SAS® 9.4 Intelligence Platform: Installation and Configuration Guide, Second Edition

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Using This Book

Audience

The information in this document can be used by a SAS system administrator to install SAS Intelligence Platform on one or more machines.

Documentation Conventions

SAS Installation Directory

The phrase *SAS installation directory* refers to a host path. (The SAS installation directory is sometimes referred to as SASHome.) 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 the topic, "Overview of the Configuration Directory Structure," in the SAS Intelligence Platform: System Administration Guide.

What's New in Installation and Configuration for the SAS 9.4 Intelligence Platform

Overview

The *SAS Intelligence Platform: Installation and Configuration Guide* explains how to install and initially configure the SAS Intelligence Platform. It contains enhancements and changes to the SAS 9.4 Intelligence Platform deployment tools.

For All SAS 9.4 Releases:

Several SAS products are retired, depending on your maintenance release. There are several ways that retired product information is available to you. For example:

- Before you upgrade or migrate, run the SAS 9 System Evaluation tool to identify any configured products that are retired in your deployment. For more information, see "Executing the System Evaluation Application" in *SAS Content Assessment* and "Unconfigure Retired SAS Products" in *SAS Intelligence Platform: Migration Guide*.
- When you create the migration package to install a maintenance release or upgrade to a new product release, the Migration Analysis Report lists any retired products.
- After you install a maintenance release or upgrade to a new product release, you might get an UpdateInstructions.html file. Review the UpdateInstructions.html file on each tier. This file lists any retired products.

For specific information about a product that is retired, see "Introduction to Product Details and Requirements" in *SAS Guide to Software Updates and Product Changes*.

A best practice is to unconfigure retired SAS products before you upgrade and to uninstall them after you upgrade. For more information, see "Removing a SAS Configuration".

Note: In this guide, content about retired products remains relevant for releases prior to when they were retired.

For SAS 9.4M8:

The following ports are not supported in SAS 9.4M8:

- 1883 (MQTT)
- 5672 (AMQP)
- 11098-11107 (JMX)
- 61613 (STOMP)
- 61614 (WebSockets)

Note: In this guide, content about these ports remains relevant for releases prior to SAS 9.4M8.

When you perform a SAS 9.4M8 deployment and your SAS middle tier is installed with multiple SAS Web Application Server instances with no clustering, and one of the instances is on a different host, you might need to perform an additional step after deployment in order to access your web applications. For more information, see "Troubleshooting SAS Web Applications".

For SAS 9.4M7:

- If you chose the **Custom** prompting level, you get an Invocation Options page for each SAS server. If you change the value for **Log File Name**, the sas.servers script is unable to determine whether the server is running. For more information, see Step 33.
- If you are adding on a SAS product, you must start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.For more information, see Step 6.
- If you are adding on a SAS product, you must stop and restart the SAS Deployment Wizard with the NOHOTFIX option during the process. For more information, see Step 10.
- If you are adding on a SAS product, on the Select Deployment Type page and Select Products to Install page, you must choose specific options to have a successful install. For more information, see Step 11 , Step 13, and Step 14.
- If you are adding on a SAS product, you must apply hot fixes for the specific product. For more information, see Step 20.
- If you are adding on a SAS product, you must apply security updates for the specific product being added. For more information, see Step 21. Then, restart your SAS metadata, compute, and middle-tier (web) servers. For more information, see Step 22.
- If you are adding on a SAS product, information has been added about the deployment plan location based on what you are adding. For more information, see Step 5.
- If you are configuring an add-on product, you must configure it on the same machine on which the current configuration was originally created. For more information, see Step 20.
- If you are uninstalling SAS products, you can choose to uninstall earlier SAS software versions. For more information, see Step 6.

For the May 2019 release of SAS 9.4M6:

- Languages supported have changed. For more information, see "Languages Supported Have Changed".
- There is a new post-deployment step for SAS Web Server. For more information, see "New Post-Deployment Step for SAS Web Server".
- The DB2 database must be configured to support MYS SQL grammar. For more information, see "DB2 and MYS SQL Grammar".
- There is a new internal account - tdadm. This is the user ID and password for accessing the database used with SAS Application Themes. For more information, see "Internal User Accounts".

For SAS 9.4M4:

- Deployment certificate information is relocated.

For SAS 9.4M3:

- Password prompts can be reduced.
- Re-entry into the SAS Deployment Wizard during SAS installation is supported.
- Optimizing SAS Software Depots is available.
- SAS Software Depot subsetting is improved.

For the October 2014 release of SAS 9.4 (SAS 9.4, Rev. 940_14w41):

- SAS Visual Analytics Administration and Reporting is supported.

For SAS 9.4M2:

- The ability to update your SAS documentation only is supported.
- Tuning SAS Web Application Servers is supported.
- SAS Metadata Server clustering is supported on z/OS.

For SAS 9.4:

- SAS Studio is supported.
- Installing MSI-based packages for SAS Enterprise Guide and SAS Add-In for Microsoft Office is supported.
- The SAS Deployment Agent is available.
- Subsetting SAS Deployment Wizard recipes is supported.
- The Locale Setup Manager task is enhanced.
- Uninstalling SAS software is supported.

Languages Supported Have Changed

SAS switched from delivering localized resources in specific Chinese cultures (for example, zh-CN, zh-TW, and zh-HK) to delivering localized resources in neutral Chinese cultures (zh-Hans and zh-Hant). For more information, see "Locale and Encoding Settings in the Deployment Wizard".

New Post-Deployment Step for SAS Web Server

If you are using SAS Visual Analytics 7.5 or higher, the sas.conf file must be modified for Microsoft SharePoint to work with SAS Visual Analytics. For more information, see Step 11.

DB2 and MYS SQL Grammar

The DB2 database must be configured to support MYS SQL grammar. For more information, see "DB2".

Information about Certificates Moved

In SAS 9.4M4, the chapter "Setting Up Certificates for SAS Deployment," has been integrated into the following documents:

- *SAS Intelligence Platform: Middle-Tier Administration Guide*
- *Encryption in SAS*
- *SAS Intelligence Platform: Security Administration Guide*

Password Prompt Reductions

In SAS 9.4M3, the SAS Deployment Wizard enables you to reduce the number of password prompts. For more information, see "Reducing the Number of Password Prompts".

Re-entry into SAS Deployment Wizard

In SAS 9.4M3, a re-entry feature has been added to the SAS Deployment Wizard. For more information, see "Re-entry Feature of the Deployment Wizard".

Support for Optimizing SAS Software Depots

In SAS 9.4M3, support has been added for optimizing SAS Software Depots. For more information, see information about how to Remove duplicate files and save space.

Improved SAS Software Depot Subsetting

In SAS 9.4M3, improvements have been made to how you can subset SAS Software Depots. For more information, see Subsetting SAS Software Orders.

SAS Visual Analytics Administration and Reporting

Starting in October 2014 (SAS 9.4, Rev. 940_14w41), SAS provides SAS Visual Analytics Administration and Reporting with most SAS solution software orders. For more information, see "SAS Visual Analytics Administration and Reporting".

Update Your SAS Documentation Only

In SAS 9.4M2, the SAS Deployment Wizard enables you to install only the newly released documentation. For more information, see "Update Your SAS Documentation Only".

Support for SAS Web Application Servers Tuning

In SAS 9.4M2, the SAS Deployment Wizard enables you to specify the size of your SAS Web Application Server based on number of users and workload. For more information, see "Estimated System Size".

Support for SAS Metadata Server Clustering on z/OS

In SAS 9.4M2, SAS Metadata Server clustering is also supported on z/OS. For more information, see "Metadata Server Clustering".

Support for SAS Studio

In the March 2014 release of SAS 9.4, the SAS Deployment Wizard supports the installation and configuration of SAS Studio.

MSI-Based Packages for SAS Enterprise Guide and SAS Add-In for Microsoft Office

In SAS 9.4, there is another installation option for SAS Enterprise Guide and SAS Add-In for Microsoft Office. This additional option has packages based on a Microsoft

installer (MSI) that are much smaller in size than the SAS Software Depot. These MSI-based packages enable administrators to install these two SAS products over a distributed deployment using software provisioning tools such as Microsoft System Center Configuration Manager (SCCM). This new installation option is available only on Windows.

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

SAS Deployment Agent

The SAS Deployment Agent is required for deployments that run remote processes. SAS uses the 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. For more information, see *Manage SAS Deployment Agent Service* in the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

Subset Recipes

The SAS Deployment Wizard enables you to subset your SAS order using recipes. A subset *recipe* is an XML file that contains a formula that the wizard uses to assemble pieces of the SAS Software Depot to subset your order for a particular SAS product or group of products (for example, SAS Enterprise Guide or SAS Add-In for Microsoft Office). For more information, see “Subset an Order”.

Locale Setup Manager Task

On Windows and UNIX machines, you can use the Locale Setup Manager task in the SAS Deployment Manager to configure the language and region for SAS Foundation and certain SAS applications. For more information, see “Change Locale for SAS”.

Uninstall SAS Software Task

On Windows and UNIX machines, you can use the Uninstall SAS Software task in the SAS Deployment Manager to remove SAS software. There is also a silent uninstall option. For more information, see “Uninstalling Your SAS Software”.

Chapter 1

Introduction to Installing the SAS Intelligence Platform

What Is the SAS Intelligence Platform? 1

What Is Covered in This Document? 1

Deploying the SAS Intelligence Platform 2
Deployment Process Overview 2

What Is the SAS Intelligence Platform?

The SAS Intelligence Platform is a comprehensive, end-to-end infrastructure for creating, managing, and distributing enterprise intelligence. The SAS Intelligence Platform comprises the following software offerings:

- SAS BI Server
- SAS Enterprise BI Server
- SAS Data Management (Standard or Advanced) and other related offerings for data management, data quality, and data governance

SAS Data Integration Server has been revised, and SAS Enterprise Data Integration Server is available only as a renewal.

Solutions for enterprise intelligence, customer intelligence, and financial intelligence are built on the SAS Intelligence Platform, as well as turnkey solutions for specialized markets in life sciences, health care, retail, manufacturing, and others. Therefore, if your SAS deployment plan includes a SAS solution, then the SAS Intelligence Platform documentation also pertains to you.

The SAS Intelligence Platform library provides information for platform offerings, which include products and components such as the SAS Metadata Server, SAS Integration Technologies, and the SAS OLAP Server. See SAS Intelligence Platform Documentation for more information about these software offerings and their components.

What Is Covered in This Document?

This document covers activities that begin after you and your SAS representative have decided what software you need and on what machines software is installed. At this

point, you can begin performing some pre-installation tasks, such as creating operating system user accounts and designating ports that you will use during installation.

This document covers all of the pre-installation, installation, and configuration tasks that you must perform to deploy the SAS Intelligence Platform on either a single machine or in a distributed, heterogeneous environment. By the time you reach the end of this document, all of your SAS servers, middle-tier servers, and clients will be functional.

Installing the software will be easier if you read the following documents as well:

- *SAS Intelligence Platform: Overview* to understand the architecture of the SAS system.
- Configuration documentation for SAS solutions. Many of the solutions leverage the functionality of the SAS Intelligence Platform. If your SAS deployment plan includes a solution, then you might be referred to additional solution-specific configuration information.

If you have licensed SAS solutions, consult with your SAS representative for more information.

Deploying the SAS Intelligence Platform

Deployment Process Overview

The following list summarizes the steps required to install and configure the SAS Intelligence Platform on a single machine or in a distributed, heterogeneous environment. The first three steps are pre-installation tasks and can be performed in any order. Perform step 4 after steps 1 through 3 are completed.

1. Plan your deployment and review additional documentation.
2. Create users and groups and designate ports.
3. Create a SAS Software Depot.
4. Install required third-party software.
5. Install and configure SAS.

Subsequent chapters provide more detail and step-by-step instructions.

Chapter 2

Planning Your Deployment and Reviewing Additional Documentation

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Planning Your Deployment 3

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Reviewing Additional Documentation 5

Deployment Process Overview: Plan your deployment and review additional documentation

This chapter describes how to plan your SAS deployment and lists additional documentation that you should review.

1. Plan your deployment and review additional documentation.

2. Create users and groups and designate ports.

3. Create a SAS Software Depot.

4. Install required third-party software.

5. Install and configure SAS.

It is important to plan your deployment and to review additional documentation associated with your deployment. This includes late-breaking information or instructions specific to a particular configuration not covered in the *SAS Intelligence Platform: Installation and Configuration Guide*.

Participating in SAS community online forums can help you plan your deployment:

- Administration and Deployment community
- SAS Hot Fix Announcements community

Planning Your Deployment

The *deployment plan* is an XML file that is used as input to the SAS Deployment Wizard. It describes the topology of your SAS system. The plan instructs the SAS

Deployment Wizard what software to install and configure on each machine in a SAS deployment.

