform any additional configuration on your system, such as installing the third-party database client and configuring the system environment for access to the native client libraries. For more information about the correct environment variables, go to *SAS Install Center Documentation*. Select an operating system and SAS version to locate the appropriate SAS Foundation configuration guide.

25. Review Required Software

   Review the list of third-party software that is required for the SAS software that you are installing on the current machine, and click **Next**. (The list depends on the SAS software that you are installing.)

   - On the subsequent pages, be prepared to provide paths to these third-party applications. The number of wizard pages varies depending on the SAS software that you are installing on the current machine.

   *Note:* You must provide valid paths to the third-party applications or the SAS Deployment Wizard will not let you continue with the installation.

   For more information, see the following resources:

   “Pre-installation Checklists for Third-Party Products” on page 63.


   Third-Party Software for SAS 9.4

26. Specify Software Location

   Specify the installation directory for the required software, and click **Next**.

   - In the field, enter the installation directory for the required third-party software.

27. Select Configuration Prompting Level

   Specify the amount of information that you want to configure by selecting one of three prompting levels. Click **Next**.

   - **Express**

     Displays the minimum set of wizard pages needed to complete the SAS configuration.

     *Note:* When deploying the SAS middle tier, the SAS Deployment Wizard automatically configures your SAS Web Application Server. To disable this feature, run the wizard using either the Typical or Custom prompting level.
Manually configuring your SAS middle tier is an advanced task and requires using other documents such as your Instructions.html file.

- **Typical**
  Displays the basic set of wizard pages needed to complete the SAS configuration.

- **Custom**
  Displays all the wizard pages to complete the SAS configuration.

28. Provide the remaining configuration information as the wizard prompts you for it.

*Note:* The following steps describe some of the more important pages that you encounter during the configuration phase of a SAS Visual Analytics deployment. The options for which the deployment wizard prompts you depend on which SAS products are identified in your deployment plan. In addition, in multiple-machine deployments, the options depend on which machine you are currently deploying. For information about all deployment wizard prompts, see the online Help.

**Specify Configuration Information**
Specify the directory for SAS configuration files and logs. Select a configuration level. Click **Next**.

- In **Configuration Directory**, select the directory for SAS configuration files and logs.
  
  In Linux environments, the Installer generally overrides the default configuration directory with the site’s preferred location (for example, /opt/sas/config). The Installer must have Write permission on this path.

- In **Configuration Level**, select the configuration level (for example, Lev1 indicates production).

*Note:* The last digit of the default port number reflects the configuration level. For example, when you select **Lev1**, the default port for the SAS Metadata Server is 8561. If you select another level, such as **Lev2**, the wizard changes the default port to 8562.

For more information, see “Overview of the Configuration Directory Structure” in *SAS Intelligence Platform: System Administration Guide*.

*Note:* Although your SAS installation directory and SAS configuration directory can share the same parent directory, one directory should not reside inside another. Specifying the configuration directory under the SAS installation directory or vice versa can lead to file permission issues because of the need to manage installed files differently from site-specific configurations.

**Local Machine Name**
Identify the local machine. Click **Next**.

- In **Fully-qualified Local Host Name**, enter the complete name of the local host.
  
  The fully qualified local host name typically takes the form of the local host name plus the domain name server (for example, MyMachine.example.com).

*Note:* As noted in RFC 952, underscores and whitespace characters are not allowed in host names.

**Tip** If you do not know the domain name server used at your site, check with your system administrator.
In **Short Local Host Name**, enter a short host name.

The short local host name is the abbreviated, more common name of the host, usually a single word (for example, MyMachine).

**Migration Information**
Specify whether to perform migration. Specify the path to the migration package. Click **Next**.

- Select **Perform migration** if you are migrating to SAS 9.4.

  *Note:* You can ignore this page unless you are migrating.

  See the instructions in “Overview of Migrating SAS Visual Analytics” on page 133.

**Authentication Domain**
Specify the authentication domain that SAS uses to authenticate logins to servers. Click **Next**.

- Accept the default value (DefaultAuth) unless you are planning to use a different authentication domain for servers on this machine. For example, if the SAS Metadata Server is on Windows and the SAS Workspace Server is on Linux, the workspace server might be assigned to a SAS authentication domain named LinuxAuth.

  For more information, see “Manage Authentication Domains” in *SAS Management Console: Guide to Users and Permissions*.

**Integrated Windows Authentication**
Specify whether you want to use Integrated Windows Authentication (IWA) for SAS client/server connections. Click **Next**.

- Select **Use Integrated Windows authentication (single sign-on)** to configure SAS Workspace Servers running on Windows or Linux to use IWA.

  IWA uses a single sign-on feature that allows a user’s identity, obtained from authentication to the user’s desktop, to be securely passed from the desktop to other processes such as the SAS Metadata Server and the SAS Workspace Server running on either Windows or Linux. The mechanism used is typically Kerberos, but on Windows, NTLM can be used.

  *Note:* If you choose to use IWA, you cannot also implement token-based authentication.

  You also encounter this page when deploying SAS Enterprise Guide and SAS Add-In for Microsoft Office. If you have not chosen IWA for the SAS Workspace Server, then choosing IWA for these products has no effect.


  A SAS Metadata Server running on Windows uses IWA by default. For more information, see “SSPI System Option” in *SAS Intelligence Platform: Application Server Administration Guide*. 
Token-based authentication
Specify whether you want to use token-based authentication for SAS client/server connections. Click Next.

- Select **Use SAS token authentication** to prompt clients of the SAS Workspace to request a token from the SAS Metadata Server.

  SAS client applications obtain a connection to the SAS Metadata Server and request a SAS token to connect to the SAS Workspace Server. For the workspace server to be launched, a launch credential is defined for the workspace server by the SAS Spawned Servers account.

  If token authentication is not used, SAS uses host authentication. Clients provide either an IWA token or a user name and password to authenticate to the workspace server.

  For more information, see “SAS Token Authentication” in *SAS Intelligence Platform: Security Administration Guide* and see “Host Authentication” in *SAS Intelligence Platform: Security Administration Guide*.

**Note:** If you use token-based authentication, you cannot also implement IWA.

**SAS Metadata Server**
Specify SAS Metadata Server information. Click Next.

- In **SAS Metadata Server Logical Name**, enter the logical name of the SAS Metadata Server. The maximum number of characters in the name is 60. Do not use special characters (for example, hyphens, underscores, and so on). Use characters appropriate for an operating system subdirectory name. On Linux, avoid shell characters that might cause unintended side effects.

  By default, SAS prefixes the logical name with the application server name (SASMeta). A logical server is a container for definitions of physical servers. A logical server can have one server component for each SAS server type.

- In **SAS Metadata Server Name**, enter the name of the SAS Metadata Server. The maximum number of characters in the name is 60. Do not use special characters (for example, hyphens, underscores, and so on). Use characters appropriate for an operating system subdirectory name. On Linux, avoid shell characters that might cause unintended side effects.

  By default, SAS prefixes the logical name with the application server name (SASMeta). A server name is the definition of a physical server. Servers are contained within a logical server (server component) that matches its server type (for example, a SAS Metadata Server definition is contained in a logical SAS Metadata Server).

- In **Host Name**, enter the name of the machine on which the SAS Metadata Server runs.

- In **Port**, enter the SAS Metadata Server listening port. If you choose to not accept the default value, refer to your completed Pre-installation Checklist for the value that you should enter.

For more information, see “Overview of the SAS Metadata Server and Its Initial Configuration” in *SAS Intelligence Platform: System Administration Guide*. 
SAS Metadata Server: Override Backup Location
Specify a different location for the SAS Metadata Server backup directory, if necessary. Click Next.

- If you want to change the location of the SAS Metadata Server backup directory, select **Override the default SAS Metadata Server backup directory**.

  When configuring a metadata server cluster, you must specify a network file system path accessible to all nodes in the cluster.

  For more information, see “Backing Up and Recovering the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*.

SAS Metadata Server: Repository Configuration
Specify the name and location of the metadata repositories and foundation repository. Click Next.

- **SAS Metadata Server Configuration Directory** is Read-only. It identifies the parent directory under which the metadata repositories and foundation repository reside.

  After deployment, you should apply appropriate operating system security on this directory. For more information, see “First-Priority Setup Tasks” in *SAS Intelligence Platform: Installation and Configuration Guide*.

- In **Metadata Repository Root Directory**, enter the location of the metadata repositories. This location must be specified as a path relative to the SAS Metadata Server Configuration Directory. Each metadata repository created during configuration is a subdirectory in this location. Do not use special characters (for example, hyphens, underscores, and so on). Use characters appropriate for an operating system subdirectory name. On Linux, avoid shell characters that might cause unintended side effects.

- In **Foundation Repository Name**, enter the name of the foundation repository and the name of the subdirectory (relative to the Metadata Repository Root Directory) in which the foundation repository is located. The maximum number of characters in the name is 60. Do not use special characters (for example, hyphens, underscores, and so on). Use characters appropriate for an operating system subdirectory name. On Linux, avoid shell characters that might cause unintended side effects.

SAS Metadata Server: Override Service Login Account
Specify whether you want to use a different service login account for the SAS Metadata Server. Click Next.

- If you want to change the service login account for the SAS Metadata Server, select **Specify the service login account for the SAS Metadata Server**. The LocalSystem account is the default Windows service login account for the SAS Metadata Server.

  When configuring a metadata server cluster on Windows, you must specify the external user account that is used to start the SAS Metadata Server. This user account must be the same account that you specify to start the other nodes. The deployment wizard automatically grants the **Log on as a service** Windows user right if the user account does not already have it.

  For more information, see “Backing Up and Recovering the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*.  

Chapter 7 • Deploying the Servers and Middle Tier
Deployment Accounts: Type of Accounts
Select the type of accounts to use for initial deployment SAS identities. Click Next.

- Select **Use SAS internal accounts when appropriate** for SAS to use accounts known only to SAS. Or, select **Use external accounts for all identities**.

  If you selected internal accounts, SAS creates and authenticates internal accounts in metadata rather than using an operating system account.

  **Note:** On Windows, whenever the deployment wizard prompts you for an external account, always enter a domain-qualified user account (for example, myDomain\myAccount).

  For more information, see “Internal User Accounts” on page 48.

External Account: Installer
Specify the operating system account (external account) used to initialize the SAS Metadata Server. Click Next.

- In **External User ID**, enter the user ID for the external account that you are using to install and configure SAS.

  Depending on the operating system, this account should meet the following requirements:

  Windows:
  Use a domain-qualified account that is available in the long term for future SAS maintenance. It must be a member of the Windows Administrators group.

  Linux:
  Use the same account on all machines on which you are deploying SAS. Do not use root.

- In **External Password**, enter the password for the user ID.

  For more information, see “Defining User Accounts” on page 48.

SAS Internal Account: Unrestricted Administrator
Enter the password for the first unrestricted administrator identity. Click Next.

- In **New Internal Password**, enter a password for the internal account (sasadm@saspw) that the wizard creates to serve as an unrestricted administrator for configuring the SAS Metadata Server.

  **Note:** Record this password because you will need it in the future.

- In **Confirm New Internal Password**, re-enter the password. Click Next.

  For more information, see “Defining User Accounts” on page 48.

- Select **Set passwords using the Unrestricted Administrator password** if you want to reuse this password for the internal SAS Metadata Server accounts and SAS Web Infrastructure Platform Data Server accounts during this deployment. Selecting this option when running the deployment wizard with the Express prompting level reduces the number of configuration prompts.

  **Note:** There are password restrictions for SAS Web Infrastructure Platform Data Server. Make sure that your password meets the criteria described in Make sure that your password meets the criteria described in “SAS Web Infrastructure Platform Data Server” in SAS Intelligence Platform: Middle-Tier Administration Guide.
For more information, see “Reducing the Number of Password Prompts” on page 70.

SAS Internal Account: Trusted User
Specify the password for the SAS Trusted User identity. Click Next.

- In **New Internal Password**, enter a password for the internal account (sastrust@saspw) that the wizard creates to enable SAS server and spawner components to communicate securely with each other.

  *Note:* Record this password because you will need it in the future.

- In **Confirm New Internal Password**, re-enter the password. Click Next.

For more information, see “Defining User Accounts” on page 48.

SAS BI Web Services: Authentication Method
Select the method by which users of SAS BI Web Services are authenticated. Click Next.

- In **Authentication Method**, make a selection.
- **SAS Authentication** is managed by the SAS Metadata Server.
- **Web Authentication** is managed by the SAS Web Application Server using container-based authentication or a third-party product.

Selecting **Web Authentication** has these effects:

- Web authentication for SAS BI Web Services for Java is partially configured. For more information, see “Secure SAS BI Web Services for Java” in *SAS Intelligence Platform: Middle-Tier Administration Guide*.
- There is no effect on BI web applications (such as SAS Web Report Studio, SAS Information Delivery Portal, and so on). You have to configure web authentication for these BI web applications.
- Web authentication prevents you from setting up an anonymous web user (as this is incompatible with web authentication).

Anonymous Web Access
When using SAS authentication, select this option to set up a SAS identity for anonymous access to certain web services and web applications that support this feature. Click Next.

- Select **Enable anonymous web access** to set up a SAS identity for anonymous access to certain web services and web applications that support this feature.

SAS BI Web Services for Java and .NET, the SAS Stored Process Web Application, and SAS Visual Analytics Guest Access are the only components that support this feature.

For more information, see “PUBLIC Access and Anonymous Access” in *SAS Intelligence Platform: Security Administration Guide*.

SAS Internal Account: Anonymous Web User
Enter the password for the anonymous web user identity. Click Next.

- In **New Internal Password**, enter a password for the internal SAS account that the wizard uses to grant clients access to applicable SAS Web Infrastructure Platform applications such as SAS BI Web Services and the SAS Stored Process Web Application.
When SAS authentication is being used and the user has not preemptively specified credentials, the client is given access to these applications under the anonymous web user identity.

For more information, see “Use the SAS Anonymous Web User with SAS Authentication” in SAS Intelligence Platform: Middle-Tier Administration Guide.

**Note:** Record this password because you will need it in the future.

- In **Confirm New Internal Password**, re-enter the password. Click **Next**.

SAS Visual Analytics: Allow Guest Access
Specify whether to allow anonymous access to a subset of SAS Visual Analytics resources and functionality. Click **Next**.

- Select **Guest Access Permitted** to allow guest access to a subset of SAS Visual Analytics applications.

Guest access is an optional feature. All users who connect to a guest access URL are authenticated as the same service account (the SAS Anonymous Web User), which functions as the single surrogate identity for all connecting users. Guest access is not compatible with web authentication.

**Tip** If you are unsure about whether to allow guest access in SAS Visual Analytics, you can create the SAS Anonymous Web User, and then easily add guest access after installation.

For more information, see “Supporting Guest Access” SAS Visual Analytics: Administration Guide.

External Account: SAS Spawned Servers Account
Specify the credentials used to launch the back-end SAS Stored Process Server and SAS Pooled Workspace Server. Click **Next**.

- In **External User ID**, enter the user ID to start the SAS Pooled Workspace Server and the SAS Stored Process Server.

**Note:** On Windows, enter a domain-qualified user ID.

- In **External Password**, enter the password for the external user ID.

**Note:** Record this password because you will need it in the future.

For more information, see “Defining User Accounts” on page 48.

Server Encryption
Select the encryption level and algorithm that SAS clients and servers use to connect to the SAS Metadata Server. Click **Next**.

- In **Encryption Level**, select **Credentials** to encrypt only login credentials. Select **Everything** to encrypt all communication with the SAS Metadata Server.

Selecting **Everything** can affect your SAS performance.

- In **Encryption Algorithm**, you can specify an encryption algorithm other than SAS Proprietary. Available algorithms are RC2, RC4, DES, Triple DES, and AES.

For more information, see “Encryption Model” in SAS Intelligence Platform: Security Administration Guide and Encryption in SAS.
Client-side Credentials Policy
Specify whether users are allowed client-side storage of credentials. Click Next.

- Select **Allow users to save credentials in client-side connection profiles** to allow users to save their user IDs and passwords in client-side connection profiles.

When this option is selected, SAS enables the OMA_SASSEC_LOCAL_PW_SAVE option in the omaconfig.xml file.

For more information, see “Reference Information for omaconfig.xml” in *SAS Intelligence Platform: System Administration Guide*.

Estimated System Size
Estimate the size of your system based on user number and workload size. Click Next.

- In **Size Estimate**, select **Large System**, and click Next.

After you have deployed, you can change JVM values and any other necessary parameters in the following file:

- **Linux**:
  
  `SAS-configuration-directory/Web/WebApp/SAS1_1/bin/setenv.sh`

- **Windows**:
  
  `SAS-configuration-directory\Web\WebApp\SAS1_1\bin`

For more information, see “Initial Sizing and Tuning Configuration Options for Deployments” in *SAS Web Applications: Tuning for Performance and Scalability*.

E-mail Server
Specify email server information. Click Next.

- In **Host Name**, enter the host name for an SMTP email server at your site. SAS uses this server to send alerts for system-related issues to an administrator (for example, the SAS Metadata Server detects a journaling issue).

The wizard uses this email server as the default for the application server to provide email services to various SAS clients. For example, with SAS Data Integration Studio, you can use a Publish to Email transformation to alert users about various data changes. For the SAS BI Dashboard to send alerts by email to dashboard users and administrators, the port and host name must be configured for the email server.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 56 and “Managing Alert Email Options for the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*.

- In **Port**, enter the port that the SMTP email server uses.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 56 and “Managing Alert Email Options for the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*. 

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SAS Application Server: Server Context
Enter the name of the SAS Application Server. Click Next.

- In **SAS Application Server Context Name**, accept the default name (SASApp) or enter a different name. The wizard creates this name in SAS metadata.

  A server context is a SAS IOM server concept that describes how SAS Application Servers manage client requests. A SAS Application Server has awareness (or has context) of how it is being used and it makes decisions based on that awareness. The server context name is prepended to all server names specified in the server context.

  **Note:** The server context name must be unique and cannot contain spaces.

For more information, see “Overview of SAS Application Servers” in *SAS Intelligence Platform: Application Server Administration Guide*.

SAS Pooled Workspace Server
Specify SAS Pooled Workspace Server information. Click Next.

- In **Logical SAS Pooled Workspace Server Name**, enter the name of the logical SAS Pooled Workspace Server. The wizard creates this name in SAS metadata.

- In **SAS Pooled Workspace Server Name**, enter the name of the SAS Pooled Workspace Server. The wizard creates this name in SAS metadata.

- In **Host Name**, enter the name of the machine on which the SAS Pooled Workspace Server runs. The machine name should match the name specified for the machine on which the SAS Object Spawner runs.

- In **Port**, enter the port on which the SAS Object Spawner listens for client requests to launch SAS Pooled Workspace Servers.

For more information, see “Overview of Workspace Servers and Stored Process Servers” in *SAS Intelligence Platform: Application Server Administration Guide*.

SAS Web Infrastructure Platform Data Server
Specify SAS Web Infrastructure Platform Data Server information. Click Next.

- In **Host Name**, enter the fully qualified host name of the SAS Web Infrastructure Platform Data Server. Or, accept the default value.

  The default value is the host name where the deployment wizard is currently running. In most cases, the default value is correct. However, a machine can have more than one network interface card (NIC) or host name alias. If so, see your Pre-installation Checklist to determine whether the default value is correct.

- In **Port**, enter the TCP/IP port number on which SAS Web Infrastructure Platform Data Server listens. Or, accept the default value.

- In **Data Administrator**, enter the user ID for the user administering SAS Web Infrastructure Platform Data Server.

- In **Data Administrator Password**, enter the password for the user ID associated with the SAS Web Infrastructure Platform Data Server administrator.

  **Note:** There are password restrictions for SAS Web Infrastructure Platform Data Server. Make sure that your password meets the criteria described in “SAS
Web Infrastructure Platform Data Server” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Note: Record this password because you will need it in the future.

- In Confirm Password, re-enter the password, and click Next.

For more information, see “Reviewing Third-Party Database Requirements” on page 78.

SAS Web Server: Automated or Manual Configuration Option
Specify whether you want the wizard to configure the SAS Web Server automatically. Click Next.

- If you want to configure the SAS Web Server manually, clear Configure SAS Web Server automatically.

Select this option for the deployment wizard to automatically build and configure the SAS web applications and to configure a sample SAS Web Server for use with SAS 9.4. (To use this wizard feature, make sure that your SAS Web Application Server is not running before proceeding.)

It is strongly recommended that you choose to automatically configure the SAS Web Server. If you need to make changes to the SAS Web Server after the automatic configuration, there are tools to help you reconfigure it.

For more information, see “Scripting Tool for SAS Web Application Server” in SAS Intelligence Platform: Middle-Tier Administration Guide.

If you choose not to automatically configure your SAS Web Server, you are prompted for the SAS Web Application Server information, and deployment stages such as configure products, deploy web applications, and start SAS Web Application Servers execute to create instructions for manual configuration. When configuration is completed, follow the manual instructions about how to configure your SAS Web Server and deploy your SAS web applications available at http://support.sas.com/resources/thirdpartysupport/v94/appservers/index.html. (Select the product name of your SAS Web Application Server.)

Note: Manually configuring your SAS middle tier is an advanced task and requires using other documents such as your Instructions.html file.

SAS Web Server: Configuration
Specify SAS Web Server information. Click Next.

- The standard port for HTTP traffic is 80. If you want to change this for SAS Web Server, then specify a new port number in HTTP Port.

Note: On Linux systems, you must start servers as root if you want them to listen on ports lower than 1024. You should install and configure as a less-privileged user, and then start SAS Web Server manually as root.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 56 and “Managing Alert Email Options for the SAS Metadata Server” in SAS Intelligence Platform: System Administration Guide.

- The standard port for TLS traffic is 443. If you want to change this port for SAS Web Server, then specify a new port number in HTTPS Port. (See earlier note.)

- In Configured Protocol, select the communication protocol for SAS Web Server. There are two choices, HTTP Protocol (unsecured) and HTTP Protocol using Secure Sockets (secured).
If you select HTTP Protocol using Secure Sockets, an X.509 certificate and RSA private key are required. The deployment wizard prompts you for the paths to these items on a later page. You can enter locations for these items or provide information to create them.

For more information, see \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

- In \textbf{Administrator Mail Address}, enter an email address for email to be sent to the SAS Web Server administrator.

**Web Application Server: Multiple Servers**

Specify whether to configure multiple SAS Web Application Servers on which to deploy SAS web applications. Click \textbf{Next}.

- Select \textbf{Configure multiple servers} to have the deployment wizard automatically configure multiple SAS Web Application Servers for you. The deployment wizard uses SAS best practices for choosing the best server to deploy each web application to.

  In some situations, it might be preferable to split the SAS web applications across multiple SAS Web Application Servers. This is usually done for performance reasons.

  If you choose to manually configure your SAS Web Application Servers, you are provided with recommended configuration values in a generated file (Instructions.html) when the deployment wizard completes.

  More advanced performance configuration considerations are documented in \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

**Web Application Server: Server Configuration**

Specify the SAS Web Application Server name and JVM options. Click \textbf{Next}.

- In \textbf{Server Name}, enter a logical name for your SAS Web Application Server. This name is displayed in your SAS Web Application Server administrative console and used in administrative scripting.

  A suffix is automatically added to the name to distinguish cluster members. For example, if the name SAS1 is entered, the actual name is SAS1_1. If the cluster member multiplier provided on the next wizard page is greater than 1, additional servers are created with unique suffixes. For example, if the multiplier is 2, then servers named SAS1_1 and SAS1_2 are created.

  \textbf{CAUTION:}  
  
  The server name cannot contain special characters (for example, periods, colons, underscores, and so on).

  \textbf{CAUTION:}  
  
  The server name must be unique. Non-unique names cause your web configuration to fail.

- In \textbf{Additional JVM Options}, enter any additional Java options that you want the SAS Web Application Server JVM to use. These JVM options are appended to the end of the server’s command line. Deployment wizard default options can be overridden in this way.

  Enter any additional Java options that you want the SAS Web Application Server JVM to use. These JVM options are appended to the end of the server's command line. Deployment wizard default options can be overridden in this way.
Note: Determine whether the machine that you are deploying SAS on has these characteristics:

• Uses IPv6 (Internet Protocol Version 6)
• Runs Windows
• Communicates with the SAS Foundation server tier.

If it does, then you must add the following JVM start-up options either now or later to your SAS Web Application Server start-up script:

• `-Djava.net.preferIPv4Stack=false`
• `-Djava.net.preferIPv6Addresses=true`

For more information, see “Designating Ports and Multicast Addresses” in SAS Intelligence Platform: Installation and Configuration Guide.

Web Applications: Automatic Deployment

Specify whether you want the deployment wizard to automatically deploy SAS web applications to the SAS Web Application Server. Click Next.

• Select **Deploy web applications automatically** for the deployment wizard to automatically deploy SAS web applications to the SAS Web Application Server.

If you do not choose to deploy SAS web applications automatically, manual deployment instructions are written to the Instructions.html file during the web application deployment stage.

Note: Manually deploying your SAS web applications is an advanced task and requires using other documents such as your Instructions.html file.

Regardless of whether you choose to automatically deploy your SAS web applications, when building web applications, the deployment wizard automatically explodes enterprise application archive (EAR) files.

For more information, see “Deploy Content Manually to the SAS Content Server” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Web Applications: White List of Sites Allowed to Link to This SAS Installation

Enter a comma-delimited list of additional known hosts and domains to trust. Click Next.

• In **URLs White List**, enter a comma-delimited list of additional known hosts and domains to trust in the following form:

  `http|https://host[:port] | domain/ , ...`

  The valid URLs whitelist can include just a list of host names to trust. The valid URLs whitelist can also include wildcards such as * for host name and domain.

  Note: The port number must be specified if the whitelisted site uses port numbers other than the standard 80 for HTTP or 443 for HTTPS.

  For example:

  `https://myserver:443/, http://example.com`

  For security reasons, you must list any host name URL for any site that could redirect browsers to your software. This might include corporate sites linking to your software for reporting purposes or single sign-on servers.
For example, if \url{https://corporatePortal.company.com/} links to your server, then enter \url{https://corporatePortal.company.com/} as one entry. This field enables you to add additional known hosts and domains to a preset list automatically created by the SAS configuration process.

For more information, see “Configure the Cross Domain Proxy Servlet through a Whitelist” in \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

- Select \textit{Enter advanced options for URL white list handling} to display an additional page on which you can specify advanced options for the whitelist.

SAS Content Server: Repository Directory
Specify SAS Content Server information. Click \textit{Next}.

- In \textit{Repository Directory}, enter the location for the SAS Content Server indexes and repository configuration file. Click \textit{Browse} to search for this location.

For more information, see “Administer the SAS Content Server” in \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

- Select \textit{Start initial node as clustered} if this machine is (or might be) part of a clustered deployment.

\textbf{CAUTION:}

If you enable this option, you must establish a central backup vault for the SAS Deployment Backup and Recovery Tool. Starting in SAS 9.4M2, a vault is no longer required for clustered SAS Content Servers.

Deselect \textit{Start initial node as clustered} if you are not deploying the SAS middle tier on a machine cluster. (This option enables journaling and the necessary cluster synchronization processes.)

If you redeploy the SAS middle tier on a machine cluster in the future, you can manually specify the Java system property \texttt{-Dcom.sas.server.isclustered=true} and restart the initial application server node. For more information, see “Add a Horizontal Cluster Member” in \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

SAS Environment Manager: Administration Database Configuration
Specify SAS Environment Manager information. Click \textit{Next}.

- In \textit{User ID}, enter the user ID for accessing the database used with your SAS Web Infrastructure Platform Database tables. This user ID must have the ability to insert, update, and delete records.

    By default, the SAS Environment Manager uses the Administration database on the SAS Web Infrastructure Platform Data Server. If you are using the SAS Web Infrastructure Platform Data Server, the user ID is Read-only.