There are two types of deployment plans: standard and customized. A standard deployment plan describes a common configuration. Standard deployment plans are provided in the SAS Deployment Wizard. A customized deployment plan is created by you and your SAS representative specifically for your site. You and your SAS representative record decisions about software and the hardware on which that software will be installed. This information is used to generate a customized deployment plan file. If your environment requires a customized deployment plan, SAS sends you an email message with an XML file (or a ZIP file containing an XML file). Those files include the following:

The Deployment File (plan.xml)
: This is one of the key files that are used throughout the rest of the deployment process to customize your installation and configuration experience. The plan.xml file serves as input to the SAS Deployment Wizard. Copy this set of files to the **`Plan_Files`** directory at the top level of the SAS Software Depot.

The Pre-installation Checklist (checklist.pdf or checklist.rtf)
: This is where you record information such as the credentials for special SAS users, machine names, ports, and the installation locations of third-party products relevant to your deployment.

The Index File (index.html)
: This file provides some high-level guidance through the remainder of the process. The index.html file includes a reference to a pre-installation checklist, which is for the information that you need to know for the remainder of the process. Information that you enter in the checklist is requested in later stages of the installation process. It is important that you record the information for later use to ensure consistency and to document decisions that you made.

Providing Access to a Local Version of the Documentation

Most SAS web applications support local access to SAS documentation. Here are two instances where this might be useful:

- You have customized SAS documentation.
- Your SAS system is highly secure, and it does not have access to the internet. Because SAS documentation is hosted in the cloud, it cannot be reached without internet access.

You can download PDF versions of SAS documentation or you can create customized versions. You can create an HTML page with links to the local documentation, and then create a link to this page.

To configure local documentation:

1. Access SAS Management Console.
2. Expand **Application Management**.
3. Expand **Configuration Manager**.
4. Right-click **SAS Application Infrastructure**, and select **Properties**.
5. Click on the **Advanced** tab.

6. Add the following two properties:
    1. HelpMenuLink. For **Property Value**, specify the path to the HTML page that contains links to your local documentation.
    2. HelpMenuLinkName. For **Property Value**, enter a meaningful label for the link.
7. Click **OK**.

Users see a new item in the **Help** menu, between the Help Center and About items. Clicking this link opens the specified HTML page.

Reviewing Additional Documentation

Review these additional documents for valuable information:

- Usage Notes

  Usage Notes for Installation Problems

  Note: In particular, review Usage Note 42197, which provides a portal to relevant papers such as Grand Designs: Why It Pays to Think About Technical Architecture Design Before You Act and How to Maintain Happy SAS 9 Users.

- system requirements

  SAS System Requirements

- SAS Security Bulletins

  Security Bulletins, Java Updates, and SAS Notes

- QuickStart Guides

  QuickStart Guides are provided with your SAS software.

  QuickStart Guides are also available online:

  - Windows
  - UNIX
  - z/OS

- software order email (SOE)

  The SOE details your order. It provides initial installation steps. For SAS 9.4, it contains instructions for using Electronic Software Delivery (ESD), if applicable.

- 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 software was in your order and when the order was placed. The SOI is in your SAS Software Depot at **`install_doc/`***order-number*`/soi.html`.

- SAS software summary

  In the same SAS Software Depot as the SOI, the SAS software summary is a more detailed list of the software in your order. Unlike the SAS order information sheet, which lists only the software that you have specifically ordered, the SOI describes the included software that supports the software in your order. The SAS software summary is in your SAS Software Depot at **`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".

Chapter 3

Creating Users and Groups and Designating Ports

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Deployment Process Overview: Create operating system users and groups and designate ports

Before you begin installing and configuring your software, you must create required users and groups at the operating system level. You must designate TCP/IP ports for the servers to use.

1. Plan and review additional documentation.
2. **Create operating system users and groups and designate ports.**
3. Create a SAS Software Depot.
4. Install required third-party software.
5. Install and configure SAS.

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?

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 3.1 *SAS Internal User Accounts*

Description	User ID
SAS Administrator This user account has privileges associated with the Metadata Server: Unrestricted role.	sasadm@saspw
SAS Trusted User 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.	sastrust@saspw
SAS Environment Manager Service 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.	sasevs@saspw
SAS Anonymous Web User 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.	webanon@saspw

The following table shows additional internal user accounts:

Table 3.2 *Additional SAS Internal User Accounts*

Description	User ID
dbmsowner This is the user ID and password for accessing the SAS Web Infrastructure Platform Data Server. This is the owner of all databases.	dbmsowner
tdadm This is the user ID and password for accessing the database used with SAS Application Themes.	tdadm
SharedServices This is the user ID and password for accessing the SharedServices database used by the SAS Web Infrastructure Platform.	SharedServices
adminowner This is the user ID and password for accessing the Administration database used by the SAS Environment Manager.	adminowner

sasevdb This is the user ID and password for the Environment Manager Enablement Kit Database.	sasevdb
EVManager This is the user ID and password for accessing the EVManager database used by the SAS Environment Manager.	EVManager
vatadm This is the user ID and password for accessing the database used with SAS Visual Analytics Services.	vatadm

Note: Passwords for internal user accounts for databases, which are listed in the previous table, are subject to guidelines. For more information, see "Password Policies".

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

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. SAS requires external user accounts for two purposes: installation and running certain SAS server processes.

During installation and configuration, the SAS Deployment Wizard must run under an external 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 external user accounts and their purposes, see "Step 1: Configure the Initial Metadata Server" in *SAS Intelligence Platform: System Administration Guide*.

As you set up external accounts, remember to use different external accounts for the First User and the SAS Spawned Servers Account user. 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 "Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX" or in "Pre-installation Checklist for External User Accounts for SAS on z/OS". You will need this information when you run the SAS Deployment Wizard later.

Note: To validate your SAS deployment, you need an external user account that is representative of a SAS client user, such as a user of SAS Data Integration Studio. This external user account is the temporary process owner when its jobs are run on a standard SAS Workspace Server. If Integrated Windows Authentication (IWA) is not being implemented, it can be helpful to use the SAS Deployment Wizard to create a First User account (sasdemo) in metadata during deployment for validation purposes. The wizard assigns the required **Log on as a batch job** Windows user that is right for you.

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

Table 3.3 *Required External User Accounts for SAS*

Description	Recommended User ID	Machine On Which It Is Authenticated
Installer The account used to install SAS.	sas	Every machine
SAS Spawned Servers Account The process owner for SAS Stored Process Servers and SAS Pooled Workspace Servers.	sassrv	SAS Stored Process Server SAS Pooled Workspace Server

Note:

- For information about the user rights that each external account requires, see "Rights Required by External User Accounts for SAS".
- UNIX: 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.
- Windows: The Installer user ID must be available in the long term for future SAS maintenance.
- UNIX: Do not use root for the Installer user ID.
- AIX: For both user IDs, make sure that the **User can LOGIN?** setting is set to **true**.
- z/OS: The Installer and the SAS Spawned Servers Account must have a TSO segment defined.
- z/OS: Here are some details about Installer:

- It is the started task owner for the servers.
- It is the owner of the configuration directory structure.
- It must have a writable home directory in the UNIX file system.
- It must have an OMVS segment definition with the following minimum settings:
  - ASSIZEMAX of at least 2 GB
  - CPUTIMEMAX of at least 5000 seconds
  - PROCUSERMAX of at least 50 users

Rights Required by External User Accounts for SAS

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 3.4 *Rights Required by External User Accounts for SAS*

External User Account	Operating System	User Rights Needed
Installer	Windows	Administrator rights
	UNIX	The primary group for the Installer must contain the SAS Spawned Servers Account.
	z/OS	The primary group for the Installer must contain the SAS Spawned Servers Account.
SAS Spawned Servers Account	Windows*	**Log on as a batch job**
	UNIX	Member of the primary group for the Installer. (This group does *not* have to be the primary group for the SAS Spawned Servers Account.)
	z/OS	Member of the primary group for the Installer. (This group does *not* have to be the primary group for the SAS Spawned Servers Account.)

* The SAS Deployment Wizard automatically assigns the Windows user right **Log on as a batch job** to the SAS Spawned Servers Account.

On Windows, if you choose to run your SAS servers using management scripts instead of running them as Windows services, then the user account that runs the object spawner must meet the following requirements on the object spawner machine:

- It must be the administrator or a member of the Windows Administrators group.
- It must have the following Windows local user rights:
  - **Adjust memory quotas for a process**
  - **Replace a process level token**

Required External User Accounts for Third-Party Software

The following table describes the external user accounts required by third-party software and the machines on which they are authenticated. These accounts are either local to a machine or they are defined in a network directory service of which the machine is a member.

Table 3.5 *Required External User Accounts for Third-Party Software*

Description	Recommended User ID	Machine On Which It Is Authenticated
LSF Administrator Process owner for Platform LSF services and daemons. This account is required if you install Platform Suite for SAS to support scheduling or grid computing. This account owns the LSF configuration and log files and has permission to perform cluster-wide operations, edit configuration files, and reconfigure a cluster.	lsfadmin	Every Platform Process Manager and Platform LSF machine
LSF User Sometimes referred to as the scheduling user. This account is required by SAS Web Report Studio to run the output generation tool, which creates scheduled reports in batch mode.	lsfuser	Platform Process Manager

As you create these external user accounts, record information about them in "Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX". You will need this information when you run the SAS Deployment Wizard.

Note: For information about the user rights that each account requires, see "Rights Required by External User Accounts for Third-Party Software".

Rights Required by External User Accounts for Third-Party Software

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

Table 3.6 *Rights Required by External User Accounts for Third-Party Software*

External User Account	Operating System	User Rights Needed
LSF Administrator	Windows	Administrator rights **Adjust memory quotas for a process** **Debug programs** **Log on as a service** **Replace a process level token**
LSF User	Windows	**Log on as a batch job** or **Allow log on locally**

Local or Directory Service Accounts?

SAS relies on its various server machines to authenticate external user accounts. In turn, the SAS server machine authenticates user accounts using an authentication provider. An *authentication provider* refers to an authentication service that is one of the following:

- local to a machine and used to authenticate local host user accounts
- available to a machine, defined in a network, and used to authenticate directory service accounts such as LDAP or Active Directory

You can create either local or directory service accounts for external users. The only requirement is that each user shown in Table 3.3 can be authenticated by the machine's authentication provider. The authentication provider can be local to the machine or available to the machine through a directory service.

The main advantage of local accounts is that if account information were to get into the wrong hands, the credentials could be used to log on only to the machine or machines that can authenticate the credentials. A secondary advantage is that the host could continue to authenticate users even if the directory service authentication provider were unavailable.

The advantage of directory service accounts is that you do not have to create the same accounts on multiple machines or keep the account information synchronized across machines. The directory service authentication provider does all of that for you.

For example, setting up the SAS Spawned Servers Account is usually straightforward. The SAS Spawned Servers Account must be able to be authenticated by the SAS Pooled Workspace Server and SAS Stored Process Server machine. If these servers are distributed on more than one machine, then each machine must be a member of the same directory service or in different directory services between which a trust has been established.

Password Policies

Note: The first part of 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 you first log on. If it is required that you create passwords that have to be reset, you will have to log on using each account, and then 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 internal 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.

There are numerous internal user accounts. For a list of them, see "Internal User Accounts".

Passwords for internal user accounts for databases are subject to the following guidelines:

- The password must be at least six characters long.

- The password can contain a mix of alphanumeric, mixed case characters, and most special characters, except a single quotation mark (‘), a double quotation mark (“), an at symbol (@) , a dollar sign ($), or an exclamation point (!).
- The password cannot include any trailing spaces. Leading spaces are allowed and blank spaces among the characters are allowed.
- The updatePasswords task for the SAS Web Infrastructure Platform Data Server does not support SAS003, SAS004, or SAS005 passwords. If an encrypted password is to be used for this task, only SAS001 and SAS002 encrypted passwords can be used.

Internal user accounts for databases are listed in Table 3.2.

Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX

Use a pre-installation checklist to create the necessary external user accounts to deploy and run SAS on Windows and UNIX.

Note: Deployment plans contains more complete and up-to-date checklists.

Table 3.7 *Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX*

Account	Recommended User ID	Actual User ID
Installer	Windows: *my-domain\installer-ID** UNIX: sas**, ***	
SAS Spawned Servers Account	Windows: *my-domain\sassrv* UNIX: sassrv**	

* On Windows, the user ID should be available in the long term for future SAS maintenance.