    For more information, see “SAS Web Infrastructure Platform Data Server” in \textit{SAS Intelligence Platform: Middle-Tier Administration Guide}.

- In \textit{Password}, enter a valid password for the user ID.

    \textit{Note:} Record this password because you will need it in the future.

- In \textit{Confirm Password}, re-enter the password.
SAS Internal Account: SAS Environment Manager Service Account
Specify the password for the SAS Environment Manager Service. Click Next.

- In **SAS Environment Manager Service Account Password**, enter a password for the SAS Environment Manager Service account (sasevs@saspw).

  The password must contain at least six characters. Make sure that you enter the same password that was specified in any previous SAS Environment Manager configuration prompts.

  **Note:** Record this password because you will need it in the future.

  This account is required for the SAS Environment Manager Service and its agent to communicate while monitoring the processes in your SAS deployment. This internal SAS account has unrestricted administrative access rights to the SAS Metadata Server.

- In **Confirm Password**, re-enter the password.

SAS Environment Manager: Database Configuration
Specify SAS Environment Manager database information. SAS Environment Manager is a default Postgres database provided by SAS that stores collected server metrics. Click Next.

- In **Database User**, enter a user ID for accessing the SAS Environment Manager database.

- In **Database User Password**, enter a valid password for the user ID associated with the database account.

  **Note:** Record this password because you will need it in the future.

- In **Confirm Password**, re-enter the password.

- In **Database Encryption Passphrase**, enter a valid passphrase key for encrypting and decrypting the SAS Environment Manager database user password.

  The key must be at least eight characters long and can contain letters and numbers only.

  **Note:** Record this passphrase because you will need it in the future.

- In **Confirm Database Encryption Passphrase**, re-enter the passphrase key. Click Next.

SAS Visual Analytics Data Provider
Select the data provider to be used with SAS Visual Analytics, and click Next.

- In **SAS Visual Analytics High-Performance Data Provider**, select Non-distributed LASR, and click Next.

- In **SAS Visual Analytics High-Performance Data Provider**, select the data provider to be used with SAS Visual Analytics.

  The supported values are co-located Hadoop; Hadoop, Greenplum, or Teradata with the SAS Embedded Process; and MapR that is mounted on a shared NFS drive.

  **Tip** If you are planning to use SAS Visual Analytics with co-located Hadoop now or in the near future, select **Hadoop (co-located HDFS)**. If you are not planning to use SAS Visual Analytics with co-located Hadoop, then select **Hadoop (with SAS embedded process)**.
For more information, see “Configuring Existing Hadoop Clusters” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

**Note:** If you are using HANA or Oracle, make sure that you choose Greenplum (with SAS embedded process) and configure your provider after running the wizard manually. For more information, see SAS 9.4 In-Database Products: Administrator’s Guide.

This configuration page appears only when your SAS order also contains a license for the distributed SAS LASR Analytic Server. If your SAS order also contains a license for the non-distributed SAS LASR Analytic Server, you can select Non-distributed LASR.

### SAS Visual Analytics High-Performance Configuration Information

Specify SAS High-Performance Analytics environment information. Click **Next**.

- **In SAS High-Performance Analytics Environment Host**, enter the fully qualified machine name in the cluster to which the SAS clients connect.

- **In SAS High-Performance Analytics Environment Port**, enter the port number for the environment through which the SAS clients connect. (By default, the port is 10010.)

  For more information, refer to “Pre-installation Checklist for Ports for SAS” on page 56.

- **In Signature files location**, specify the absolute path where the SAS LASR Analytic Server writes signature files.

  If you are using SAS LASR Analytic Server in distributed mode, specify a path located on the SAS High-Performance Analytics environment root node. If you are using a non-distributed SAS LASR Analytic Server, specify a path located on the local machine.

  It is important to carefully manage access to the signature files directory. User IDs under which certain activities are performed (for example, starting a server or loading data) must have Write access to the signature files directory. Access to a signature files directory can provide access to loaded data. Therefore, the signature files directory should be protected against unauthorized access. For more information, see “Signature Files” in the SAS Visual Analytics: Administration Guide.

- **In Location of the TKGrid or TKGrid_REP Installation on the SAS High-Performance Analytics Environment**, specify the absolute path to the TKGrid directory or the TKGrid_REP directory on the root node host (for example, /opt/TKGrid).

  Specify the TKGrid_REP directory when you are feeding your SAS High-Performance Analytics environment with parallel loads from a remote (not co-located) data provider.

  **Tip** Be sure not to leave any whitespace characters at the end of the path because whitespace characters can cause problems when you attempt to submit SAS LASR Analytic Server jobs later.

  For more information, see “Install the Analytics Environment” or “Configure for Access to a Data Store with a SAS Embedded Process” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

- **In SAS High-Performance Computing Management Console URL**, enter the URL used to access SAS High-Performance Computing Management Console. (By default, the URL is http://local_host_name:10020.)
For more information, see the SAS High-Performance Computing Management Console: User’s Guide.

• In **Location for the SAS linguistic distributed binaries**, specify the directory on disk that stores the SAS linguistic binary files. In order for certain HPA procedures and text analysis to work, these binary files are required.

SAS Visual Analytics Data Provider: Hadoop
Specify Hadoop configuration information. Click **Next**.

• In **Hadoop NameNode Host**, specify the machine in the HDFS cluster that is the Hadoop NameNode.

• In **Hadoop NameNode Port**, enter a port number for the HDFS NameNode service, which runs only on the NameNode in the HDFS cluster. This value maps to the Hadoop property `com.sas.lasr.hadoop.service.namenode.port`.

For more information, see the Configuration Guide for SAS 9.4 Foundation for UNIX Environments.

• In **Hadoop NameNode Authentication Domain**, enter the domain to use for identifying logins that access the Hadoop NameNode machine.

  The authentication domain is a metadata construct that pairs each login with the servers for which that login is valid. The authentication domain provides logical groupings for resources and logins in a metadata repository. This ensures that resources use the same authentication process.

  For example, when an application needs to locate credentials that enable a particular user to access a particular server, the application searches the metadata for logins that are associated with the authentication domain in which the particular server is registered.

• In **Library Name**, enter the library name for the Hadoop library.

• In **Libref**, enter the libref for the Hadoop library.

• In **Hadoop Path**, enter the path to the database for the Hadoop data server.

SAS Visual Analytics Data Provider: Greenplum
Specify the requested Greenplum information to create a remote parallel connection with the SAS High-Performance Analytics environment. Click **Next**.

• In **Greenplum Database Host**, enter the name of the Greenplum Data Computing Appliance. Host name, fully qualified host name, or an IP address are valid values.

• In **Greenplum Database Port**, enter the port for the database.

• In **Greenplum Database Authentication Domain**, enter the domain associated with metadata identities that can access the Greenplum Data Computing Appliance.

  The authentication domain is a metadata construct that pairs each login with the servers for which that login is valid. The authentication domain provides logical groupings for resources and logins in a metadata repository. This ensures that resources use the same authentication process.

  For example, when an application needs to locate credentials that enable a particular user to access a particular server, the application searches the metadata for logins that are associated with the authentication domain in which the particular server is registered.
• In Library Name, enter the library name for the Greenplum library.
• In Libref, enter the libref for the Greenplum library.
• In Greenplum Database, enter the database name of the Greenplum database.
• For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Visual Analytics Data Provider: Greenplum (Schema)
Specify the requested additional Greenplum information. Click **Next**.

• In Greenplum Database Schema, enter the database schema name for the Greenplum database. Click **Next**.
• For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Visual Analytics Data Provider: Teradata
Specify the requested Teradata information to create a remote parallel connection with the SAS High-Performance Analytics environment. Click **Next**.

• In Teradata Data Host, enter the name of the Teradata Managed Cabinet. Host name, fully qualified host name, or an IP address are valid values.
• In Teradata Data Authentication Domain, enter the domain associated with metadata identities that can access the Teradata Managed Cabinet.
  The authentication domain is a metadata construct that pairs each login with the servers for which that login is valid. The authentication domain provides logical groupings for resources and logins in a metadata repository. This ensures that resources use the same authentication process.
  For example, when an application needs to locate credentials that enable a particular user to access a particular server, the application searches the metadata for logins that are associated with the authentication domain in which the particular server is registered.
• In Library Name, enter the library name for the Teradata library.
• In Libref, enter the libref for the Teradata library.
• In Teradata Database, enter the database name of the Teradata Managed Cabinet.
• For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Visual Analytics Public Data Library: Hadoop
Specify public data library information for Hadoop. Click **Next**.

• In Library Name, enter the library name for the public Hadoop library.
• In Hadoop Path, enter the path to the database for the public Hadoop data server.
• In Libref, enter the libref for the public Hadoop library.
• For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.
SAS LASR Analytics Server Monitor Hadoop Options
Specify SAS LASR Analytic Server Monitor Hadoop options. Click Next.

- In **Enable SSH**, enter `true` or `false` to indicate whether SSH-based communication should be used.

**CAUTION:**

If you set this property to `false`, your environment becomes unsecure. See “hadoop.plugins.use.ssh” on page 116.

- In **SSH Command Path**, enter a command to invoke SSH (on the machine where SAS Environment Manager Administration runs). On Windows, make sure this field is cleared and left blank.

- In **SSH Options**, enter SSH command options. Separate options with a space. Individual options cannot contain quotation marks or shell-provided syntax (such as “~”). On Windows, make sure this field is cleared and left blank.

- In **Hadoop Install Path**, enter the installation directory (home path) for Hadoop. See “hadoop.plugins.hadoop.home” on page 116.

- In **STDERR Redirection**, enter a directory path to which standard is redirected.

SAS Visual Analytics Public Data Library: Greenplum
Specify public data library information for Greenplum. Click Next.

- In **Library Name**, enter the library name for the public Greenplum library.

- In **Libref**, enter the libref for the public Greenplum library.

- In **Greenplum Database**, enter the database for the public Greenplum data server.

- In **Greenplum Database Schema**, enter the database schema for the public Greenplum data server.

- For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Visual Analytics Public Data Library: Teradata
Specify public data library information for Teradata. Click Next.

- In **Library Name**, enter the library name for the public Teradata library.

- In **Libref**, enter the libref for the public Teradata library.

- In **Teradata Database**, enter the database for the public Teradata data server.

- For more information, see “Configuring the Analytics Environment for a Remote Parallel Connection” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

SAS Visual Analytics Public Data Provider
Specify a library definition for a public, non-distributed SAS LASR Analytic Server data provider. Click Next.

- In **Data Reload Library Name**, enter the name for the Reload library.

- In **Data Reload Libref**, enter the libref for the Reload library.

- In **Data Reload Path**, enter the absolute path to the Reload library.
SAS LASR Analytic Server Monitor Configuration Information
Specify SAS LASR Analytic Server Monitor configuration information. Click Next.

- In SAS LASR Analytic Server Monitor Host, enter the Monitor host name.
- In SAS LASR Analytic Server Monitor RMI Registry Port, enter the Remote Method Invocation (RMI) port that the Server Monitor listens on for activity.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 56.

SAS Visual Analytics Public Data Library Information
Confirm the port for the SAS High-Performance Analytics environment to which the SAS clients connect. Click Next.

- In SAS Visual Analytics Public Data Library Port, confirm the port number for the SAS High-Performance Analytics environment to which the SAS clients connect.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 56.

SAS Visual Analytics: SAS LASR Analytic Server Library
Specify SAS LASR Analytic Server information. Click Next. You can modify these properties after installation by using SAS Management Console.

- In Library Name, enter the name for the SAS LASR Analytic Server library.
- In Libref, enter the libref for the SAS LASR Analytic Server library.

SAS Visual Analytics Transport Service: Whitelist Mobile Devices
Specify whether to enforce a whitelist for SAS Visual Analytics Apps, and click Next.

- Select Enforce whitelist for mobile devices to use a whitelist to control access to SAS Visual Analytics Apps.

A deployment enforces either the blacklist or the whitelist. If the whitelist is not selected to be enforced, the blacklist is enforced by default. If the whitelist is enforced, only devices that are on the whitelist can use SAS Visual Analytics Apps. If the blacklist is enforced, any device that is not on the blacklist can use SAS Visual Analytics Apps. Although only one list is enforced, you can make changes to both lists.

For more information, see SAS Visual Analytics: Administration Guide.

SAS Visual Analytics: Protocol for OpenStreetMap Server
Specify the protocol for how SAS Visual Analytics communicates with the OpenStreetMap server hosted by SAS. Click Next.

- In OpenStreetMap Communication Protocol, select a protocol to use for standard web browser communication.

Available options are HTTP Protocol (default) and HTTPS Protocol (secure).

Using the HTTPS protocol can result in performance degradation because of additional communication and encryption.

For more information, see “OpenStreetMap ” in the SAS Visual Analytics: Administration Guide.
SAS Visual Analytics Sample Reports
Decide whether to include nearly 13 GB (or more) of data and reports to help you get started. Click Next.

- Select Include Visual Analytics Sample Reports to install sample SAS Visual Analytics reports with your configuration.

Quick links to these reports are available on the SAS Visual Analytics home page. The sample data is loaded when the associated server (public LASR analytic server) starts. For information about how to manage this sample content, see “Sample Objects” in the SAS Visual Analytics: Administration Guide.

SAS Visual Analytics: Configure ArcGIS Server
Specify whether to configure an Esri ArcGIS server. Click Next.

- Select Configure ArcGIS to configure an ArcGIS server. If this option is not selected, then the deployment wizard skips ArcGIS server configuration.

For more information, see “Esri ” in the SAS Visual Analytics: Administration Guide.

SAS Visual Analytics: Access to Geo Map Server URLs
Indicate whether to enable outbound access from SAS Visual Analytics applications to necessary geo map server URLs by adding them to the cross domain proxy servlet whitelist. Click Next.

- Select Add the necessary geo map URLs to the whitelist to add OpenStreetMap servers (hosted by SAS) and your specified ArcGIS server (optional) to the cross domain proxy servlet whitelist.

If you do not select this option, geo map functionality might be incomplete.

After installation is completed, you can review and modify the whitelist in the Configuration Manager in SAS Management Console (on the SAS Application Infrastructure node via the sas.web.cdps.knownHosts property).

For more information, see “Configure the Cross Domain Proxy Servlet through a Whitelist” in SAS Intelligence Platform: Middle-Tier Administration Guide.

SAS Visual Analytics Hyperlink Service: Context Root
Specify the context root. Click Next.

- In Context Root for SAS Visual Analytics Hyperlink Service, enter the context root.

The form of the URL for SAS Visual Analytics Service Hyperlink Service is http://machine:port/SASVisualAnalytics. Although the machine and port are configured elsewhere and typically apply to the web container as a whole, the SASVisualAnalytics portion is the context root, and you can change it (within the constraints of URL rules).

SAS Visual Analytics Designer: Context Root
Specify the context root. Click Next.

- In Context Root for SAS Visual Analytics Designer, enter the context root.

The form of the URL for SAS Visual Analytics Designer is http://machine:port/SASVisualAnalyticsDesigner. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the SASVisualAnalyticsDesigner portion is the context root, and you can change it (within the constraints of URL rules).
SAS Visual Analytics Hub: Context Root
Specify the context root. Click Next.

- In **Context Root for SAS Visual Analytics Hub**, enter the context root.

  The form of the URL for SAS Visual Analytics Hub is http://machine:port/SASVisualAnalyticsHome. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the **SASVisualAnalyticsHome** portion is the context root, and you can change it (within the constraints of URL rules).

SAS Visual Analytics Report Viewer: Context Root
Specify the context root. Click Next.

- In **Context Root for SAS Visual Analytics Report Viewer**, enter the context root.

  The form of the URL for SAS Visual Analytics Report Viewer is http://machine:port/SASVisualAnalyticsReportViewer. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the **SASVisualAnalyticsReportViewer** portion is the context root, and you can change it (within the constraints of URL rules).

SAS Visual Analytics Admin: Context Root
Specify the context root. Click Next.

- In **Context Root for SAS Visual Analytics Admin**, enter the context root.

  The form of the URL for SAS Visual Analytics Administrator is http://machine:port/SASVisualAnalyticsAdministrator. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the **SASVisualAnalyticsAdministrator** portion is the context root, and you can change it (within the constraints of URL rules).

SAS Visual Analytics Graph Builder: Context Root
Specify the context root. Click Next.

- In **Context Root for SAS Visual Analytics Graph Builder**, enter the context root.

  The form of the URL for SAS Visual Analytics Graph Builder is http://machine:port/SASVisualAnalyticsGraphBuilder. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the **SASVisualAnalyticsGraphBuilder** portion is the context root, and you can change it (within the constraints of URL rules).

SAS Visual Data Builder: Context Root
Specify the context root. Click Next.

- In **Context Root for SAS Visual Data Builder**, enter the context root.

  The form of the URL for SAS Visual Data Builder is http://machine:port/SASVisualDataBuilder. Although the machine and port are configured elsewhere and they typically apply to the web container as a whole, the **SASVisualDataBuilder** portion is the context root, and you can change it (within the constraints of URL rules).

SAS Deployment Backup and Recovery Tool: Enable Central Vault
Indicate whether to use a central backup vault for the SAS Deployment Backup and Recovery Tool. Click Next.

- Select **Enable central vault storage of backup files** to enable central storage of backup files by specifying a network-accessible vault directory.
CAUTION:
If your SAS deployment is not current SAS 9.4M2, then a central backup vault directory is required if your middle-tier environment includes a clustered SAS Content Server.

The default value for the central backup vault directory is kept blank. The feature of storing backup files at a central location is disabled by default.

To enable this feature, provide a directory shared across all the tiers. The default retention period for a backup is 30 days. If the configuration that you are performing requires a backup at a central shared location and you want to change the retention period, change the Retention period.

(On Windows only) Provide a valid operating system (external) user account and password to execute commands using the SAS Deployment Agent. This user account must have the following characteristics:

• It must be an external account that has access to and sufficient privileges for each host machine to be included in the backup.

• It must be known to the host machine that contains the central vault.

• It must have Read and Write access to the following directories:
  • the central vault directory
  • $SAS-configuration-directory/SASMeta/Metadata

For more information, see “Using the Deployment Backup and Recovery Tool” in SAS Intelligence Platform: System Administration Guide.

29. Deployment Summary

Review software that the deployment wizard plans to install and configure.

• When you see the Deployment Summary page, the deployment wizard has finished collecting installation and configuration input. This is the last opportunity to go back and change any information that you have provided in previous pages before the wizard begins writing to your system.

Make one of the following choices:

• Click Start to begin installing SAS files and writing the configuration to the current machine.

The deployment wizard launches the installation and configuration process and provides an ongoing status update.

• Click Back to navigate to previous pages to change installation and configuration information.

• Click Cancel to terminate the deployment wizard session. Note that you will lose installation and configuration information previously entered.

CAUTION:
If you encounter a situation in which the deployment wizard reports a configuration failure, leave the error message displayed. Do not continue. Consult additional documentation and, if necessary, contact SAS Technical Support. Moving past an error most often results in having to delete your deployment and start over.

On Linux, when you are installing the server tier, you are instructed to run a script as root. As the message in the installation program explains, certain SAS products and features use functionality that requires SAS to check user ID authentication and file access authorizations. This, in turn, necessitates that
certain files within your SAS installation have setuid permissions and be owned
by root.

Your credentials are temporarily stored in your Windows Registry using the
Windows automatic logon functionality. In rare circumstances, it is possible that
those values will remain in your Windows Registry after they are used. This
poses a potential security risk.

For more information about this functionality including any risks, see Microsoft
documentation about security and automatic logons. You should weigh the risk of
costvenience of automatic logon after restart against the security policies in place
at your site.

30. Deployment Complete

The Deployment Complete page displays the configuration results for each SAS
product.

• A green check mark next to every item on this page indicates that your
deployment completed successfully. Click Next.

• If you received errors during your deployment, then contact SAS Technical
Support at mailto:support@sas.com. Attach to your email the files listed in
“Review SAS Deployment Tool Documents, Reports, and Logs” in SAS
Intelligence Platform: Installation and Configuration Guide.
31. Additional Resources

Use the links displayed to review more information about your SAS deployment.

- Click Finish to close the SAS Deployment Wizard.

32. Configuration Guidelines and Details
Review configuration guidelines and details for post-deployment steps. Click **Next**.

- To complete your SAS deployment, review the configuration guidelines and details and perform the steps listed.

  Configuration Guidelines and Details (the Instructions.html file) is automatically generated by the deployment wizard. It has post-installation steps specific to your SAS order that you must perform.

- The SAS Deployment Wizard writes the Configuration Guidelines and Details (the Instructions.html file) to the **Documents** directory under the SAS configuration path. For example:
  - Linux:
    
    ```
    /opt/SAS/Lev1/Documents/Instructions.html
    ```
  - Windows:
    
    ```
    C:\SAS\Config\Lev1\Documents\Instructions.html
    ```

33. Back up your metadata repositories and your SAS configuration directories.

- Make backup copies of your SAS Visual Analytics configuration directories by using your site-approved method. Your SAS configuration directories are all of the child directories under the path that you specified previously on the Specify Configuration Information wizard page.

- Back up your SAS Web Application Server directories.

- Back up your metadata repositories and repository manager. For more information, see “About Backing Up and Restoring Your SAS Content” in **SAS Intelligence Platform: System Administration Guide**.

34. If you opted not to automatically deploy your SAS web applications, then you must manually deploy them. For more information, see **SAS Support for Web Application Servers and HTTP Servers**.

35. Be sure to restart any servers that you stopped when creating the backup.
36. If you are deploying SAS Visual Analytics on Windows, proceed to “Adding SAS LASR Analytic Server Monitor as a Windows Service” on page 120. Otherwise, proceed to “Validating Your SAS Visual Analytics Deployment” on page 120.

Post-Deployment Tasks for Co-located HDFS

Introduction

About this Topic
This topic is relevant to deployments that meet all of the following criteria:

- The deployment includes co-located HDFS.
- Administrators of the deployment want to use the HDFS tab in SAS Environment Manager Administration.
- The deployment uses SSH for communications between SAS Environment Manager Administration and Hadoop.

Note: The HDFS tab provides a host-layer view of folders and files in the Hadoop file system. Using the HDFS tab is an alternative to using a third-party HDFS console. For usage information, see “About the HDFS Tab” in SAS Visual Analytics: Administration Guide.

Dependencies
Information about the HDFS tab is provided by plug-ins that are launched by a compute-tier process. The dependency chain is as follows:

- To communicate with Hadoop, the HDFS tab uses the client-side helper functionality of the SAS Plug-ins for Hadoop (the plug-ins).
- To launch the plug-ins, the HDFS tab uses SAS LASR Analytic Server monitor (the monitor).

Note: The monitor is a compute-tier process that runs under a service account that is created during installation. This topic refers to that account as the sas account.

service.properties
Settings in the monitor’s service.properties file control how the monitor launches the plug-ins.

The monitor’s service.properties file is located on the compute tier in the SAS configuration directory in your equivalent of the following path: /Lev1/Applications/SASVisualAnalytics/HighPerformanceConfiguration/.

For details that are specific to your host, see “Configuration Properties for the Monitor (UNIX)” or “Instructions for a Compute Tier on Windows”.

Summary
By default, the account that starts the monitor is the account that uses SSH to access the Hadoop cluster and retrieves information from HDFS. If the monitor and the plug-ins are on different machines, the account under which the monitor runs must exist on the machine where the plug-ins run (the Hadoop NameNode) in addition to existing on the compute tier machine.
You can configure the monitor to use a different account to connect to the Hadoop cluster. The different account can be an existing Hadoop service account (for example, `hdfs`) or a new account that is created specifically for the purpose of supporting the HDFS tab (for example, `vahdfs`). See “Additional Steps for Using a Separate Account (UNIX)”.

**Instructions for Hadoop Clusters That Use Kerberos Authentication**

Each time the HDFS tab is used, the plug-ins must obtain valid and unexpired Kerberos credentials for a designated principal. To meet that requirement, complete the following steps on the Hadoop NameNode:

1. Create or obtain a keytab for the principal that you want Hadoop to use for authenticating to Hadoop and performing actions requested on the HDFS tab. In these instructions, the `vahdfs` account is the principal.
2. In the `~/.ssh/rc` file for the account under which the plug-ins run, add a `kinit` command. The `kinit` command ensures that the keytab is used to obtain a Kerberos ticket-granting ticket (TGT) whenever SSH is invoked.

For example, if the plug-ins run under the `vahdfs` account, enter the following command in the `~vahdfs/.ssh/rc` file:

```
kinit -kt vahdfs.keytab vahdfs
```

*Note:* For this example, you must also complete the additional steps in the following section, which include specifying the `vahdfs` account and its private key in the monitor’s service.properties file. If you instead use the same account (for example, `sas`) for both purposes, no additional steps are needed.

**Additional Steps for Using a Separate Account (UNIX)**

If you do not want the `sas` account to have access to the Hadoop file system, designate a different account for that purpose. In this configuration, you add options to the monitor’s service.properties file to explicitly specify the account and private key that the plug-ins use to communicate with Hadoop.

To use a separate account for HDFS browsing, complete these additional steps:

1. Create or identify an account to use for browsing HDFS from SAS Environment Manager Administration. These instructions refer to this account as the `vahdfs` account.
2. Configure the `vahdfs` account to access the Hadoop file system using passwordless SSH with a public/private key pair.
3. Make the `vahdfs` account’s private SSH key available to the `sas` account. To share the private key, copy it to the SSH directory for the `sas` account (for example, `/home/sas/.ssh`).
4. Change the way the monitor launches the plug-ins so that the plug-ins use the `vahdfs` account for communications between SAS Environment Manager Administration and Hadoop.
   a. Make a backup copy of the monitor’s service.properties file.
   b. Edit the original service.properties file. Here is an example of the modified line with the additional options highlighted:

```
hadoop.plugins.ssh.options=-o StrictHostKeyChecking=no -o
```
PasswordAuthentication=no -l vahdfs -i /home/sas/.ssh/id_rsa_machine_hdfs

The -l option causes the monitor to launch the plug-ins using the vahdfs account.

The -i option identifies the file that contains a copy of the private key for the vahdfs account.

c. To make the changes take effect, use the sas account to restart the monitor. Here is an example command:
   LASRMonitor.sh restart

5. To verify the results, access the HDFS tab on the Tools page in SAS Environment Manager Administration. Make sure the expected information is available.

Configuration Properties for the Monitor (UNIX)

Note: The properties that are documented in this section are defined in the monitor’s service.properties file.

The following properties control the way that the monitor invokes passwordless SSH on UNIX:

hadoop.plugins.use.ssh
   When set to true, enables SSH-based communication.
   CAUTION:
   If you set this property to false, your environment becomes unsecure. This property should not be false in an Hadoop environment using Kerberos authentication. If you set it to false, make sure the com.sas.cas.hadoop.service.restrict property (in the hdfs-site.xml file) is also set to false. The location of the hdfs-site.xml file varies based on Hadoop distribution, so consult your system administrator.

hadoop.plugins.ssh.command
   Identifies the command that invokes SSH (on the machine where SAS Environment Manager Administration runs).
   Example: /usr/bin/ssh

hadoop.plugins.ssh.options
   Specifies options for the SSH command. Separate options with a space. Individual options cannot contain quotation marks or shell-provided syntax (such as “~”).
   TIP Use options to control the plug-in execution account. Here is an example:
   -o StrictHostKeyChecking=no -o PasswordAuthentication=no -l vahdfs -i id_rsa_vahdfs

   Default: -o StrictHostKeyChecking=no -o PasswordAuthentication=no

sas.grid.broker.hadoop.host
   The name node for your Hadoop cluster. A value for this required property is supplied during installation.

hadoop.plugins.hadoop.home
   The location of your Hadoop installation. This is the same as the HADOOP_HOME setting that is specified for the TKGrid install. SAS Environment Manager Administration expects to find the hadoop command in the bin subdirectory of the path that you specify here.
Example: `/opt/hadoop/

hadoop.plugins.ssh.stderr.redirection
Redirects error information to a specified file. This option is rarely needed. You can use it to diagnose problems with SSH command execution.