** On AIX, make sure that the **User can LOGIN?** setting is set to **true** for the user.

*** On UNIX, do not use root.

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

Consider these important items:

- For information about the user rights that each external account requires, see “Rights Required by External User Accounts for SAS”.
- The SAS Deployment Wizard prompts you for the Installer account and the SAS Spawned Servers Account information. You cannot complete the installation without supplying it.
- 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. SAS provides a script to set these permissions. This script, setuid.sh, must be run as root to complete successfully. You have three options for running setuid.sh:
  - Set up sudo for the Installer before running the SAS Deployment Wizard to not be prompted for the sudo password. The wizard running under the Installer account has sudo privileges to run setuid.sh.

  - Provide the sudo password when prompted by the SAS Deployment Wizard and allow the wizard to run setuid.sh as sudo.
  - When the SAS Deployment Wizard is paused, run setuid.sh yourself. When the script is completed, resume running the wizard.
- If your UNIX 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 will not function properly. For more information, see the Configuration Guide for SAS Foundation for UNIX Environments.

Pre-installation Checklist for External User Accounts for Third-Party Software

Use a pre-installation checklist to create the necessary external user accounts to deploy and run third-party software.

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

Note: Deployment plans contain more complete and up-to-date checklists.

Table 3.8 *Pre-installation Checklist for External User Accounts for Third-Party Software*

Account	Recommended User ID	Actual User ID
LSF Administrator	Windows: *my-domain*\lsfadmin UNIX: lsfadmin	
LSF User	Windows: *my-domain*\lsfuser UNIX: lsfuser	

Note: For information about the user rights that each external account requires, see "Rights Required by External User Accounts for Third-Party Software".

Pre-installation Checklist for External User Accounts for SAS on z/OS

Use a pre-installation checklist to create the necessary external user accounts to deploy and run SAS on z/OS. Record information about them in this checklist.

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

Note: Deployment plans contains more complete and up-to-date checklists.

Table 3.9 *Pre-installation Checklist for External User Accounts for SAS on z/OS*

Account	Recommended User ID	Actual User ID
Installer	sas	

Account	Recommended User ID	Actual User ID
SAS Spawned Servers Account	sassrv	

Note:

- For information about the user rights that each external account requires, see "Rights Required by External User Accounts for SAS".
- The Installer and the SAS Spawned Servers Account must have a TSO segment defined.
- Here are some details about the Installer:
- It is the started task owner for the servers.
- It is the owner of the configuration directory structure.
- It must have a writable home directory in the UNIX file system.
- It must have an OMVS segment definition with the following minimum settings:
  - ASSIZEMAX of at least 2 GB
  - CPUTIMEMAX of at least 5000 seconds
  - PROCUSERMAX of at least 50 users

Defining Groups

Overview of Defining Groups

On UNIX, adding users to a group is required to assign the necessary operating system privileges to deploy and run SAS. Using a group is one method for granting the corresponding user rights needed on Windows.

The SAS Server Users Group (Windows)

To deploy SAS on Windows, the user must have certain local user rights on the machine hosting the server. These rights are required before the user can start a process for a SAS Stored Process Server, a SAS Pooled Workspace Server, or a standard SAS Workspace Server. One suggestion for granting these rights is to create a group, add users to the group, and then assign the rights to the group. (The scheduling user, lsfuser—which is required if you are scheduling reports—must have these rights.)

Note: Not all of these user accounts exist in every installation. You add only those that you have created. In addition, if you are working in a multi-machine environment and you are using local groups, not all of the users that you have created need to be included in every local group. You need to include only the users who will be authenticated by a SAS Stored Process Server, SAS Pooled Workspace Server, or standard SAS Workspace Server on a given machine. On some machines (for example, a machine hosting middle-tier components), there might be no need for the group at all.

To set up a group, complete these steps:

1. Create a SAS server users group. This can be a local group or a group with domain scope.
2. Add the following users to the group:
   - SAS Spawned Servers Account
   - First User (optional account)
   - LSF User
   - any other external users that need to access a standard SAS Workspace Server

   Note: The SAS Deployment Wizard automatically grants the Windows user right **Log on as a batch job** to the SAS Spawned Servers Account. If you use the wizard to create the optional First User account in metadata, the wizard also automatically grants the **Log on as a batch job** Windows user right to this First User account. If Integrated Windows Authentication (IWA) is implemented, this user right is not required for the First User and other regular SAS users who access standard SAS Workspace Servers, such as SAS Data Integration Studio or SAS Enterprise Guide users.
3. Grant the user right **Log on as a batch job** to the group. For information about setting local user rights, see your Microsoft Windows documentation. If the users in the group need that right on more than one Windows machine, the right needs to be assigned specifically on each machine.

The sas Group (UNIX)

To deploy SAS on UNIX, you should create an operating system group called sas and make it the primary group for the UNIX 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 UNIX documentation.

The SASGRP Group (z/OS)

To deploy SAS on z/OS, you should create a RACF group named SASGRP. This group is used to control access to directories and files in the configuration directory created in the HFS file system. The definition of this RACF group must include an OMVS segment and must be set as the default group for the Installer and the SAS Spawned Servers Account.

For information about creating groups and adding user accounts, see your IBM z/OS documentation.

Pre-installation Checklist for Groups for SAS on Windows and UNIX

Use a pre-installation checklist to make sure that you have created the necessary groups to deploy and run SAS on Windows and UNIX. Record information about them in this checklist.

Note: Deployment plans contain more complete and up-to-date checklists.

Table 3.10 *Pre-installation Checklist for Groups for SAS on Windows and UNIX*

Recommended Group Name	Group Members	Operating System and Purpose	Actual Group Name
SAS Server Users*	SAS Spawned Servers Account	Windows This is the suggested method for assigning the **Log on as a batch job** user right to the SAS Spawned Servers Account for the SAS Stored Process Server and SAS Pooled Workspace Server.	
	First User Any other users	This is the suggested method for assigning the **Log on as a batch job** user right to the First User and any other standard SAS Workspace Server users.	
sas**	Installer	UNIX This is the primary group for the Installer user. It enables the SAS Deployment Wizard to create the necessary log and configuration directories required by SAS.	
	SAS Spawned Servers Account	Through group membership, this group grants Write permissions to the SAS Spawned Servers Account for modifying specific SAS log and configuration directories.	

* Unless Integrated Windows Authentication (IWA) is implemented, add any external users accessing standard SAS Workspace Servers.

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

Pre-installation Checklist for Groups for Third-Party Software

Use a pre-installation checklist to create the necessary groups to deploy and run third-party software. Record information about them in this checklist.

Note: Deployment plans contain more complete and up-to-date checklists.

Table 3.11 *Pre-installation Checklist for Groups for Third-Party Software*

Recommended Group Name	Group Members	Operating System and Purpose	Actual Group Name
SAS Server Users	Scheduling user (lsfuser)	Windows This is the suggested method for assigning the **Log on as a batch job** user right to scheduling users.	

Pre-installation Checklist for Groups for SAS on z/OS

Use a pre-installation checklist to create the necessary groups to deploy and run SAS on z/OS. Record information about them in this checklist.

Note: Deployment plans contain more complete and up-to-date checklists.

Table 3.12 *Pre-installation Checklist for Groups for SAS on z/OS*

Recommended Group Name	Group Members	Purpose	Actual Group Name
SASGRP*	Installer	This is the default group for the Installer user.	
	SAS Spawned Servers Account	Through group membership, this group grants Write permissions to the SAS Spawned Servers Account for modifying SAS log and configuration directories.	

* The definition of this RACF group must include an OMVS segment. Limit membership because this privileged group has operating system access to certain configuration files.

Additional z/OS Pre-installation Tasks

About Additional z/OS Pre-installation Tasks

In addition to creating the necessary users, groups, and ports to deploy the SAS Intelligence Platform on z/OS, you must perform the tasks in the following sections.

Create a Configuration Directory and Define the SAS Library on z/OS

On z/OS:

- Create a directory that will serve as the configuration directory for the SAS server tier on the z/OS machine.
- Define the SAS executable library to be program-controlled.

Record information in this checklist.

Table 3.13 *Configuration Directory and SAS Library Checklist on z/OS*

Task	Actual Directory or Library Name
Create a configuration directory* for the SAS server tier.	

Task	Actual Directory or Library Name
Define the SAS executable library to be program-controlled.	

* A typical path is /usr/lpp/SAS/SAS_9.4/*configuration-directory*.

Install the SAS 9.4 SVC Routine

On z/OS, you must install the SAS 9.4 SVC routine. To install the SAS 9.4 SVC routine, follow these steps:

1. Download the instsvc.xmit file from the SAS FTP website.
2. Using FTP, transfer the instsvc.xmit file (in binary mode) to your z/OS system. You should preallocate the target data set with the following DCB characteristics:

   LRECL=80

   BLKSIZE=3120

   RECFM=FB
3. Submit a RECEIVE command to create a PDS that will contain the JCL members that are required to install the SVC routine. In the command, sas94.instsvc.xmit is the name of the file to which you transferred the instsvc.xmit file using FTP.

   ```
   receive indataset(sas94.instsvc.xmit)
   ```

   Respond with the name of a data set that will contain the JCL members by issuing the following command:

   ```
   da(sas94.instsvc.cntl)
   ```
4. Continue your SVC installation by following the instructions in "Installing the SAS 9.4 SVC Routine" in the Configuration Guide for SAS 9.4 Foundation for z/OS. Make the following exceptions:
   - Anywhere that the documentation refers to the BAMISC data set, use the CNTL data set that you created in step 3.
   - Anywhere that the documentation refers to the SAS.LIBRARY data set, use the CNTL data set that you created in step 3.

Install the SAS 9.4 SASCP Module

On z/OS, you must install the SAS 9.4 SASCP module. To install the SAS 9.4 SASCP module, follow these steps:

1. Download the instsascp.xmit file from the SAS FTP website.
2. Using FTP, transfer the instsascp.xmit file (in binary mode) to your z/OS system. You should preallocate the target data set with the following DCB characteristics:

   LRECL=80

   BLKSIZE=3120

   RECFM=FB

3. Submit a RECEIVE command to create a PDS that will contain the SASCP load module. In the command, sas94.instsascp.xmit is the name of the file to which you transferred the instsascp.xmit file using FTP.

   ```
   receive indataset(sas94.instsascp.xmit)
   ```

   Respond with the name of a data set that will contain the SASCP load module by issuing the following command:

   ```
   da(sas94.instsascp.load)
   ```

4. Copy the SASCP module to a load library that contains TSO commands. This can be a STEPLIB library defined in a LOGON procedure, a system link list library, or a link pack area library.

   For more information about the SASCP module, see "Implementing SAS TSO Support" in the Configuration Guide for SAS Foundation for z/OS.

Install the SASCP64 Module

On z/OS, you must install the SAS 9.4 SASCP64 module. To install the SAS 9.4 SASCP64 module, follow these steps:

1. Download the instsascp64.xmit file from the SAS FTP website.
2. Using FTP, transfer the instsascp64.xmit file (in binary mode) to your z/OS system. You should preallocate the target data set with the following DCB characteristics:

   LRECL=80

   BLKSIZE=3120

   RECFM=FB

3. Submit a RECEIVE command to create a PDS that will contain the SASCP load module. In the command, sas94.instsascp64.xmit is the name of the file to which you transferred the instsascp.xmit file using FTP.

   ```
   receive indataset(sas94.instsascp64.xmit)
   ```

   Respond with the name of a data set that will contain the SASCP64 load module by issuing the following command:

   ```
   da(sas94.instsascp64.load)
   ```

4. Copy the SASCP64 module to a load library that contains TSO commands. This can be a STEPLIB library defined in a LOGON procedure, a system link list library, or a link pack area library.

   For more information about the SASCP64 module, see "Implementing SAS TSO Support" in the Configuration Guide for SAS Foundation for z/OS.

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 a pre-installation checklist:

- "Pre-installation Checklist for Ports for SAS"
- "Pre-installation Checklists for Third-Party Products"

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 Custom Applications" 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

The following checklist indicates what ports are used for SAS by default. Record information about them in this checklist.

SAS servers and their clients dynamically allocate ports in the ephemeral ports range. Ephemeral ports are temporary ports that are assigned by a machine's IP stack from a designated range of ports that are specifically for temporary use.

Each operating system assigns ephemeral ports from a specific port range. By default, the range is 32768 to 65535 on Linux, Solaris, and AIX. On Windows and HP-UX, it is 49152 to 65535. In SAS 9.*x* environments, SAS attempts to bind to an ephemeral port number in the 49152-65535 range. However, testing is needed to determine how the firewall functions with these ports.

These ranges are generally tunable by a system administrator. Consult your operating system administration documentation for details about tuning your system. An ephemeral port becomes available for reuse when the connection terminates.

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

On z/OS, the SAS servers are configured and initially started as TSO processes invoked from the USS shell using **`/bin/tso`**. When these servers are started under TSO, the job name is the user ID that is starting the server with a character appended to the end. If your site uses the reserved ports facility in TCP/IP, each port definition should include

the started task and the Installer ID job name as valid users of this port. You can use an asterisk (such as, sas*) in this definition. You can use a TCP service name instead of a hardcoded port. For more information about how to reserve the TCP port for a particular SAS server, refer to your operating system documentation.

On all operating systems, for the SAS server tier, 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: Deployment plans contain more complete and up-to-date checklists. If you are a SAS solutions customer, consult the pre-installation checklist provided by your SAS representative for a complete list of ports that you must designate.

Table 3.14 *Pre-installation Checklist for Ports for SAS*

Server or Spawner	Default Port Lev0–Lev9	Data Direction	Actual Port
Email Server	25	Outbound	
HTTP Server	80 (Windows) 7980 (UNIX)	Inbound and outbound	
HTTP Server (Secure Port)	443 (Windows) 8343 (UNIX)	Inbound and outbound	
SAS Scheduling Port • SAS Job Flow Scheduler • Platform Computing Process Manager • Platform Computing Grid Management Service • SAS Launcher Server	1964–1989	Inbound and outbound	
SAS Environment Manager Agent Listening Port	2143–2152	Inbound and outbound	
SAS Environment Manager (UDP multicast)	3029–3038	Inbound and outbound	
SAS Remote Services Application	5090–5099	Inbound	
SAS Web Infrastructure Platform Data Server	5431–5440	Inbound and outbound	
SAS OLAP Server	5450–5459	Inbound and outbound	
SAS Deployment Agent	5660–5669	Inbound and outbound	
Event Broker administration	6050–5059	Inbound	

Server or Spawner	Default Port Lev0–Lev9	Data Direction	Actual Port
Web Application Server: JMX Port (Server 1) . . . Web Application Server: JMX Port (Server 15)	6969 (Single) 6969–6973 (Vertical Clustering) . . 8369 (Single) 8369-8373 (Vertical Clustering)	Inbound	
SAS Environment Manager HTTP Port	7079–7088	Inbound and outbound	
SAS Environment Manager HTTPS Secure Port	7442–7450	Inbound and outbound	
IP Multicast UDP Scheduler Main Channel	7450–7459	Inbound and outbound	
IP Multicast UDP Scheduler Hash Channel	7460–7469	Inbound and outbound	
SAS/CONNECT Spawner	7540–7549	Inbound	
SAS/CONNECT Server	7550–7559	Inbound and outbound	
SAS Web Report Studio: In-Process Scheduling Ports 1–3	7570–7599	Inbound and outbound	
Web Application Server: HTTP Port (Server 1) . . . Web Application Server: HTTP Port (Server 15)	8080 (Single) 8080–8084 (Vertical Clustering) . . 9480 (Single) 9480–9484 (Vertical Clustering)	Inbound and outbound	
SAS Environment Manager (embedded Tomcat server BIO SSL port)	8442–8451	Inbound	

Server or Spawner	Default Port Lev0–Lev9	Data Direction	Actual Port
Web Application Server HTTPS Port (Server 1) . . . Web Application Server HTTPS Port (Server 15)	8443 (Single) 8443–8448 (Vertical Clustering) . . 9843 (Single) 9843–9848 (Vertical Clustering)	Inbound and outbound	
Event Broker HTTP	8110–8119	Inbound	
Operating System Services Scheduling Server	8450–8459	Inbound	
SAS/SHARE Server	8550–8559	Inbound	
IP Multicast UDP Port	8560–8569	Inbound and outbound	
SAS Metadata Server	8560–8569	Inbound and outbound	
SAS Object Spawner: Operator Port	8580–8589	Inbound	
SAS Workspace Server	8590–8599	Inbound	
SAS Stored Process Server: Bridge Port	8600–8609	Inbound	
Stored Process Server: Multibridge Connections	8610–8619	Inbound	
SAS Stored Process Server: load balancing connection 2 (MultiBridge)	8620–8629	Inbound	
SAS Stored Process Server: load balancing connection 3 (MultiBridge)	8630–8639	Inbound	
SAS Pooled Workspace Server	8700–8709	Inbound	
SAS Object Spawner: PortBank Port 1	8800–8809	Inbound	
SAS Object Spawner: PortBank Port 2	8810–8819	Inbound	

Server or Spawner	Default Port Lev0–Lev9	Data Direction	Actual Port
SAS Object Spawner: PortBank Port 3	8820–8829	Inbound	
SAS Workload Orchestrator	8900–8909	Inbound and outbound	
SAS Environment Manager (embedded Tomcat server JMX port)	9360–9369	Inbound	
SAS Environment Manager (embedded Tomcat server Base JMX port)	9360–9369	Inbound	
SAS Web Infrastructure Platform Database Server (default instance)	9431–9440	Inbound and outbound	
SAS Environment Manager (database port)	9432	Inbound and outbound	
SAS Job Monitor Database Server	9451–9460	Inbound and outbound	
Data Remediation Data Server	9831–9840	Inbound and outbound	
SAS Deployment Tester Server	10020–10029	Inbound	
Data Management Data Server	10441–10450	Inbound and outbound	
JMS Broker†	1883 (MQTT) 5672 (AMQP) 11098–11107 (JMX) 61613 (STOMP) 61614 (WebSockets) 61616 (OpenWire)	Inbound	
SAS Cloud Analytic Services (CAS)**	19990–19999	Inbound and outbound	
DataFlux Data Management Server	21036	Inbound and outbound	
Data Management Server (WLP DataFlux port)	21037	Inbound and outbound	

Server or Spawner	Default Port Lev0–Lev9	Data Direction	Actual Port
DataFlux Web Studio Server	21038	Inbound and outbound	
Process Orchestration Server (for design)	21040–21049	Inbound and outbound	
SAS Visual Process Orchestration Runtime Server for execution)	21050–21059	Inbound and outbound	
DataFlux Web Studio Client	21079	Inbound and outbound	
Authentication Server	24139	Inbound and outbound	
Cache Locator Port	41414–41423	Inbound and outbound	
JMS Server Port	61615–61624	Inbound and outbound	
Cache Locator membership port range (TCP/UDP port range)*	1024–65535	Inbound and outbound	
TCP port for middle-tier cache communications***	0–65535	Inbound and outbound	

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

** SAS Cloud Analytic Services (CAS) is installed with SAS Viya.

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

† You can manually change a port.

Changing Ports for the JMS Broker Server

To change ports on the JMS Broker Server in the ActiveMQ broker configuration file (*SAS configuration directory*/*level*/Web/activemq/conf/activemq.xml), perform the following step:

OpenWire

```
<transportConnectors>
<transportConnector name="openwire" uri="tcp://0.0.0.0:61616" enableStatusMonitor="true"
</transportConnectors>
```

Reference:

https://activemq.apache.org/openwire

AMQP

```
<transportConnectors>
<transportConnector name="amqp" uri="amqp://0.0.0.0:5672"/
</transportConnectors>
```

Reference:

https://activemq.apache.org/amqp

STOMP

```
<transportConnectors>
<transportConnector name="stomp" uri="stomp://localhost:61613"/>
</transportConnectors>
```

Reference:

https://activemq.apache.org/stomp

MQTT

```
<transportConnectors>
<transportConnector name="mqtt" uri="mqtt://localhost:1883"/>
</transportConnectors>
```

Reference:

https://activemq.apache.org/mqtt

WebSockets

```
<transportConnectors>
<transportConnector name="ws" uri="ws://0.0.0.0:61614"/>
</transportConnectors>
```

Reference:

https://activemq.apache.org/websockets

For more information about ActiveMQ configuration and transport configuration, see https://activemq.apache.org/configuring-transports.html and https://activemq.apache.org/xml-configuration.

Chapter 4

Creating a SAS Software Depot

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Deployment Process Overview: Create a SAS Software Depot

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.

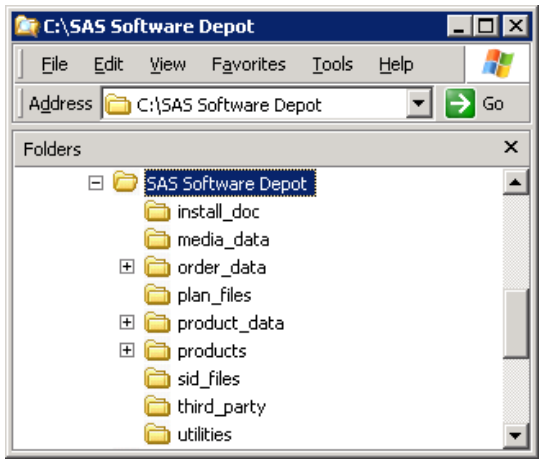
1. Plan and review additional documentation.
2. Create users and groups and designate ports.
3. **Create a SAS Software Depot.**
4. Install required third-party software.

5. Install and configure SAS.

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 4.1 *SAS Software Depot File Structure*

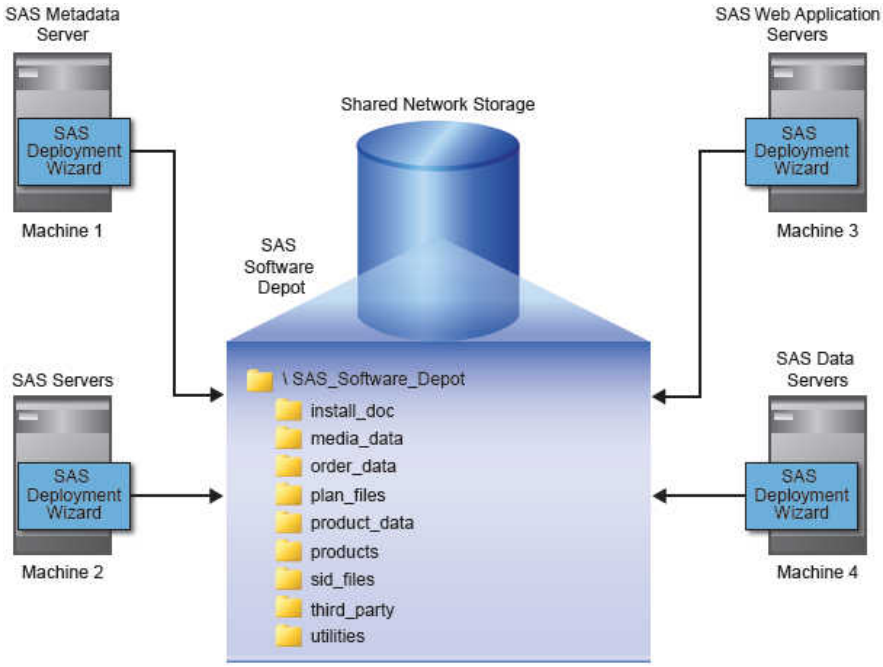


Before you can install SAS, you must have a SAS Software Depot to install from. During a SAS software download, the SAS Download Manager downloads your order, verifies it, and automatically creates a SAS Software Depot.

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.

Figure 4.2 *Shared SAS Software Depot Model*



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.

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.

  - Java SDK for z/OS installed (z/OS only)

    For more information, see the Third-Party Software Requirements for Use with SAS 9.4.

  - Windowing system

    If you want to run the SAS Download Manager and the SAS Deployment Wizard using a traditional graphical user interface (GUI), then on a UNIX or a z/OS system, make sure that a windowing system such as the Common Desktop Environment (CDE) or X11 is installed.

    To run the deployment wizard on an operating system that does not have a windowing system, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

    Note: You have the option of creating a SAS Software Depot on a UNIX or Windows machine, and then transferring the depot to a z/OS environment using the SAS Software Depot Copy Utility. For more information, 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.

For z/OS, see Installation Instructions for SAS Electronic Software Delivery for Planned Installations on z/OS.