Example: `2>/tmp/vahdfs-plugins-stderr.log`

Note: Changes to the preceding properties take effect after you restart the monitor.

**Instructions for a Compute Tier on Windows**

In the unusual circumstance in which a Windows compute tier accesses a distributed LASR server that uses co-located HDFS, you can support the **HDFS** tab by completing the following steps:

1. In the monitor's `service.properties` file, make sure values are appropriately specified and omitted as follows:
   - The `hadoop.plugins.ssh.options` property should be empty or unspecified.
   - The `hadoop.plugins.ssh.command` property should be empty or it can specify your equivalent of the following path and command:
     
     ```
     sas-installation-directory\tkssh
     ```
   - The `hadoop.plugins.ssh.stderr.redirection` property should be empty or it can retain its default value. This property redirects error information to a specified file for debugging purposes.

   Example: `2>/tmp/vaa-plugins-stderr.log`

   Note: If you use tkssh, any stderr output must be redirected because tkssh intermixes stderr to stdout. For example, using the `-V` option in the `kinit` command against `~/.ssh/rc` produces stderr output. The monitor mistakenly interprets that output as communications data from the plug-ins. (The redirection is usually to `/dev/null` or a log file in `/tmp`.)

   If you need to make changes, begin by making a backup copy of the monitor's `service.properties` file. After you make changes, restart the monitor.

   **TIP** On Windows, the monitor runs as a service (for example, **SAS [config-Lev1] LASR Analytic Server Monitor**). You can manage the process using the Windows Services interface.

2. To change the plug-in execution account, set the following system environment variables—`TKSSH_USER` and `TKSSH_IDENTITY`—on the machine that hosts the monitor.

   Note: This step identifies the user ID and key for the account that accesses HDFS file content. Specify an account that can access Hadoop using SSH and has appropriate access to Hadoop content.

   **TIP** In the Windows control panel, select **System** ⇒ **Advanced Settings** ⇒ **System Environment Variables**, and then add the two variables.

   After you set the environment variables, restart the monitor.

**See Also**

“Validating Your SAS LASR Analytic Server Monitor Deployment” on page 122
Post-Deployment Tasks for SAS Web Server

The following header is configured by default for the SAS Web Server in the sas.conf file:

Header set X-Frame-Options SAMEORIGIN

This header prohibits a user from embedding a SAS Visual Analytics report into other application using an iframe. This protects other users from unknowingly providing information to an application other than the current one. If the user tries to, an error message is displayed.

To enable this functionality, perform the following steps:

1. Make a backup copy of the sas.conf file in the `SAS-configuration-directory/Lev1/Web/WebServer/conf` directory.
2. Open the sas.conf file in a text editor.
3. Locate the following line (line #22) in the file:
   
   ```
   Header set X-Frame-Options SAMEORIGIN
   ```
4. Comment out that line. Here is what line 22 should now look like:
   
   ```
   #Header set X-Frame-Options SAMEORIGIN
   ```
5. Save the changes to the sas.conf file.
6. Restart the SAS Web Server.

Post-Deployment Tasks for Horizontal Clusters

On a SAS Visual Analytics horizontal cluster, perform the following steps after deploying SAS Visual Analytics:

1. Sign on to SAS Management Console with administrative privileges.
2. On the `Plug-ins` tab, navigate to `Application Management ➔ Configuration Manager ➔ SAS Application Infrastructure`.
4. On the `Advanced` tab of the Visual Analytics Properties dialog box, for `va.lastActionLogPath`, enter the path to a shared resource that is available to all machines in the cluster.
   
   Administrators should grant Read and Write access to this path for the SAS Web Application Server process owner and users of SAS Environment Manager Administration (or for the launch credential account if SAS token authentication is being used).
5. Save your changes.
6. To make the changes take effect, restart the SAS Web Application Server on each machine in the cluster.
Post-Deployment Tasks for SAS Information Retrieval Studio

After running SAS Deployment Wizard to install and configure SAS Visual Analytics, you must add the path to SAS Foundation for SAS Information Retrieval Studio. On Linux, in addition to the path to SAS Foundation, you must add the path to the trusted CA bundle provided by the SAS Security Framework.

To add the SAS Foundation path to SAS Information Retrieval Studio, perform these steps:

1. Sign on to the SAS Visual Analytics server machine as the SAS Installer user.
2. Using a text editor, open `SAS-configuration-directory/Applications/SASInformationRetrievalStudioforSAS/work/information-retrieval-studio.conf`
3. Add the following paths to the information-retrieval-studio.conf file based on your operating system:
   - **Linux**
     
     Add `tkpath` and `auth-server-certificates-path`:
     
     - In SAS 9.4M2 and earlier:
       ```
       tkpath=/SAS-installation-directory/SASFoundation/9.4/sasexe:
       /SAS-installation-directory/SASFoundation/9.4/utilities/bin/
       auth-server-certificates-path=certificate-file.pem
       ```
     - In SAS 9.4M3 and later:
       ```
       tkpath=/SAS-installation-directory/SASFoundation/9.4/sasexe:
       /SAS-installation-directory/SASFoundation/9.4/utilities/bin/
       auth-server-certificates-path=SAS-installation-directory/
       SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.pem
       ```
   - **Windows**
     
     Add `tkpath`:
     
     ```
     tkpath=\SAS-installation-directory\SASFoundation\9.4\core\sasext
     ```
5. Sign on to SAS Home and clear the browser cache, including Favorites. Enter an asterisk (*) in Search to verify that the search feature is working.
Adding SAS LASR Analytic Server Monitor as a Windows Service

To add the SAS LASR Analytic Server Monitor as a Windows Service, follow these steps:

1. Log on to the SAS LASR Analytic Server Monitor machine as a user who is a member of the Windows Administrators group.

2. In the Windows taskbar, click Start, in Search programs and files, type services.msc, and then press Enter.


4. On the Log On tab, select This account, and enter the domain and user name (for example, DOMAIN\user_name). Click Apply.

5. Windows automatically grants the Log On As A Service right. Click OK.

6. Click OK.

7. Copy the SSH keys from the SAS High-Performance Analytics environment host to the SAS LASR Analytic Server Monitor machine under disk: \Users\current-user-ID\ .ssh.

8. Open LASRMonitor.conf, located at SAS-configuration-directory\Applications\SASVisualAnalytics\HighPerformanceConfiguration\wrapper.

9. Update the set.USERNAME= property with the SAS High-Performance Analytics environment host user ID whose SSH keys match the SSH keys that you copied earlier.

10. Save and close LASRMonitor.conf.

11. Start the SAS LASR Analytic Server Monitor in the Services window or by running the following script from the command line:

   SAS-configuration-directory\Applications\SASVisualAnalytics\HighPerformanceConfiguration\LASRMonitor.bat -start.

Validating Your SAS Visual Analytics Deployment

Here are suggestions about how you can validate your distributed SAS Visual Analytics deployment using SAS Home. SAS Visual Analytics documentation is available at http://support.sas.com/documentation/onlinedoc/va/.

Remember that a large part of SAS Visual Analytics is provided with SAS solutions. Therefore, you can use this section to validate any part of SAS Visual Analytics that your SAS solution contains.

You might want to wait to validate your deployment after you have deployed both the server tier and middle tier. If you have deployed only the server tier, then some of the validation steps cannot be completed until you have deployed the middle tier.
Table 7.2  Suggestions for SAS Visual Analytics Validation

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Actions</th>
<th>More Information</th>
</tr>
</thead>
</table>
| Create an account for use later in the validation.                     | 1. Log on as the SAS LASR Analytic Server installer and create a new administrator account (such as saslasradm).  
2. (On Windows) Assign the Windows user permission Log on as a batch job to the account. | Operating system documentation.                                                                                                              |
| Create a SAS identity for use later in the validation.*               | In SAS Management Console:  
1. Define a SAS Visual Analytics Administrator.  
2. Assign the administrator to the Visual Analytics Data Administrators group and the Visual Data Builder Administrators group.  
3. Give the administrator the necessary operating system permissions to write to the signature files directory.  
| Validate that SAS Home is running and users can sign in as expected.   | Sign on to SAS Home as saslasradm (for example, http://myHost.example.com/SASVisualAnalyticsHub).                                                                                                       | “Access SAS Home” in SAS Home Documentation                                                                                             |
| Start the Public LASR Analytic Server.                                 | In SAS Home:  
1. Click the side menu icon next to SAS Home  
2. Click Administrator.  
3. Select the check box next to Public LASR Analytic Server.  
4. Click start  
| Demonstrate that SAS Environment Manager Administration is functional and able to communicate with the SAS LASR Analytic Server. | In SAS Environment Manager Administration:  
| Demonstrate that SAS Visual Data Builder is functional.*              | In SAS Home:  
1. Click Data Preparation.  
2. In the SAS Visual Data Builder window, click New Object.                                                                 | SAS Visual Data Builder: Preparing Data                                                                                                 |
| Demonstrate that SAS Visual Analytics is functional.                  | In SAS Home:  
1. Click Report Builder.  
2. Click Data.  
3. The Open Data Source window is displayed.  
4. Select one or more data sources that begin with VA_SAMPLE, and click OK.                                                                 | SAS Visual Analytics: Working with Report Data                                                                                         |
### Purpose
Demonstrate that SAS Graph Builder is functional.

### Actions
**In SAS Home:**
1. Click **Custom Graph Builder**.
2. In the Graph Gallery window, verify that graphs are available.

### More Information
*SAS Graph Builder: User’s Guide*

---

*SAS Visual Data Builder requires that a SAS identity be a member of the Visual Data Builder Administrators group. Members of the Visual Analytics Data Administrators group do not have access to SAS Visual Data Builder.

---

**Validating Your SAS LASR Analytic Server Monitor Deployment**

On distributed server deployments only, certain features in SAS Environment Manager Administration rely on the SAS LASR Analytic Server Monitor.

To validate the SAS LASR Analytic Server Monitor deployment, follow these steps:

1. Log on to the SAS LASR Analytic Server Monitor machine (blade 0) using the SAS Installer account.

2. Navigate to the SAS LASR Analytic Server Monitor configuration directory.
   
   By default, this directory is located at `SAS-configuration-directory/Applications/SASVisualAnalytics/HighPerformanceConfiguration/wrapper`.

3. Run the `LASRMonitor` script or executable with a user account that normally starts the SAS LASR Analytic Server.

4. (UNIX) Enter the following command to confirm that SAS LASR Analytic Server Monitor is running:
   
   ```
   LASRMonitor.sh status
   ```

5. (UNIX) If the SAS LASR Analytic Server Monitor is not running, enter the following command:
   
   ```
   LASRMonitor.sh start
   ```
Chapter 8
What to Do Next: Administration Tasks

Overview of Required Administration Tasks

After installing and configuring SAS Visual Analytics using the SAS Deployment Wizard, you must perform certain administration tasks. These tasks are explained in the topics that follow.

Review Post-deployment Documentation

Review the Instructions.html file that is generated by the SAS Deployment Wizard. This file provides an overview of the configuration guidelines and details. Any warnings that were generated during the deployment process are described in this file. The file is in the following location:

SAS-config-dir/Levn/Documents/Instructions.html

Review SAS Intelligence Platform Post-deployment Documentation

Check Status for SAS Visual Analytics Servers

Ensure that the SAS Visual Analytics servers are running:

- The status of SAS High-Performance Computing Management Console on the server tier is checked with the following command:
  
  `service sashpcmc status`

- The status of the server-tier SAS servers is checked with the following command:
  
  `SAS-config-dir/Levn/sas.servers status`

  For more information, see “Checking the Status of Servers” in SAS Intelligence Platform: System Administration Guide.

- The status of SAS LASR Analytic Server Monitor is checked with the following command:
  
  `SAS-config-dir/Levn/Applications/SASVisualAnalytics/HighPerformanceConfiguration/LASRMonitor.sh status`

  For more information, see “Managing the Monitor” in SAS Visual Analytics: Administration Guide.

- The status of SAS Information Retrieval Studio server is checked with the following command:
  
  `SAS-config-dir/Levn/Applications/SASInformationRetrievalStudioforSAS/IRStudio.sh status`

  For more information, see “Administer the Search Facility” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Create SAS Users and Groups

The following tasks related to SAS users and groups need to be performed. For more information, see the SAS Visual Analytics: Administration Guide.

- Create operating system groups and user accounts for data administrators on the machines in the cluster.

- Create SAS metadata users for the operating system accounts for data administrators and add these users to the Visual Analytics Data Administrators group.

  (Membership in the Visual Analytics Data Administrators group grants metadata users explicit permission to use a default library for the distributed database.)


  For more information, see “Roles and Capabilities” in SAS Visual Analytics: Administration Guide.
Set ulimits for SAS Web Applications

(On Linux) On the SAS middle tier system, set ulimit settings in `/etc/security/limits.conf` for the Installer user account that runs the SAS Web Application Server processes.

For example, here are ulimit settings added to `/etc/security/limits.conf` for the Installer user account, `sas`:

```bash
sas - nofile 150000
sas - nproc 100000
sas - stack 10240
```

The NPROC (max number of processes) changes do not take effect unless `/etc/security/limits.d/90-nproc.conf` (Red Hat Enterprise Linux 6) or `/etc/security/limits.d/20-nproc.conf` (Red Hat Enterprise Linux 7) is also changed.

For example, to allow 100,000 processes on Red Hat Enterprise Linux 6, make the following change to `/etc/security/limits.d/90-nproc.conf`:

```bash
sas soft nproc 100000
```
Appendix 1
Deploying SAS LASR Analytic Server in a Different Mode

Overview of Deploying SAS LASR Analytic Server in a Different Mode

SAS LASR Analytic Server has two modes of operation:

- Distributed mode runs in a distributed computing environment and performs analytic tasks on data that is loaded in memory.
- Non-distributed mode runs on a single machine.

For documentation about deploying SAS Visual Analytics for a non-distributed SAS LASR Analytic Server, see the *SAS Visual Analytics: Installation and Configuration Guide (Non-distributed SAS LASR)*.

SAS enables you to license SAS LASR Analytic Server to run in distributed mode, non-distributed mode, or both modes. The server mode that you deploy and run is driven by the contents of your order and the license that accompanies it. For more information, see your SAS representative.

Using the SAS Deployment Wizard and the SAS Deployment Manager, you can do the following:

- Deploy the server in non-distributed mode.
  For more information, see “Deploy Visual Analytics with SAS LASR Analytic Server in Non-distributed Mode” on page 128.
- Deploy the server in distributed mode.
  For more information, see “Deploying SAS Visual Analytics Interactively” on page 81.
- Add a server to run in non-distributed mode.
For sites that are licensed for both server modes, you can add and run a server in non-distributed mode. For more information, see “Add a SAS LASR Analytic Server to Run in Non-distributed Mode” on page 128.

• Convert a non-distributed server to a distributed server.

Your non-distributed servers are upgraded, and you can run the server in distributed mode only.

Also, during conversion, the SAS Deployment Wizard automatically configures the SAS LASR Analytic Server monitor.

For more information, see “Convert a Non-distributed SAS LASR Analytic Server to Distributed Mode” on page 128.

Deploy Visual Analytics with SAS LASR Analytic Server in Non-distributed Mode

For documentation about deploying SAS Visual Analytics for a non-distributed SAS LASR Analytic Server, see the *SAS Visual Analytics: Installation and Configuration Guide (Non-distributed SAS LASR)*.

Add a SAS LASR Analytic Server to Run in Non-distributed Mode

For sites that are licensed to run both server modes, the SAS Deployment Wizard prompts you during installation to deploy SAS LASR Analytic Server in distributed mode only. (Actually, the non-distributed mode is deployed silently.) When sites are licensed for both server modes, to create a non-distributed SAS LASR Analytic Server, you use SAS Management Console.

For more information, see “LASR Server Definition” in *SAS Visual Analytics: Administration Guide*.

Convert a Non-distributed SAS LASR Analytic Server to Distributed Mode

When converting to distributed mode, your non-distributed servers are upgraded, and SAS retains their names. (We recommend that you rename these new distributed servers.)

Also, during conversion, the SAS Deployment Wizard automatically configures the SAS LASR Analytic Server monitor.

To convert your SAS LASR Analytic Server to run in distributed mode, follow these steps:

1. Shut down your SAS server and middle tiers.

   For more information, see “Operating Your Servers” in *SAS Intelligence Platform: System Administration Guide*. 
2. Deploy the SAS High-Performance Analytics environment on your data appliance or machine cluster.

   For more information, see “Deploying the SAS High-Performance Analytics Environment” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

3. Run the SAS Deployment Wizard with it set to install only.

   Follow the directions in the topic, “Deploying SAS Visual Analytics Interactively” on page 81. When the Select Deployment Type page appears, make sure that you choose Install SAS Software. Make sure that Configure SAS Software is deselected.

   **Figure A1.1 SAS Deployment Wizard Install Mode**

4. When the wizard is finished, restart your SAS server tier.

   For more information, see “Operating Your Servers” in SAS Intelligence Platform: System Administration Guide.

5. Rerun the SAS Deployment Wizard with it set to configure only.

   Follow the directions in the topic, “Deploy SAS Visual Analytics Interactively.” When the Select Deployment Type page appears, make sure that you choose Configure SAS Software. Make sure that Install SAS Software is deselected.
Figure A1.2 SAS Deployment Wizard Configure Mode

Note: When prompted for the SAS configuration directory, make sure that you specify the directory that contains your pre-existing SAS Visual Analytics configuration.

When the wizard displays the Select Products to Configure page, it is important that you choose **SAS Visual Analytics High-Performance Configuration**.

Figure A1.3 SAS Visual Analytics High-Performance Configuration

6. Using SAS Management Console, change the **Single machine server** property to **No** for the newly converted SAS LASR Analytic Server.
7. The deployment wizard retains a server’s text analytics binary paths. To update these paths, use SAS Management Console and navigate to the server’s Extended Attributes tab. Update the VA.TextAnalyticsBinaryLocation attribute. For more information, see “Supporting Text Analytics” in SAS Visual Analytics: Administration Guide.

8. Restart your SAS server and middle tiers. For more information, see “Operating Your Servers” in SAS Intelligence Platform: System Administration Guide.

9. Make sure that the signature file path for SAS LASR Analytic Server exists on the root node machine.

10. Regenerate all pre-existing code maintained by SAS applications (SAS Visual Analytics, SAS Enterprise Guide, SAS Data Integration Studio, and so on) that contain LIBNAME statements that reference SAS LASR Analytic Server tables. (You must also redeploy any scheduled jobs for this code.)
Appendix 2
Migrating SAS Visual Analytics

Overview of Migrating SAS Visual Analytics

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Overview of Migrating SAS Visual Analytics

How to Use This Document

This document is designed to be used with the SAS Intelligence Platform: Migration Guide and previous sections of the SAS Visual Analytics: Installation and Configuration Guide (Distributed SAS LASR).

What Is Migration and What Is Supported?

Migration is a process in which your SAS content and configuration from an earlier SAS release are upgraded to run in a later SAS release. Same release migration is also
possible (for example, 7.5 to 7.5). When performed successfully, migration attempts to preserve as much of your current content and configuration as possible, reduce the number of manual upgrade tasks, and minimize system downtime.

SAS provides automated migration tools—the SAS Migration Utility and the SAS Deployment Wizard. You can migrate with the SAS automated migration tools in the following scenarios:

- SAS Visual Analytics 6.1 to SAS Visual Analytics 7.4
- SAS Visual Analytics 6.2 to SAS Visual Analytics 7.4
- SAS Visual Analytics 6.3 to SAS Visual Analytics 7.4
- SAS Visual Analytics 6.4 to SAS Visual Analytics 7.4
- SAS Visual Analytics 7.1 to SAS Visual Analytics 7.4
- SAS Visual Analytics 7.2 to SAS Visual Analytics 7.4
- SAS Visual Analytics 7.3 to SAS Visual Analytics 7.4
- SAS Visual Analytics 7.4 to SAS Visual Analytics 7.5
- SAS Visual Analytics 7.5 to SAS Visual Analytics 7.5

Migration is a one-time operation to deploy SAS Visual Analytics 7.5 and upgrade your release 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 7.3, or 7.4 content. By contrast, you can choose to do the following:

- Deploy SAS Visual Analytics 7.5 and use promotion to upgrade your content piece by piece.
  
  For more information, see “Comparing Promotion and Migration” in SAS Intelligence Platform: Migration Guide.

- Upgrade to SAS Visual Analytics 7.5.
  
  For more information, see “Upgrading SAS Visual Analytics” on page 145.

As with all migrations of SAS software, the system to which you are migrating (target) must have the same number of machines on the same operating systems as the system from which you are migrating (source).

Provided that you are properly licensed, you can change the type of SAS LASR Analytic Server (distributed or non-distributed) in your SAS Visual Analytics environment with the automated migration tools. SAS LASR Analytic Server migration supports the following:

- non-distributed to non-distributed
- distributed to distributed
- non-distributed and distributed to non-distributed and distributed
- non-distributed to distributed

The following deployments are not supported by the automated migration tools:

- data migration from distributed to non-distributed
- earlier SAS Visual Analytics deployments where the SAS High-Performance Analytics environment is co-located with a Greenplum Data Computing Appliance or a Teradata Managed Server Cabinet

The alternative to migration is to use partial promotion or to perform a software update. For more information, see “Introduction to the Promotion Tools” in SAS Intelligence Platform: Migration Guide.
**What about SAS Visual Statistics?**

You cannot directly migrate an earlier release of SAS Visual Statistics to SAS Visual Analytics 7.5.

To migrate the content of an earlier release of SAS Visual Statistics (such as 6.4 or 7.1) to SAS Visual Analytics 7.5:


2. Upgrade explorations to SAS Visual Analytics 7.5.

**A High-Level View of Migration**

The following list summarizes the steps required to install SAS 9.4 and migrate earlier SAS version content on a single machine or in a distributed, heterogeneous environment:

1. Review additional documentation on page 135.
2. Design your migration on page 135.
3. Perform pre-migration tasks on page 136.
5. Install SAS Visual Analytics 7.5 and migrate your content on page 136.
7. Validate your migration on page 136.

The sections that follow provide brief descriptions of each of these tasks. Subsequent sections provide the step-by-step instructions that you need to perform.

**Step 1: Review Additional Documentation**

It is very important to review all of the different documents associated with deploying your SAS software. There can be late-breaking information. Or, instructions that are specific to a particular configuration might be too narrow to be included in the SAS Visual Analytics: Installation and Configuration Guide (Distributed SAS LASR). For more information, see “Reviewing Additional Documentation” on page 137.

**Step 2: Design Your Migration**

Designing your migration means reviewing the SAS Visual Analytics 7.5 requirements (hardware, software, and migration), comparing them to your current deployment, and developing a plan for how to get your SAS content—your data and configuration—integrated into a SAS Visual Analytics 7.5 system.

Download your software order. In the SAS Software Depot that contains your order, run the SAS Migration Utility to generate a migration analysis report. Using this report, you can analyze every machine in your current SAS Visual Analytics deployment to answer these crucial design questions:
• Which SAS products currently reside on each machine?
• Are there any changes that I need to make to my current deployment before migrating?

The SAS Software Depot contains SAS Visual Analytics 7.5 software that you deploy in a later step.

For more information, see “Designing Your Migration” on page 138.

**Step 3: Perform Pre-migration Tasks**

During the pre-migration task phase, using the SAS Migration Utility, you create a migration package that contains your current SAS data and configuration. In a later step, the SAS Deployment Wizard uses your migration package as input to move your earlier SAS content successfully to SAS Visual Analytics 7.5.

For more information, see “Performing Pre-migration Tasks” on page 138.

**Step 4: Upgrade Your SAS High-Performance Analytics Infrastructure**

Follow the steps in the topic, “Updating the SAS High-Performance Analytics Infrastructure” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

*Note:* SAS Visual Analytics 7.5 requires that you use SAS High-Performance Analytics environment 2.9 or higher.

**Step 5: Install SAS Visual Analytics 7.4 and Migrate Your Content**

In step four, you use the SAS Deployment Wizard to install SAS Visual Analytics 7.5 and to migrate your current SAS content and configuration that you packaged using the SAS Migration Utility in step three. During your deployment wizard session, you select the migration option.

For more information, see “Deploying SAS Visual Analytics 7.5 and Migrating Your Content” on page 140.

**Step 6: Perform Post-migration Tasks**

Step five consists of performing any required manual tasks to complete your migration.

For more information, see “Performing Post-Migration Tasks” on page 142.

**Step 7: Validate Your Migration**

An important final step in migration is validating that your SAS Visual Analytics 7.5 servers, clients, middle tier, and web clients are functioning and can use migrated content from your earlier SAS Visual Analytics release.

For a discussion of functionality changes in SAS Visual Analytics 7.5, see the SAS Guide to Software Updates.

For more information, see the “Validating Your Migrated Deployment” on page 143.
Reviewing Additional Documentation

Your review should include these documents:

- **QuickStart Guide**
  This document is shipped with your SAS software. Follow its instructions.
  The QuickStart Guides are also available online:
  - Linux: http://support.sas.com/documentation/installcenter/94/unx/index.html

- **software order e-mail (SOE)**
  This e-mail is sent to your site to announce the software and detail the order. It enumerates the initial installation steps and, for SAS 9.4, contains instructions for using Electronic Software Delivery (ESD), if applicable, and the SID file. The SID file contains your site’s SAS license (SETINIT).

- **SAS order information (SOI)**
  After you download your order to an existing SAS Software Depot, you can use the SAS order information (SOI) file to determine what products were in your order and when the order was placed. The SOI is in your SAS Software Depot in install_doc/order-number/soi.html.

- **SAS software summary**
  In the same depot location as the SOI, the SAS software summary is a more detailed list of the software included in your order. Unlike the SAS order information, which lists only the software that you have specifically ordered, this document also describes the included software that supports your order. The SAS software summary is in your SAS Software Depot in install_doc/order-number/ordersummary.html.

  *Note:* The SAS Deployment Wizard installs only what is listed in the deployment plan. The SAS software summary might list more products than the deployment plan. For more information, see “About Deployment Plans” on page 69.

- **SAS 9.4 system requirements**
  http://support.sas.com/resources/sysreq/index.html

- **SAS Visual Analytics system requirements**
  System Requirements--SAS Visual Analytics 7.5 (Distributed or Non-distributed LASR)

- **SAS Visual Analytics and SAS Visual Statistics system requirements**
  System Requirements--SAS Visual Analytics 7.5 and SAS Visual Statistics 7.5

- **SAS Notes**

- For a discussion of functionality changes in SAS Visual Analytics 7.5, see the SAS Guide to Software Updates.
Designing Your Migration


The tasks required for designing your migration are as follows:

1. Understand the high-level SAS migration requirements.
   Consult “High-Level SAS Migration Requirements” in *SAS Intelligence Platform: Migration Guide*.

2. Determine which SAS products reside on each machine.
   Run a SAS migration analysis report on your SAS Visual Analytics server and middle tier machine. (Do not run the migration utility on the SAS High-Performance Analytics environment.)
   • To report on SAS Visual Analytics 6.1, use smu93.
   • To report on SAS Visual Analytics 6.2 and later, use smu94.
   For more information, see “Inventorying Your Current SAS Deployment” in *SAS Intelligence Platform: Migration Guide*.

3. Obtain a SAS 9.4 deployment plan.
   With a current migration analysis report at hand, contact your SAS representative to obtain a valid SAS 9.4 deployment plan for your current SAS deployment.
   *Note:* The SAS Visual Analytics Explorer Server Configuration component in release 6.1 has been merged into SAS Visual Analytics Server Components.

4. Plan SAS user downtime at your site.
   You need to schedule a window of time when your SAS deployment is not being used to install and configure SAS 9.4 and migrate your SAS content.

Performing Pre-migration Tasks

Consult “Performing Pre-migration Tasks” in *SAS Intelligence Platform: Migration Guide*.