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

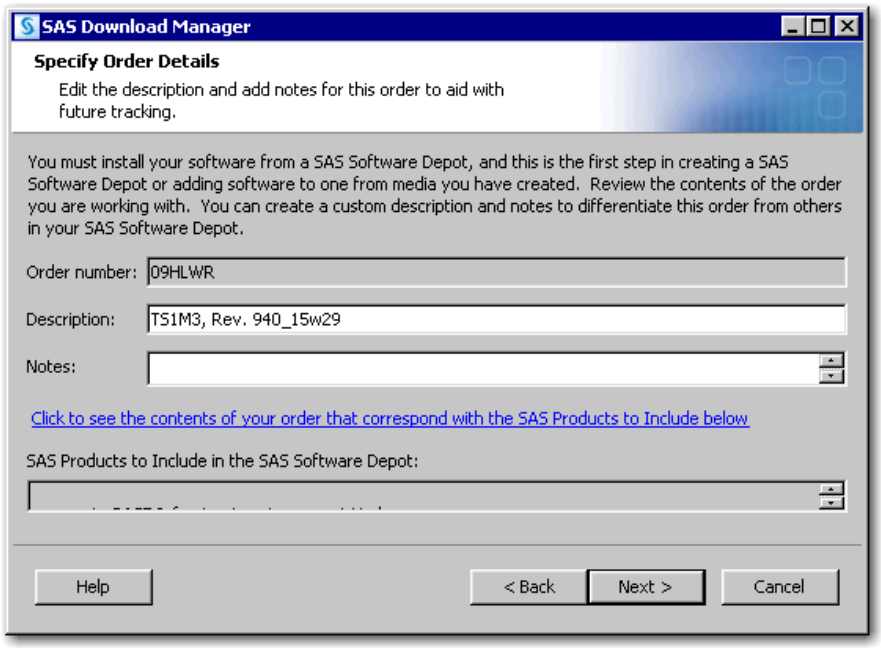
   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order

details require depot Write privileges. Windows XP and earlier 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".

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".
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".

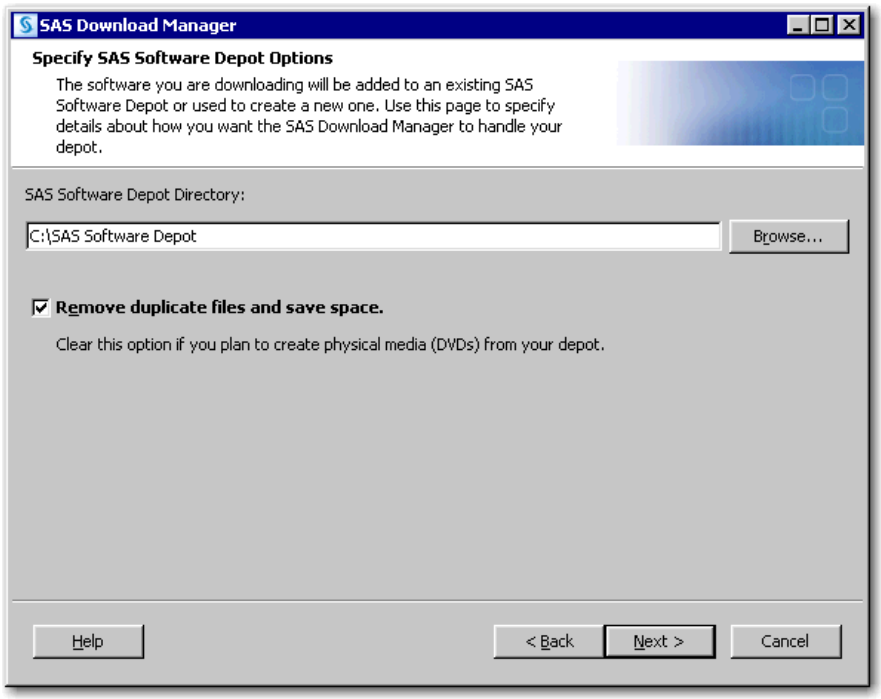
CAUTION:

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**.

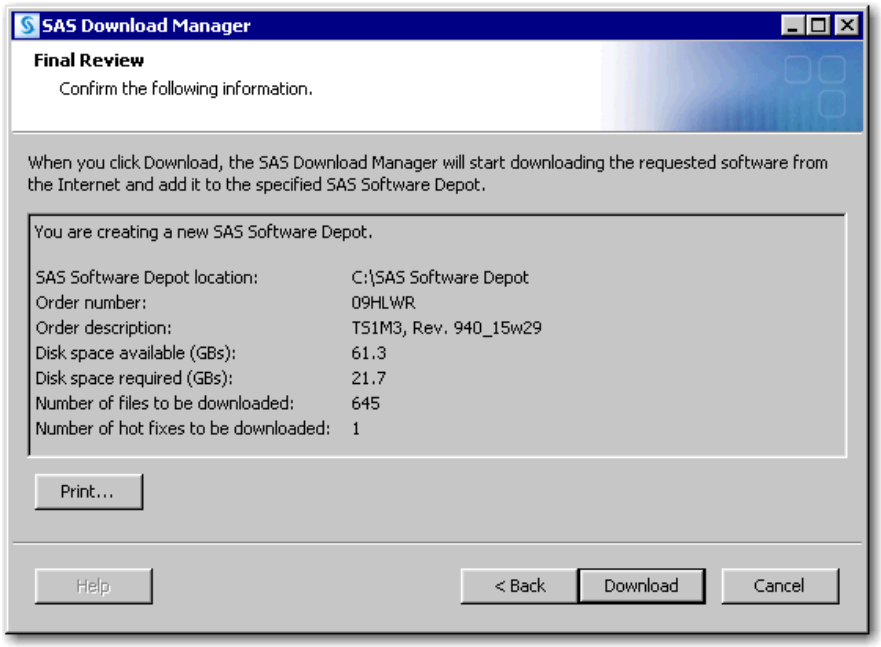
14. If the directory that you specify does not exist, the wizard prompts you. If you want it to create the directory for you, click **Yes**.

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:

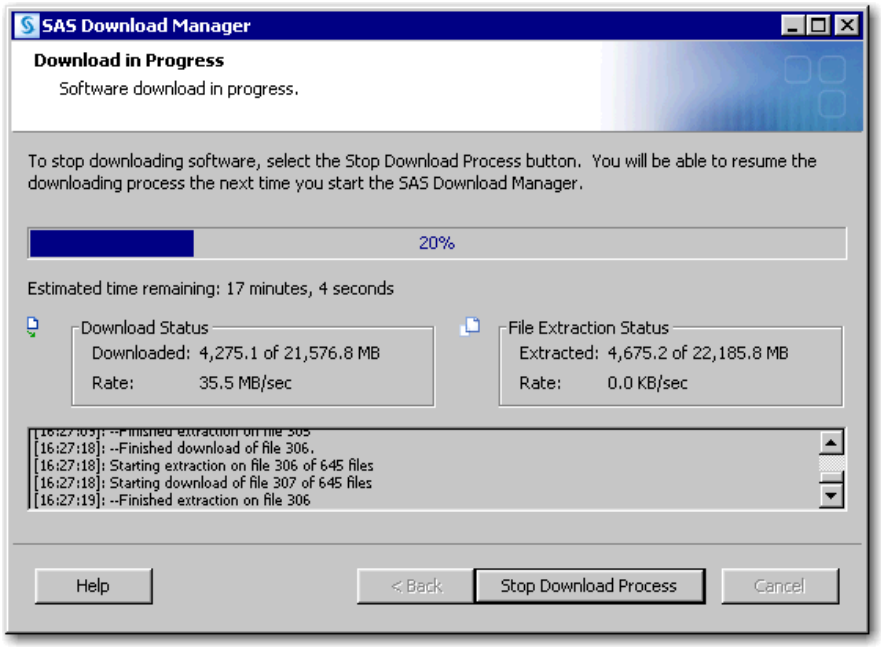
    - Click **Download** to begin downloading the SAS order and writing files to the target directory.
    - Click **Back** to navigate to earlier pages to change order information previously entered.
    - Click **Cancel** to terminate the SAS Download Manager session. Note that you will lose any order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

Note: SAS tracks downloads. It counts only a *completed* download toward your download limit.

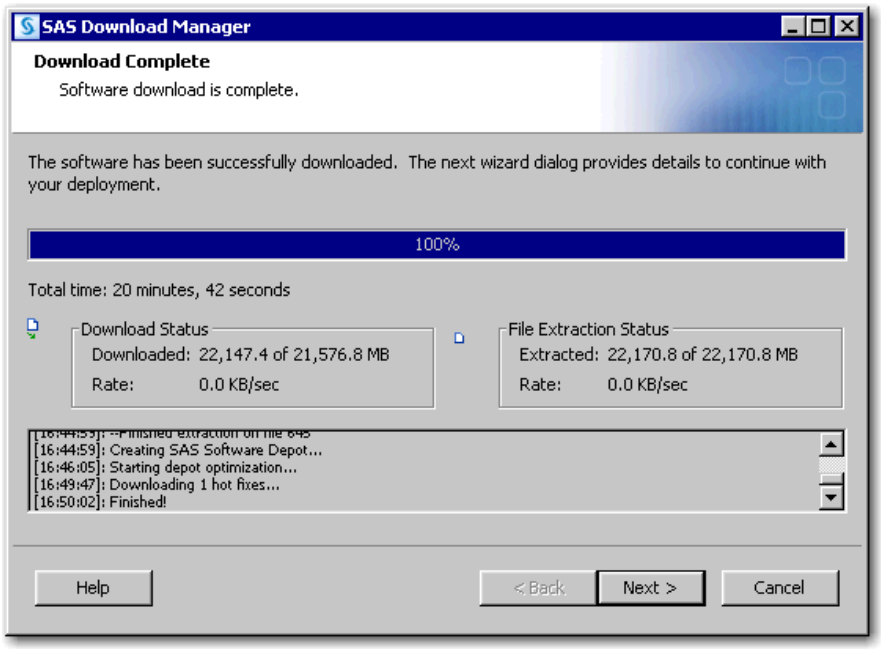


Note: The **Disk space required** value that is displayed on the Final Review page will actually be smaller if you selected **Remove duplicate files and save space** on the Specify SAS Software Depot Options page. For more information, see Step 13.

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 installation, proceed to Chapter 5, "Installing Required Third-Party Software".

    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".
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 XP and earlier requires that you run SAS Download Manager using administrator privileges.
3. Start the SAS Deployment Wizard.

   Navigate to the depot's root directory, and do one of the following:

   - Windows:

Double-click **setup.exe**.

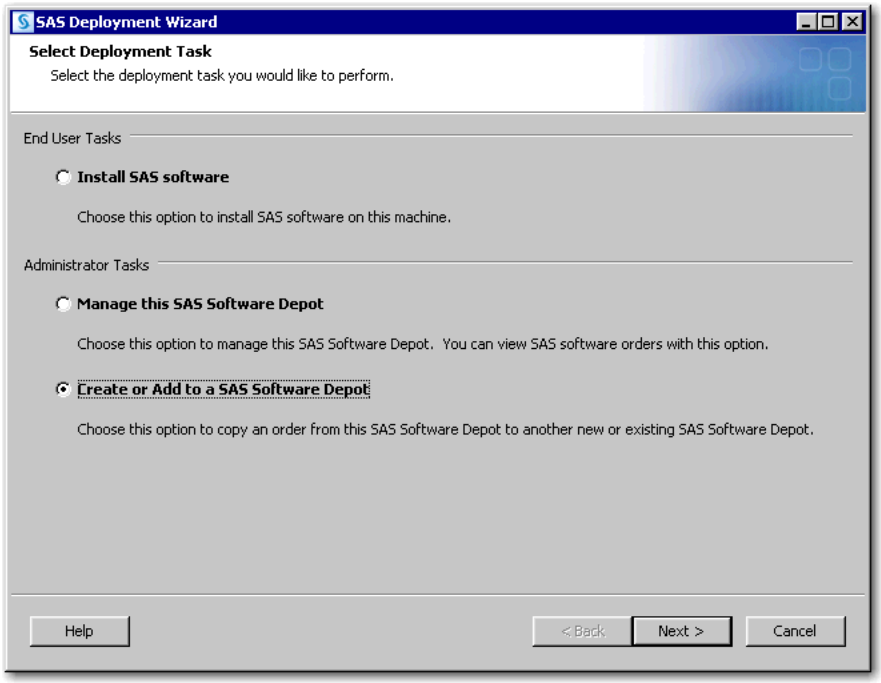
- UNIX:

  Enter **`./setup.sh`** at a command prompt.

- z/OS:

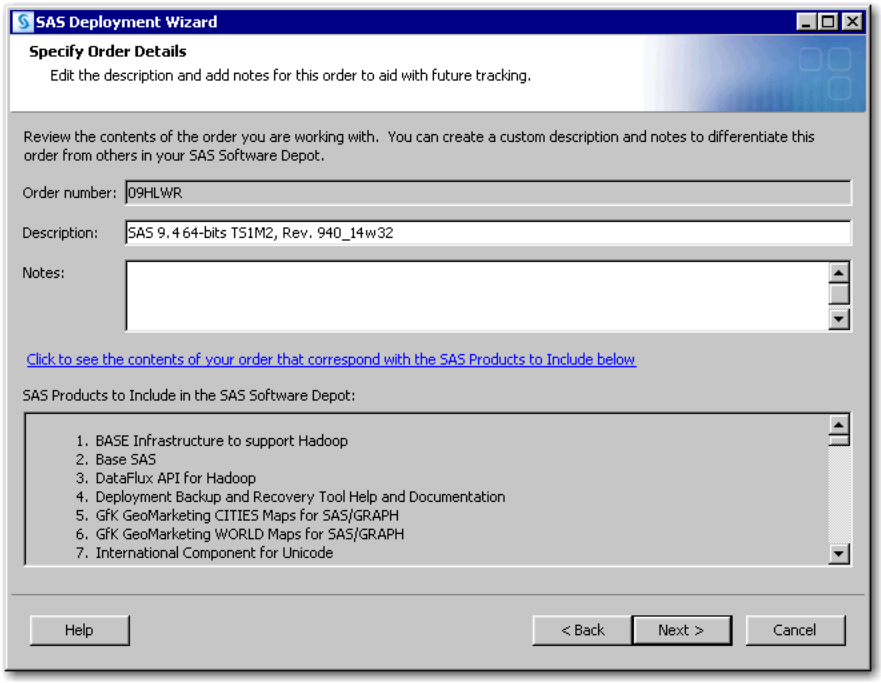
  Enter **`./setup.rexx`** at a command prompt.

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**.



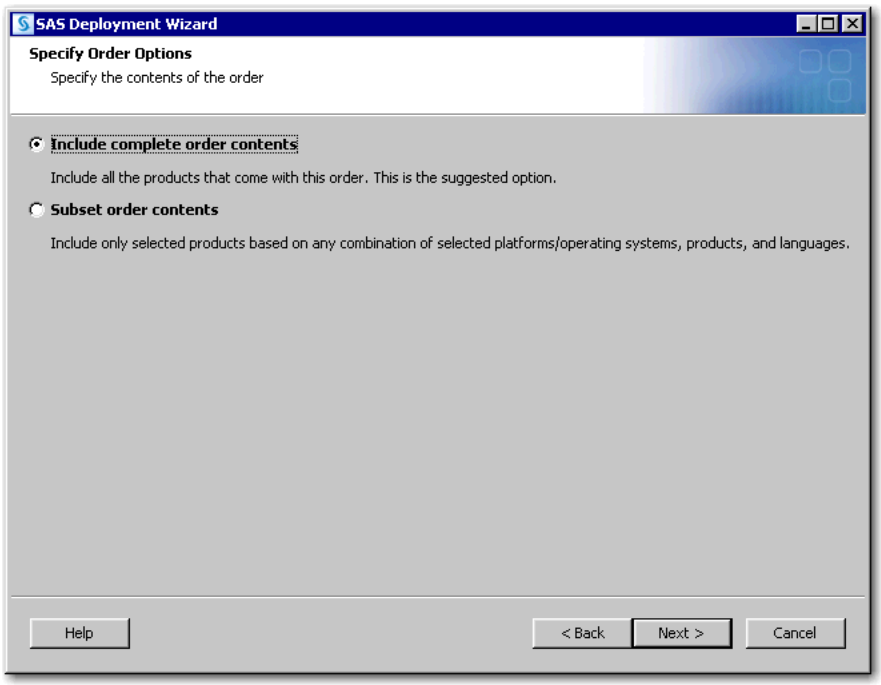
6. Verify the list of SAS products in your order.

   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.



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".

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".



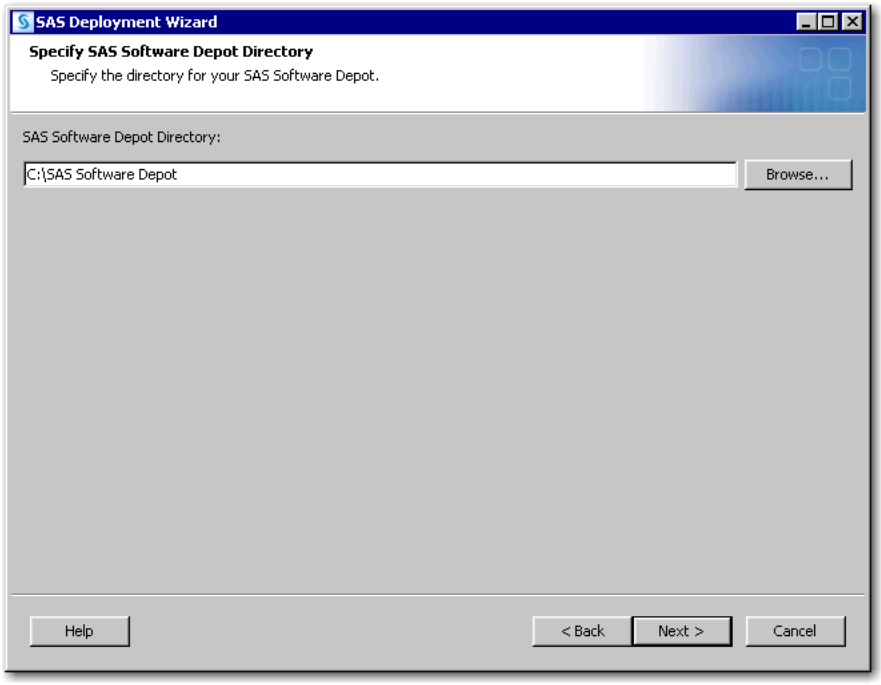
10. Specify a location where you want to download SAS and build the depot. (This location can be shared storage that physically resides on another machine.)

    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".

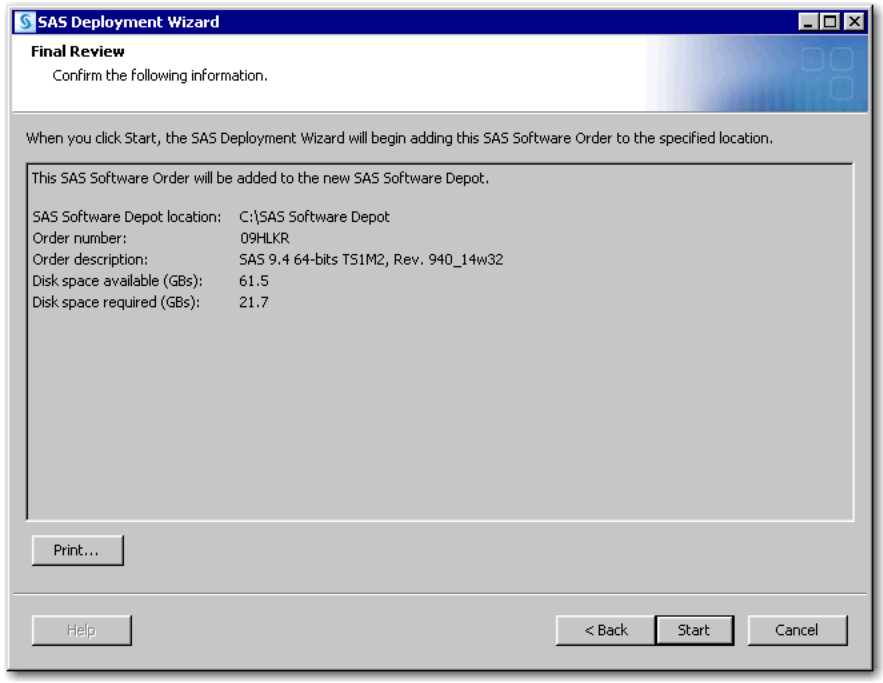


11. If the directory that you specify does not exist, the wizard prompts you. If you want it to create the directory for you, click **Yes**.

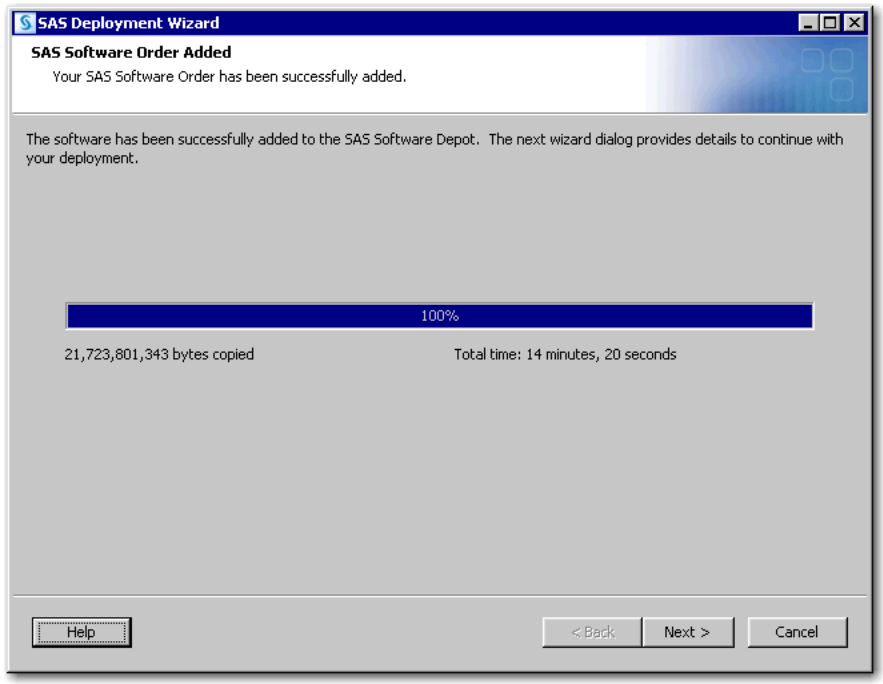
12. At this point, the SAS Deployment Wizard has finished collecting order input. You have one last opportunity to change any information before downloading the SAS order and writing files to the target directory.

    Make one of the following choices:

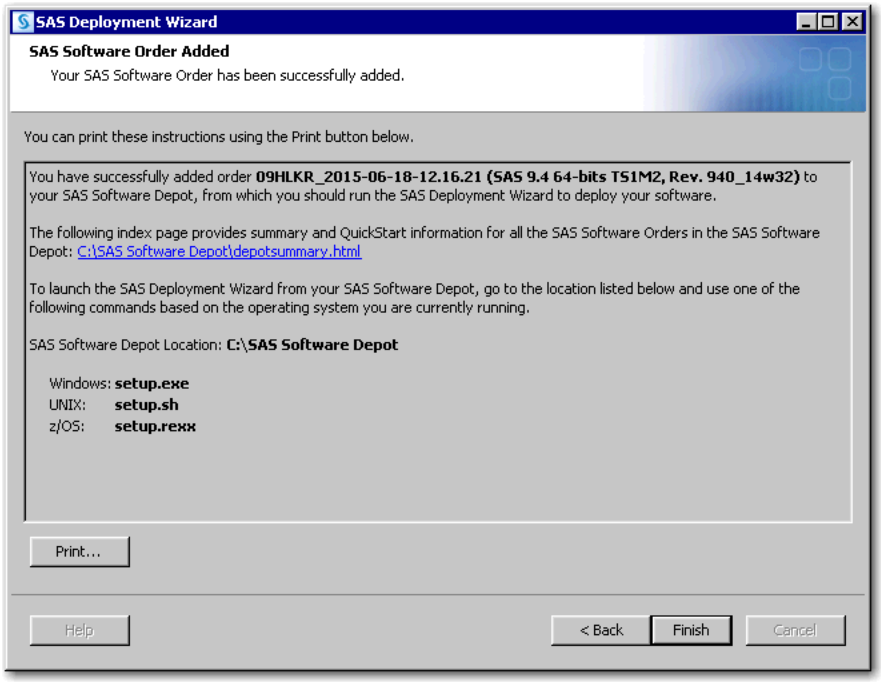
    - Click **Start** to begin downloading the SAS order and writing files to the target directory.
    - Click **Back** to navigate to earlier pages to change order information previously entered.
    - Click **Cancel** to terminate the SAS Deployment Wizard session. Note that you will lose any order information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



13. 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.



14. Click the **depotsummary.html** link to review the QuickStart Guide.
15. Click **Finish** to close the SAS Deployment Wizard.



16. To continue with the installation, proceed to Chapter 5, “Installing Required Third-Party Software".

    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.