Pre-migration tasks are as follows:

1. Back up your current SAS deployment.
   This is a best practice to ensure that your current SAS deployment is protected.
   For more information, see “About Backing Up and Restoring Your SAS Content” in *SAS Intelligence Platform: System Administration Guide*.

2. Apply required maintenance to any current SAS products.
   During your migration design, you identified any current SAS products that required maintenance before you can migrate them.
Migration Considerations for SAS Visual Analytics

Because of the many ways that you can customize SAS Visual Analytics, the automated SAS migration tools cannot fully migrate all user customizations. The following list describes actions that you might need to perform to complete your SAS Visual Analytics migration:

- In most cases, signature file paths are not updated for existing SAS LASR Analytic Servers during migration.
  
  Signature file paths are updated when you are migrating from a non-distributed to a distributed SAS LASR Analytic Server environment and SAS LASR Analytic Server non-distributed components are not in your order.

- Migration for user-created SAS LASR Analytic Servers is only partially supported. After migration, you must specify their port numbers and any changes to the install paths or signature files paths.

- The metadata labels for the two SAS LASR Analytic Servers created at installation remain the same. If these labels are to be changed in SAS Visual Analytics 7.5, you must do this manually.
• SAS Visual Analytics 6.1 GeoMap data sets are replaced when migrating.

• SAS LASR Analytic Server names are maintained. (The server names automatically created by the SAS Deployment Wizard include the host name. If you choose, you can easily change server names using SAS Management Console.)

• A device limitation whitelist is new for SAS Visual Analytics after release 6.1. The previous SAS Visual Analytics 6.1 blacklist is migrated forward. When doing a SAS Visual Analytics migration, both the blacklist and the whitelist are migrated. When a database other than Postgres is used, special migration utility properties must be specified. For more information, see “Product-Specific SAS Migration Utility Properties” in SAS Intelligence Platform: Migration Guide.

• During migration from SAS Visual Analytics 6.1, the metadata user groups Visual Analytics Admin Group and Visual Analytics Data Builder Group are renamed to Visual Analytics Admin and Visual Analytics Data Builder, respectively.

• Java Virtual Machine (JVM) settings for SAS Visual Analytics web applications are not migrated from release 6.1. The JVM settings used in release 7.5 and later are the values supplied to the SAS Deployment Wizard during migration.

• You can add more fonts for printing to a PDF. See “Make More Fonts Available” in SAS Intelligence Platform: Middle-Tier Administration Guide.

Upgrading Your SAS High-Performance Analytics Infrastructure

Follow the steps in the topic, “Updating the SAS High-Performance Analytics Infrastructure” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.

Note: SAS Visual Analytics 7.5 requires that you use SAS High-Performance Analytics environment 2.9 or higher.

Deploying SAS Visual Analytics 7.5 and Migrating Your Content

The deploy step when performing a migration is similar to a typical SAS Visual Analytics deployment experience. The major difference is that early in the SAS Deployment Wizard session, you select the Perform migration option.
On the Remap Ports page, by default, the wizard assumes that ports used in your current SAS deployment are identical to the ports that will be used in your SAS Visual Analytics 7.5 deployment. Use this page if you want to specify different ports in your SAS Visual Analytics 7.5 deployment. The wizard displays the port being used in your current SAS deployment (Port from Source column). To specify a different port to use for SAS Visual Analytics 7.5, click the Port for Target cell in the appropriate row for the SAS product and enter the new port number.
Performing Post-Migration Tasks

After deploying SAS Visual Analytics 7.5 and migrating your content, complete the following post-migration tasks:

- Point each SAS LASR Analytic Server to its new signature file path location.
  To determine the signature file path location for each SAS LASR Analytic Server, follow these steps:
  1. Sign on to SAS Management Console with administrative privileges.
  2. On the **Plug-ins** tab, expand **SAS Management Console ⇒ Server Manager**.
  3. Right-click each SAS LASR Analytic Server, and select **Properties**.
  4. Click the **Options** tab.
  5. Click **Advanced Options**.
  6. Click the **Additional Options** tab.
  7. The path listed in **Signature files location on server** must exist and be writable on the target system.

- Regenerate all pre-existing code maintained by SAS applications (SAS Visual Analytics, SAS Enterprise Guide, SAS Data Integration Studio, and so on) that contains LIBNAME statements that reference SAS LASR Analytic Server tables. (You must also redeploy any scheduled jobs for this code.)

- The SAS Migration Utility migrates the default, system-created autoload directories and their contents to the target system. However, before you can use these autoload files, you must update the host names and paths that they reference.
  For your convenience, the SAS Migration Utility locates these migrated autoload files in a subdirectory named **backup** under the following directory (`SAS-configuration-directory/Levnn/AppData/SASVisualAnalytics/VisualAnalyticsAdministrator`).
  Manually created autoload files and directories from the source system are not migrated. You must manually create them to migrate them. For reference, SAS migrates copies of the manually created files to the backup location specified earlier. When re-creating these autoload files, be sure to use new autoload files as templates. Compare the new autoload files to the migrated autoload files to integrate custom code into the target system.

- Starting with SAS Visual Analytics 6.4, you are no longer prompted for the path to the TKGrid installation on the SAS High-Performance Analytics environment root node host.
  If this location has changed for release 7.5, then after migration, you must do the following:
1. Shut down your SAS LASR Analytic Servers.
   For more information, see “Operating Your Servers” in SAS Intelligence Platform: System Administration Guide.

2. Manually modify the High-Performance Analytics environment install location property using SAS Management Console (Plug-ins ⇒ Server Manager, right-click the server, and select Properties ⇒ Options).
   For more information, see “LASR Server Definition” in SAS Visual Analytics: Administration Guide.

3. Restart your SAS LASR Analytic Servers.
   For more information, see “Operating Your Servers” in SAS Intelligence Platform: System Administration Guide.

   • Custom themes must be redeployed.
     For more information, see the SAS Theme Designer for Flex: User’s Guide.

   • If you are migrating from version 6 of SAS Visual Analytics, then you should remove the loadindex.sh cronjob from the SAS Installer user’s crontab.
     The presence of the loadindex.sh cronjob causes unnecessary entries for the sassearch user in the public.sas_user_x_ticket table in the SAS Web Infrastructure Platform Data Server.
     For example, when logged in to the SAS Visual Analytics server machine as the Installer, run the following command:

     ```bash
     crontab -e
     ```
     Delete the line that resembles the following:

     ```bash
     */60 * * * * /opt/config/Lev1/Web/Applications/SearchInterfacetoSASContent/loadindex.sh > /dev/null 2>&1
     ```

   • Consult “Performing Post-migration Tasks” in SAS Intelligence Platform: Migration Guide.

   • Also, review “Migration Considerations for SAS Visual Analytics” on page 139.

---

**Validating Your Migrated Deployment**

Also, review “Validating Your SAS LASR Analytic Server Monitor Deployment” on page 122.
Managing Your SAS Visual Analytics Deployment

Appendix 3

Upgrading SAS Visual Analytics

Overview of Upgrading SAS Visual Analytics

You have two options for upgrading SAS Visual Analytics:

• SAS automatic migration tools
  For more information, see Appendix 2, “Migrating SAS Visual Analytics,” on page 133.

• SAS Deployment Wizard (Update mode)
  For more information, see “Upgrade SAS Visual Analytics” on page 145.

Upgrade SAS Visual Analytics

Follow these steps to upgrade SAS Visual Analytics using the SAS Deployment Wizard running in update mode:

Note: Upgrading to SAS Visual Analytics 7.5 is supported for versions 6.2 and later.

1. Properly back up your existing system.

CAUTION:

The upgrade process writes over the existing system. If any problems are encountered, it might be necessary to recover the existing system from backup. Keep in mind that your existing system can be corrupted to the
point of being unusable and unrecoverable. Backing up your system should include backing up your SAS Metadata Server. For more information, see “Backing Up and Recovering the SAS Metadata Server” in SAS Intelligence Platform: System Administration Guide.

2. Understand how the SAS Deployment Wizard upgrades SAS software.


3. Understand how your SAS Visual Analytics deployment will change.

   (In some releases, new SAS products are added during upgrades.) See SAS Guide to Software Updates and Product Changes.

4. If you are running SAS Visual Analytics with a distributed SAS LASR Analytic Server, upgrade your SAS High-Performance Analytics infrastructure

   Note: SAS Visual Analytics 7.5 requires that you use SAS High-Performance Analytics environment 2.9 or higher.

   See “Updating the SAS High-Performance Analytics Infrastructure” in the SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide.


6. Locate and familiarize yourself with your SAS software order.

7. Download your order and create a SAS Software Depot.

   See SAS Guide to Software Updates and Product Changes.


10. Validate your deployment.

    See “Validating Your SAS Visual Analytics Deployment” on page 120.

11. Before you begin using SAS Visual Analytics, check to see whether there are any new groups or capabilities that have been added to SAS metadata and whether any new metadata properties need to be manually updated.

    See SAS Guide to Software Updates and Product Changes.

12. Be sure to load your data sources into SAS LASR Analytic Server to enable reporting and exploration.

---

**Update SAS License**

In certain scenarios when you are adding on SAS products, the SAS license does not automatically update. You get a message similar to the following:

"You have attempted to access an application that is not licensed for use. Please contact your system administrator."
To manually update your SAS license, follow these steps:

1. Use the Installer user ID to sign in to the machine where the SAS Metadata Server is installed. If it is not currently running, start your SAS Metadata Server.

2. Navigate to `SAS-installation-directory/SASDeploymentManager/9.4`, and launch `sasdm.exe` (Windows), `sasdm.sh` (UNIX), or `sasdm.rexx` (z/OS). On Windows, you can use the shortcut on the Start menu.

3. In the Choose Language dialog box, select a language, and click OK.

4. In the SAS Deployment Manager, select Update SID File in Metadata, and click Next.

5. On the next page, specify the configuration directory and the level (for example, Lev1) that you want to update, and click Next.
6. On the next page, enter the user ID and password for an unrestricted administrative user.

7. On the next page, click **Browse**, locate the SAS installation data (SID) file, click **OK**, and then click **Next**.
8. When you see the Summary page, the SAS Deployment Manager has finished collecting input. This is the last opportunity to go back and change any information that you have provided on previous pages before the manager begins updating your license.

Make one of the following choices:

- Select **Start** to begin updating the license file on the current machine.
- Select **Back** to navigate to earlier pages to change information previously entered.
- Select **Cancel** to terminate the session. Note that you will lose information previously entered.
When you see a page similar to the following, the SAS Deployment Manager is finished:

9. Click **Next** to go to the Additional Resources page.

10. Click **Finish** to close the SAS Deployment Manager.

11. Restart your SAS server and middle tiers.

   For more information, see “Operating Your Servers” in *SAS Intelligence Platform: System Administration Guide*. 
Add on SAS Visual Analytics Administration and Reporting

If you are adding on SAS Visual Analytics or SAS Visual Analytics Administration and Reporting to SAS 9.4 (SAS 9.4_M0) or later, do the following before deploying your SAS software order:

1. On your middle-tier machines, check your deployment summary to determine whether you already have these two SAS components:
   • SAS Visual Analytics Administrator
   • SAS Visual Analytics Services

   Your SAS Deployment Registry is located on your machine here:

   $SAS-installation-directory/SASHome/InstallMisc/InstallLogs/DeploymentRegistry.html

2. If you plan to deploy the middle tier for SAS Visual Analytics or SAS Visual Analytics Administration and Reporting to:
   • the same middle-tier machine, then you do not need to do anything further before deploying your SAS software order.
   • a different middle-tier machine, continue to step 3.

3. Before deploying your SAS software order, unconfigure these two SAS software components:
   • SAS Visual Analytics Administrator
   • SAS Visual Analytics Services

   For more information, see “Removing a SAS Configuration” in SAS Intelligence Platform: Installation and Configuration Guide.

Remove SAS Visual Analytics Product Configurations

The Remove Existing Configuration feature of the SAS Deployment Manager provides an automated way to remove one or more products of a SAS 9.4 configuration from your environment. With this feature, you can remove the configurations of all SAS products or just selected products from a machine.

When removing a product configuration, you must first determine the product’s dependencies. If you remove a product configuration that another product depends on, then the dependent product is not able to function. Therefore, when you remove a product’s configuration, the SAS Deployment Manager requires that you also remove the configurations of any dependent products.

Note: Starting with release 7.3, SAS Visual Analytics provides sample objects. For this reason, when unconfiguring SAS Visual Analytics, the SAS Content Server must be running.
To remove a SAS Visual Analytics product, consult the table in “Identify Dependent SAS Visual Analytics Products” on page 152 to determine the product dependencies. Next, follow the instructions in the “Removing a SAS Configuration” in SAS Intelligence Platform: Installation and Configuration Guide.

Identify Dependent SAS Visual Analytics Products

Product dependencies are shown in the following table. If you remove the configuration for a product in the left column, then you must also remove the configurations for all of the products that are in the right column opposite that product.

Note: Remove SAS Visual Analytics products in the opposite order in which you deployed them. For more information see, “Installation Rules for Multiple-Machine Deployments” on page 74.