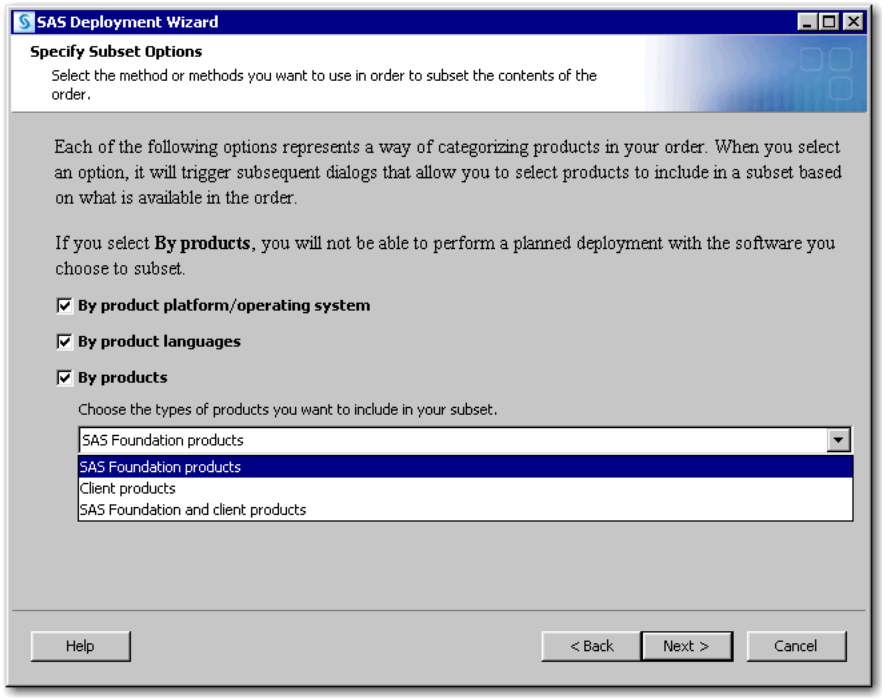
Subsetting SAS Software Orders

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.

Figure 4.3 Specify Subset Options Page



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".

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 XP and earlier 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**.

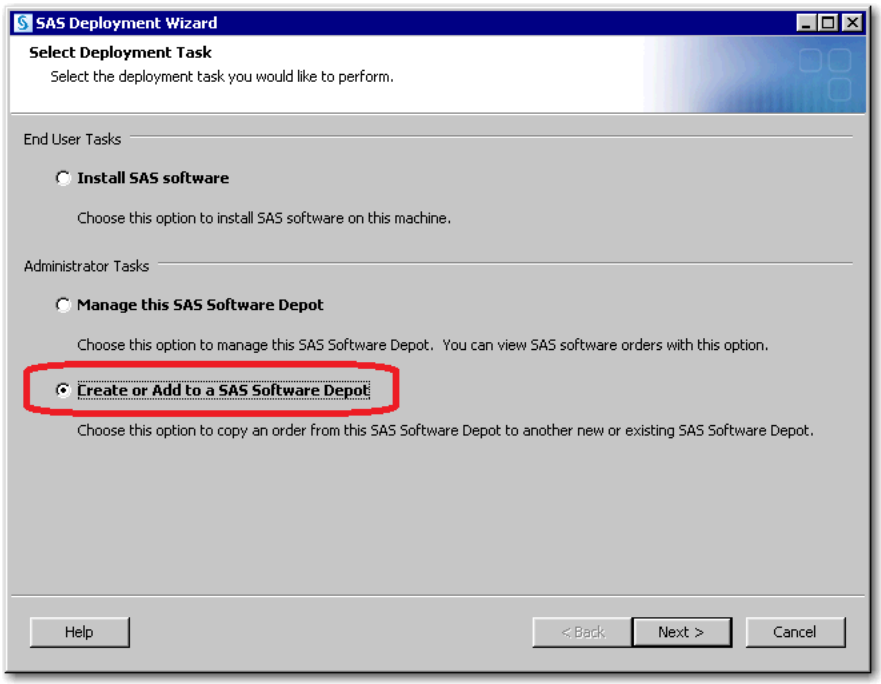
   - UNIX:

     Enter **`./setup.sh`** at a command prompt.

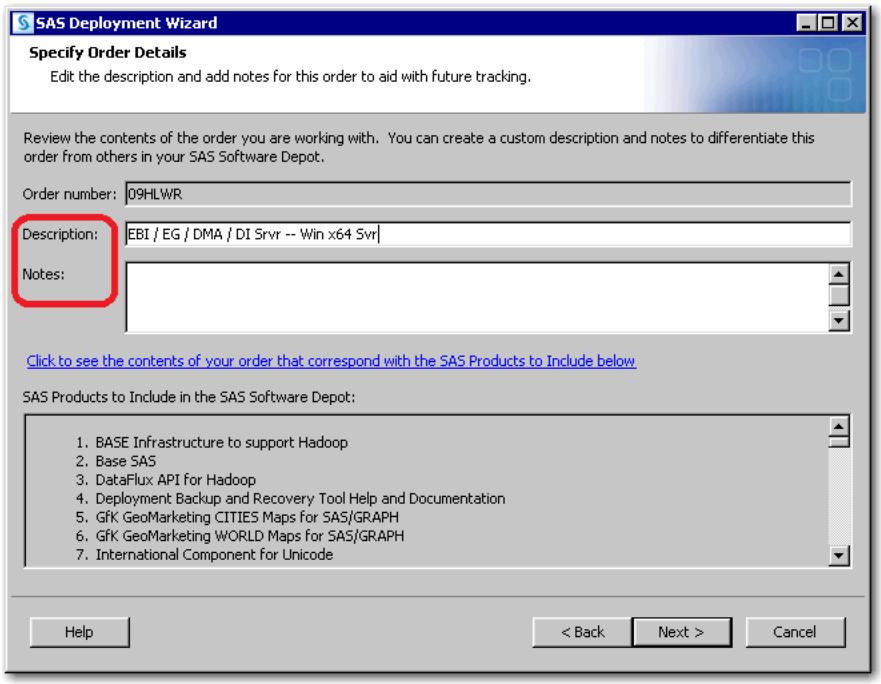
   - z/OS:

Enter **`./setup.rexx`** 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.

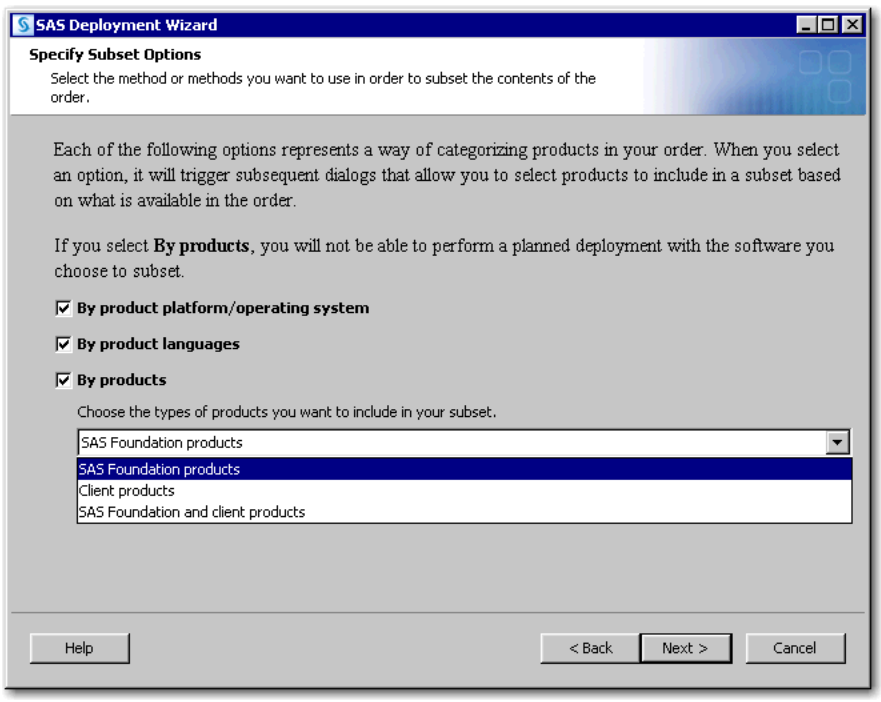


7. When you are finished adding order information, click **Next**.
8. Select **Subset order contents**, and click **Next**.
9. On the Specify Subset Options page, select one or more of the following options, and click **Next**.
   - Select **By product platform/operating system** to choose SAS products 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.

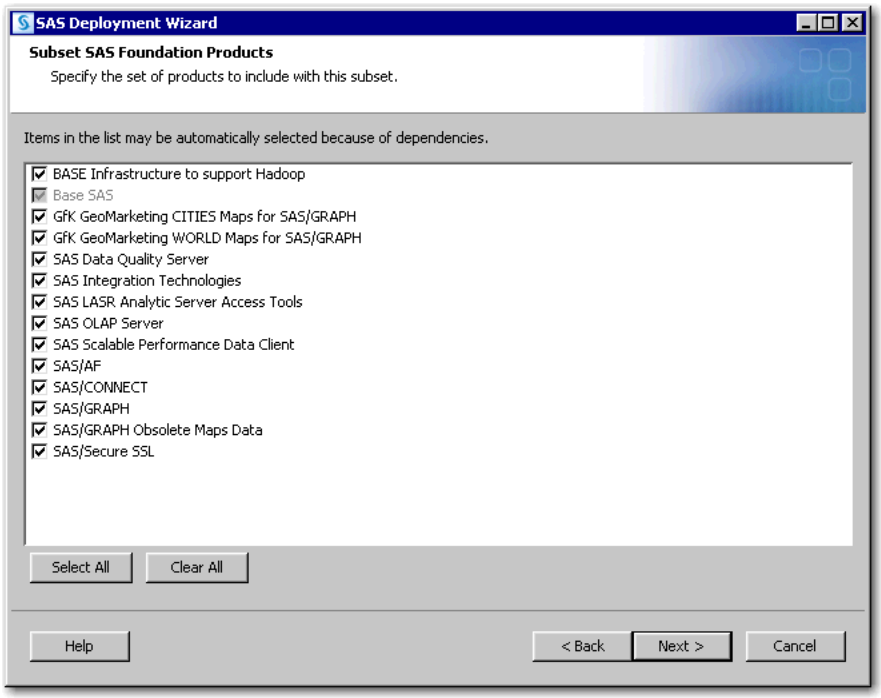
       Note: If you select **By products**, you cannot deploy the subsetted products using a deployment plan file. Typically, client products do not require a deployment plan file so this restriction should not affect deploying them. If you select **By products**, the SAS Migration Utility is not included in the subsetted depot.



10. (This page appears if you chose **By products** in Step 9.)

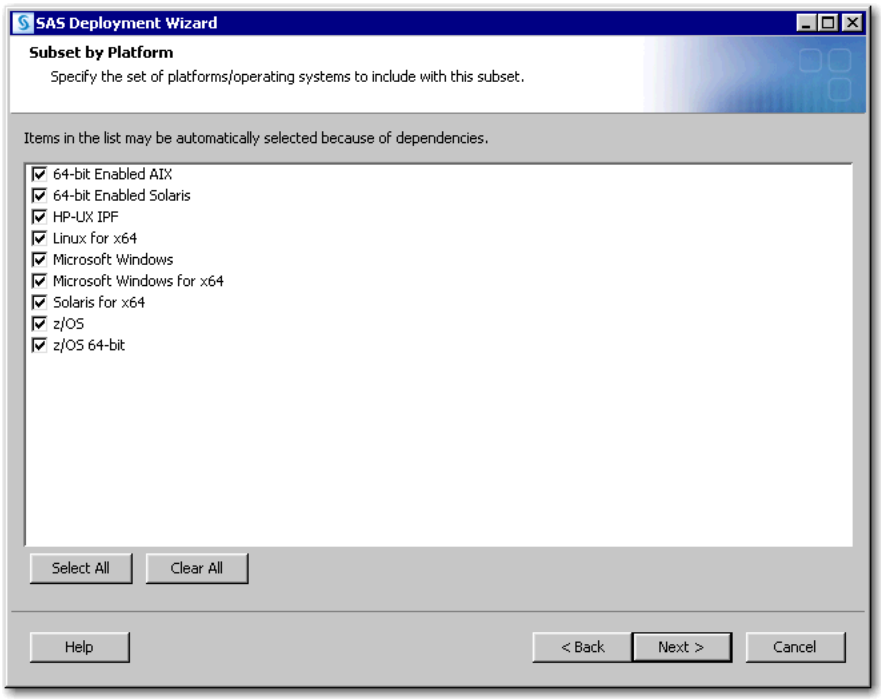
    Select one or more SAS products to add to your new depot, and click **Next**.

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.)