Table A3.1 Dependencies in SAS Visual Analytics

<table>
<thead>
<tr>
<th>Product</th>
<th>Dependent Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Visual Analytics Extensions for Services</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Graph Builder</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Graph Builder Configuration Data</td>
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</tr>
<tr>
<td>SAS Visual Data Builder Configuration Data</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Explorer Configuration Data</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Configuration Data</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Explorer</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Designer</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Report Viewer</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Administrator</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Data Builder</td>
<td>None</td>
</tr>
<tr>
<td>SAS Visual Analytics Hub</td>
<td>SAS Visual Analytics Services</td>
</tr>
<tr>
<td>Product</td>
<td>Dependent Products</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SAS Visual Analytics Services</td>
<td>SAS Visual Analytics Administrator</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Designer</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Explorer</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Graph Builder</td>
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<tr>
<td></td>
<td>SAS Visual Analytics Hub</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Report Viewer</td>
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<tr>
<td></td>
<td>SAS Visual Data Builder</td>
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<tr>
<td>SAS Web Application Server</td>
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<tr>
<td></td>
<td>SAS Visual Analytics Report Viewer</td>
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<td>SAS Visual Analytics Services</td>
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<tr>
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<td>SAS Visual Data Builder</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform</td>
<td>SAS Visual Analytics Administrator</td>
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<td>SAS Visual Analytics Designer</td>
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<td>SAS Visual Analytics Explorer</td>
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<td>SAS Visual Analytics Extensions for Services</td>
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<td>SAS Visual Analytics Services</td>
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<td>SAS Visual Data Builder</td>
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<tr>
<td>SAS Pooled Workspace Server</td>
<td>SAS Visual Analytics Explorer Server Configuration</td>
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<td>Application Server Context</td>
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<tr>
<td></td>
<td>SAS Visual Analytics High-Performance Configuration</td>
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<td>SAS Visual Data Builder</td>
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<tr>
<td>SAS Workspace Server</td>
<td>SAS Visual Analytics Administrator</td>
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<tr>
<td></td>
<td>SAS Visual Data Builder</td>
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<tr>
<td>DATA Step Batch Server</td>
<td>SAS Visual Analytics Administrator</td>
</tr>
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</table>
### Product Dependent Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Dependent Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Web Infrastructure Platform Data Server</td>
<td>Visual Analytics Services</td>
</tr>
<tr>
<td></td>
<td>Visual Data Builder</td>
</tr>
</tbody>
</table>

* These products depend on the product in the left column. Therefore, they must be removed if the product in the left column is removed.

When you remove a product’s configuration, the SAS Deployment Manager checks to see whether your deployment plan includes any products that depend on that product. If dependent products exist, and if you have not selected those products for removal, then the SAS Deployment Manager prompts you to remove them.

### Change Autoload Location for the Public LASR Library

In SAS Visual Analytics 6.3 and later, the default directory for SAS Autoload has changed to the following: `configuration-directory/Levn/AppData/SASVisualAnalytics/VisualAnalyticsAdministrator/AutoLoad`.

Your previous configured SAS Autoload directory still exists and is your preferred Autoload directory. If you want to update your environment to use the newly created default directory, update the `VA.Autoload.Location` property using SAS Management Console. For more information, see “Autoload” in *SAS Visual Analytics: Administration Guide*.
Here is the recommended reading list for this title:

- Configuration Guide for SAS Foundation for Microsoft Windows for x64
- Configuration Guide for SAS Foundation for UNIX Environments
- SAS Guide to Software Updates and Product Changes
- SAS High-Performance Analytics Infrastructure: Installation and Configuration Guide
- SAS High-Performance Computing Management Console: User’s Guide
- *SAS Intelligence Platform: Installation and Configuration Guide*
- *SAS Intelligence Platform: Security Administration Guide*
- *SAS LASR Analytic Server: Reference Guide*
- System Requirements—SAS Visual Analytics 7.5 (Distributed or Non-distributed LASR)
- System Requirements—SAS Visual Analytics 7.5 and SAS Visual Statistics 7.5
- *SAS Visual Analytics: Administration Guide*
- SAS Visual Analytics: Distributed Environment Deployment Prerequisites
- Help and tutorials integrated into SAS Visual Analytics Apps.
- SAS offers instructor-led training and self-paced e-Learning courses to help you administer SAS Visual Analytics. For more information about the courses available, see [support.sas.com/admintraining](http://support.sas.com/admintraining)
- SAS Visual Analytics Tutorials
- SAS Visual Analytics on YouTube

For a complete list of SAS publications, go to [sas.com/store/books](http://sas.com/store/books). If you have questions about which titles you need, please contact a SAS Representative:

SAS Books
SAS Campus Drive
**browser**

See web browser.

**co-located data provider**

A distributed data source, such as SAS Visual Analytics Hadoop or a third-party vendor database, that has SAS High-Performance Analytics software installed on the same machines. The SAS software on each machine processes the data that is local to the machine or that the data source makes available as the result of a query.

**data set**

See SAS data set.

**data warehouse (warehouse)**

A collection of pre-categorized data that is extracted from one or more sources for the purpose of query, reporting, and analysis. Data warehouses are generally used for storing large amounts of data that originates in other corporate applications or that is extracted from external data sources.

**deployment plan**

Information about what software should be installed and configured on each machine in a SAS deployment. A deployment plan is stored in a plan.xml file.

**encryption**

The conversion of data by the use of algorithms or other means into an unintelligible form in order to secure data (for example, passwords) in transmission and in storage.

**Extensible Markup Language**

See XML.

**foundation services**

See SAS Foundation Services.

**grid host**

The machine to which the SAS client makes an initial connection in a SAS High-Performance Analytics application.

**Hadoop Distributed File System (HDFS)**

A portable, scalable framework, written in Java, for managing large files as blocks of equal size. The files are replicated across multiple host machines in a Hadoop cluster in order to provide fault tolerance.
HDFS
See Hadoop Distributed File System.

high-performance root node
See root node.

identity
See metadata identity.

Integrated Windows authentication (IWA)
a Microsoft technology that facilitates use of authentication protocols such as Kerberos. In the SAS implementation, all participating components must be in the same Windows domain or in domains that trust each other.

Internet Protocol Version 6 (IPv6)
a protocol that specifies the format for network addresses for all computers that are connected to the internet. This protocol, which is the successor of Internet Protocol Version 4, uses hexadecimal notation to represent 128-bit address spaces. The format can consist of up to eight groups of four hexadecimal characters, delimited by colons, as in FE80:0000:0000:0000:0202:B3FF:FE1E:8329. As an alternative, a group of consecutive zeros could be replaced with two colons, as in FE80::0202:B3FF:FE1E:8329.

IPv6

IWA
See Integrated Windows authentication.

JAR (Java Archive)
the name of a package file format that is typically used to aggregate many Java class files and associated metadata and resources (text, images, etc.) into one file to distribute application software or libraries on the Java platform.

Java
a set of technologies for creating software programs in both stand-alone environments and networked environments, and for running those programs safely. Java is an Oracle Corporation trademark.

Java Archive
See JAR.

Java Database Connectivity (JDBC)
a standard interface for accessing SQL databases. JDBC provides uniform access to a wide range of relational databases. It also provides a common base on which higher-level tools and interfaces can be built.

Java Development Kit (JDK)
a software development environment that is available from Oracle Corporation. The JDK includes a Java Runtime Environment (JRE), a compiler, a debugger, and other tools for developing Java applets and applications.

JDBC
See Java Database Connectivity.
JDK
See Java Development Kit.

localhost
the keyword that is used to specify the machine on which a program is executing. If a client specifies localhost as the server address, the client connects to a server that runs on the same machine.

login
a SAS copy of information about an external account. Each login includes a user ID and belongs to one SAS user or group. Most logins do not include a password.

Message Passing Interface (MPI)
a standardized and portable message-passing system that was designed to function on a wide variety of parallel computers. SAS Analytics applications implement MPI for use in high-performance computing environments.

metadata identity (identity)
a metadata object that represents an individual user or a group of users in a SAS metadata environment. Each individual and group that accesses secured resources on a SAS Metadata Server should have a unique metadata identity within that server.

metadata object
a set of attributes that describe a table, a server, a user, or another resource on a network. The specific attributes that a metadata object includes vary depending on which metadata model is being used.

middle tier
in a SAS business intelligence system, the architectural layer in which web applications and related services execute. The middle tier receives user requests, applies business logic and business rules, interacts with processing servers and data servers, and returns information to users.

MPI
See Message Passing Interface.

object spawner (spawner)
a program that instantiates object servers that are using an IOM bridge connection. The object spawner listens for incoming client requests for IOM services.

planned deployment
a method of installing and configuring a SAS business intelligence system. This method requires a deployment plan that contains information about the different hosts that are included in the system and the software and SAS servers that are to be deployed on each host. The deployment plan then serves as input to the SAS Deployment Wizard.

root node (high-performance root node)
in a SAS High-Performance Analytics application, the software that distributes and coordinates the workload of the worker nodes. In most deployments the root node runs on the machine that is identified as the grid host. SAS High-Performance Analytics applications assign the highest MPI rank to the root node.

SAS Application Server
a logical entity that represents the SAS server tier, which in turn comprises servers that execute code for particular tasks and metadata objects.
**SAS authentication**
a form of authentication in which the target SAS server is responsible for requesting or performing the authentication check. SAS servers usually meet this responsibility by asking another component (such as the server's host operating system, an LDAP provider, or the SAS Metadata Server) to perform the check. In a few cases (such as SAS internal authentication to the metadata server), the SAS server performs the check for itself. A configuration in which a SAS server trusts that another component has pre-authenticated users (for example, web authentication) is not part of SAS authentication.

**SAS configuration directory**
the location where configuration information for a SAS deployment is stored. The configuration directory contains configuration files, logs, scripts, repository files, and other items for the SAS software that is installed on the machine.

**SAS data set (data set)**
a file whose contents are in one of the native SAS file formats. There are two types of SAS data sets: SAS data files and SAS data views.

**SAS Deployment Manager**
a cross-platform utility that manages SAS deployments. The SAS Deployment Manager supports functions such as updating passwords for your SAS deployment, rebuilding SAS web applications, and removing configurations.

**SAS Deployment Wizard**
a cross-platform utility that installs and initially configures many SAS products. Using a SAS installation data file and, when appropriate, a deployment plan for its initial input, the wizard prompts the customer for other necessary input at the start of the session, so that there is no need to monitor the entire deployment.

**SAS Foundation Services (foundation services)**
a set of core infrastructure services that programmers can use in developing distributed applications that are integrated with the SAS platform. These services provide basic underlying functions that are common to many applications. These functions include making client connections to SAS application servers, dynamic service discovery, user authentication, profile management, session context management, metadata and content repository access, information publishing, and stored process execution.

**SAS installation data file**
See SID file.

**SAS installation directory**
the location where your SAS software is installed. This location is the parent directory to the installation directories of all SAS products. The SAS installation directory is also referred to as SAS Home in the SAS Deployment Wizard.

**SAS IOM workspace (workspace)**
in the IOM object hierarchy for a SAS Workspace Server, an object that represents a single session in SAS.

**SAS Metadata Server**
a multi-user server that enables users to read metadata from or write metadata to one or more SAS Metadata Repositories.
SAS Pooled Workspace Server
a SAS Workspace Server that is configured to use server-side pooling. In this configuration, the SAS object spawner maintains a collection of workspace server processes that are available for clients.

SAS Software Depot
a file system that consists of a collection of SAS installation files that represents one or more orders. The depot is organized in a specific format that is meaningful to the SAS Deployment Wizard, which is the tool that is used to install and initially configure SAS. The depot contains the SAS Deployment Wizard executable, one or more deployment plans, a SAS installation data file, order data, and product data.

SAS Stored Process Server
a SAS IOM server that is launched in order to fulfill client requests for SAS Stored Processes.

SAS Workspace Server
a SAS server that provides access to SAS Foundation features such as the SAS programming language and SAS libraries.

SASHDAT file format
a SAS proprietary data format that is optimized for high performance and computing efficiency. For distributed servers, SASHDAT files are read in parallel. When used with the Hadoop Distributed File System (HDFS), the file takes advantage of data replication for fault-tolerant data access.

SASHOME directory
the location in a file system where an instance of SAS software is installed on a computer. The location of the SASHOME directory is established at the initial installation of SAS software by the SAS Deployment Wizard. That location becomes the default installation location for any other SAS software that is installed on the same computer.

server context
a SAS IOM server concept that describes how SAS Application Servers manage client requests. A SAS Application Server has an awareness (or context) of how it is being used and makes decisions based on that awareness. For example, when a SAS Data Integration Studio client submits code to its SAS Application Server, the server determines what type of code is submitted and directs it to the correct physical server for processing (in this case, a SAS Workspace Server).

server description file
a file that is created by a SAS client when the LASR procedure executes to create a server. The file contains information about the machines that are used by the server. It also contains the name of the server signature file that controls access to the server.

SID file (SAS installation data file)
a control file containing license information that is required in order to install SAS.

single sign-on (SSO)
an authentication model that enables users to access a variety of computing resources without being repeatedly prompted for their user IDs and passwords. For example, single sign-on can enable a user to access SAS servers that run on different platforms without interactively providing the user's ID and password for each platform. Single sign-on can also enable someone who is using one application to launch other
applications based on the authentication that was performed when the user initially logged on.

**SOE**

*See* software order email.

**software order email (SOE)**

A message, sent by email to a customer site, that announces the availability of purchased software and describes the order. The message contains download and preliminary installation steps as applicable.

**spawner**

*See* object spawner.

**SSO**

*See* single sign-on.

**trusted user**

A privileged service account that can act on behalf of other users on a connection to the metadata server.

**unrestricted identity**

A user or group that has all capabilities and permissions in the metadata environment due to membership in the META: Unrestricted Users Role (or listing in the adminUsers.txt file with a preceding asterisk).

**update mode**

An operating state of the SAS Deployment Wizard in which users are required to install software updates before they can perform any other deployment tasks. The SAS Deployment Wizard automatically goes into update mode when it determines that the current SAS order contains new versions or maintenance updates to the deployed products in a given SAS installation directory.

**warehouse**

*See* data warehouse.

**web application**

An application that is accessed via a web browser over a network such as the internet or an intranet. SAS web applications are Java Enterprise Edition (JEE) applications that are delivered via web application archive (WAR) files. The applications can depend on Java and non-Java web technologies.

**web authentication**

A configuration in which users of web applications and web services are verified at the web perimeter, and the metadata server trusts that verification.

**web browser (browser)**

A software application that is used to view web content, and also to download or upload information. The browser submits URL (Uniform Resource Locator) requests to a web server and then translates the HTML code into a visual display.

**worker node**

In a SAS High-Performance Analytics application, the role of the software that receives the workload from the root node.
workspace

See SAS IOM workspace.

XML (Extensible Markup Language)
a markup language that structures information by tagging it for content, meaning, or use. Structured information contains both content (for example, words or numbers) and an indication of what role the content plays. For example, content in a section heading has a different meaning from content in a database table.
# Index

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