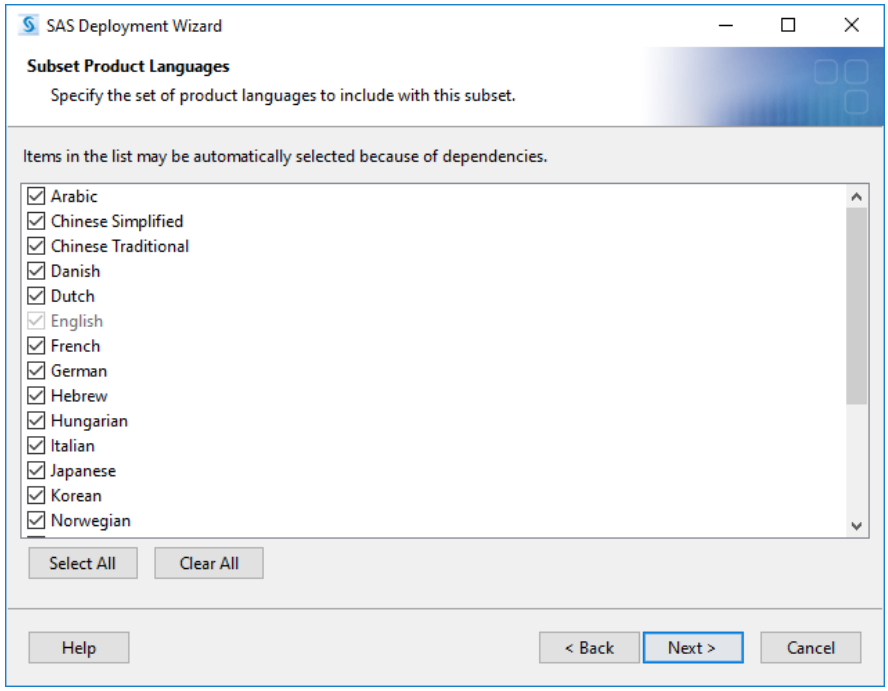
11. (This page appears if you chose **By product platform/operating system** in Step 9.)

    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.)

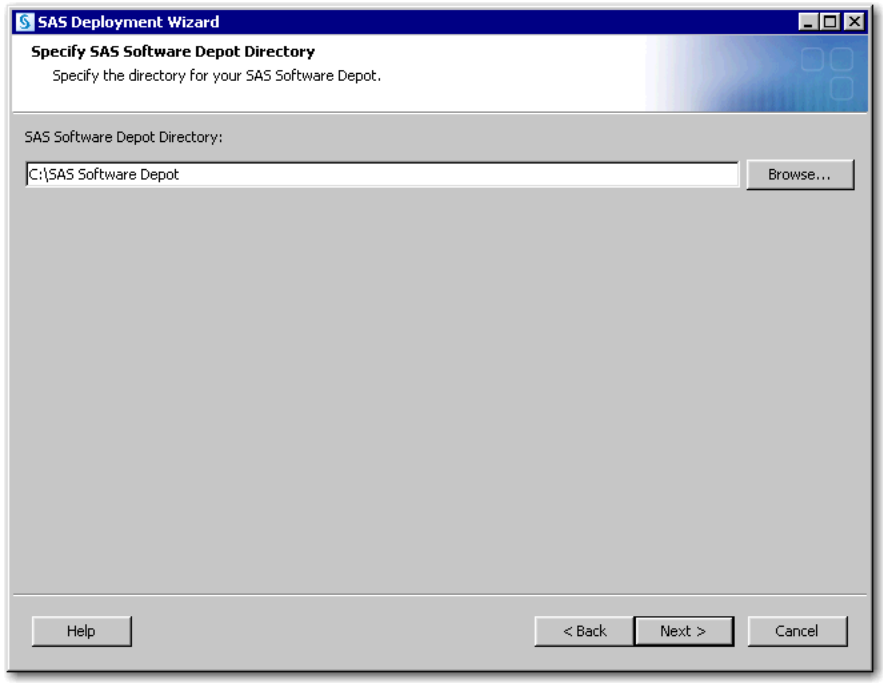
    Select languages in which the SAS products are installed to add these products to your new depot, and click **Next**.



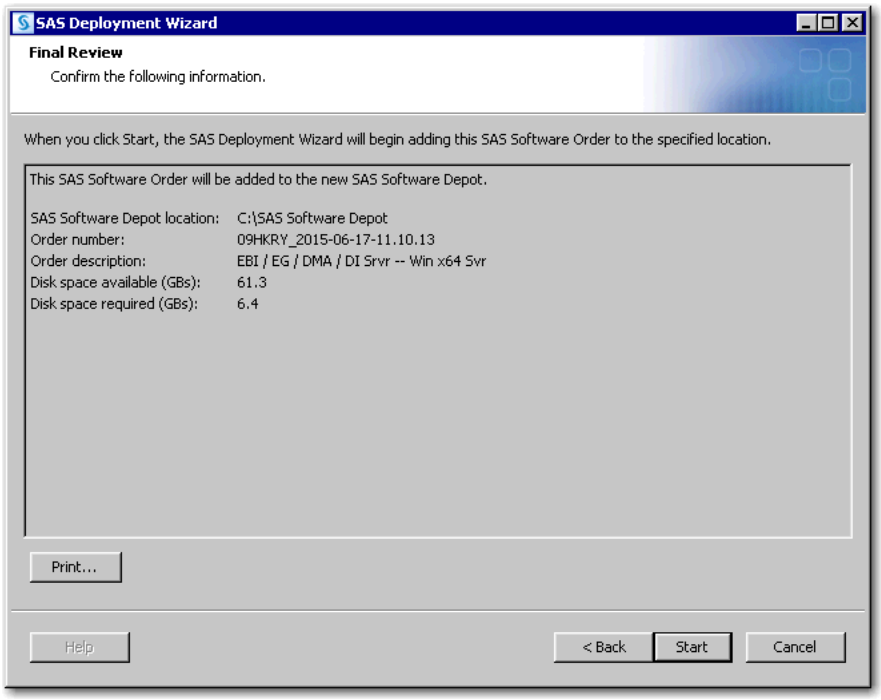
13. Specify a location where the deployment wizard creates your depot, and click **Next**.

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.

- Windows

  `setup.exe -listdepot` ***`output-pathname`***

- UNIX:

  `setup.sh -listdepot` ***`output-pathname`***

- z/OS

  `setup.rexx -listdepot` ***`output-pathname`***

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"
- "Delete an Order"
- "Create a Disc Image of Your Order"

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.

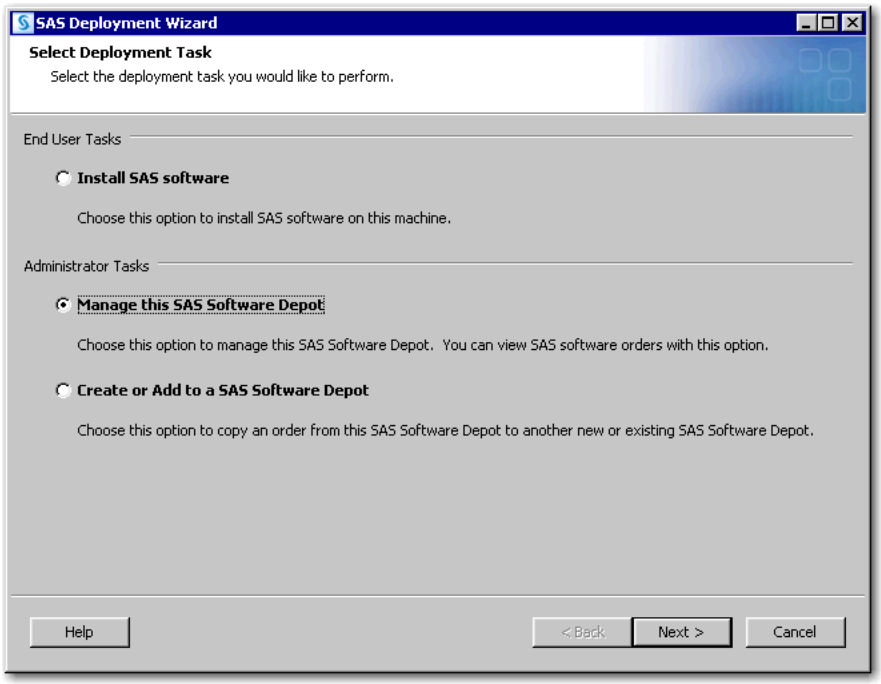
   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows XP and earlier 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:

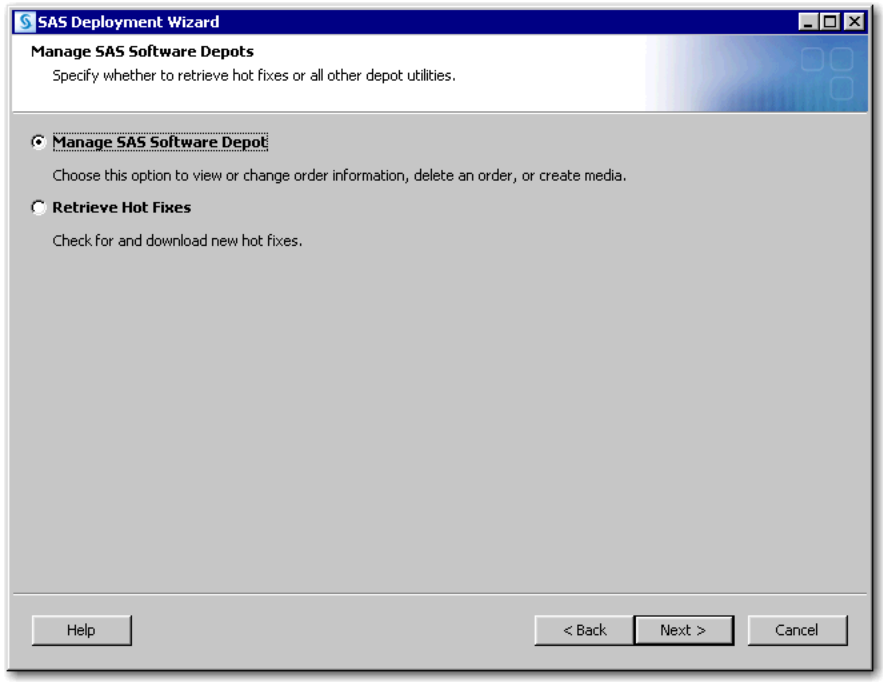
     Double-click **setup.exe**.
   - UNIX:

     Enter `./setup.sh` at a command prompt.
   - z/OS:

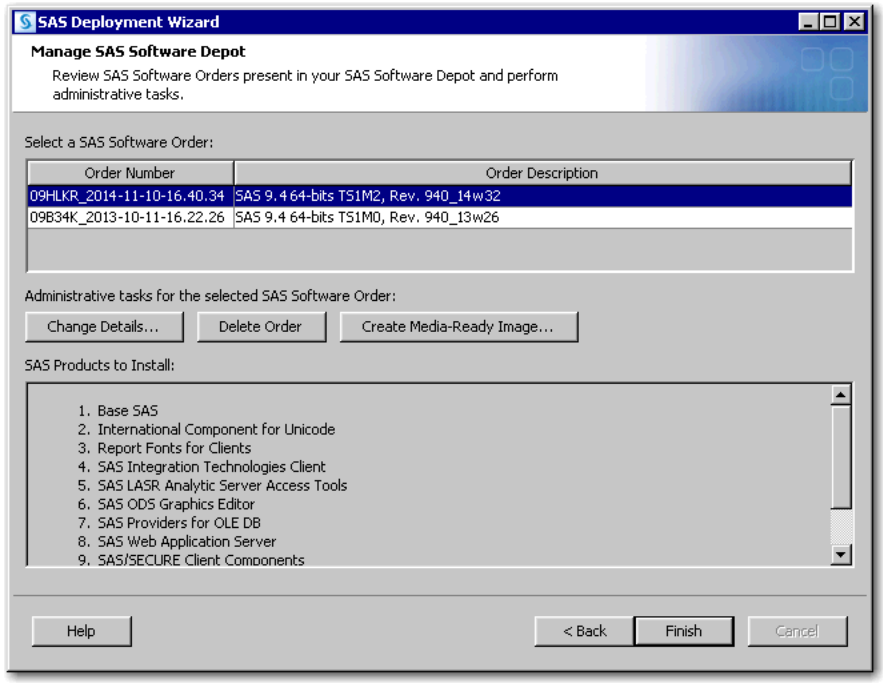
     Enter `./setup.rexx` at a command prompt.
3. Select the language in which the SAS Deployment Wizard displays messages and prompts.
4. Select **Manage this SAS Software Depot**. Click **Next**.



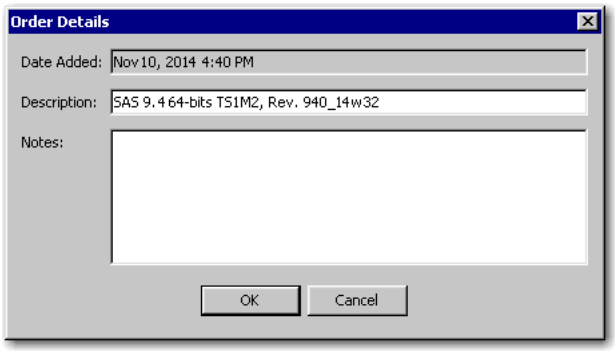
5. Select **Manage SAS Software Depot**. Click **Next**.



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 XP and earlier 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**.

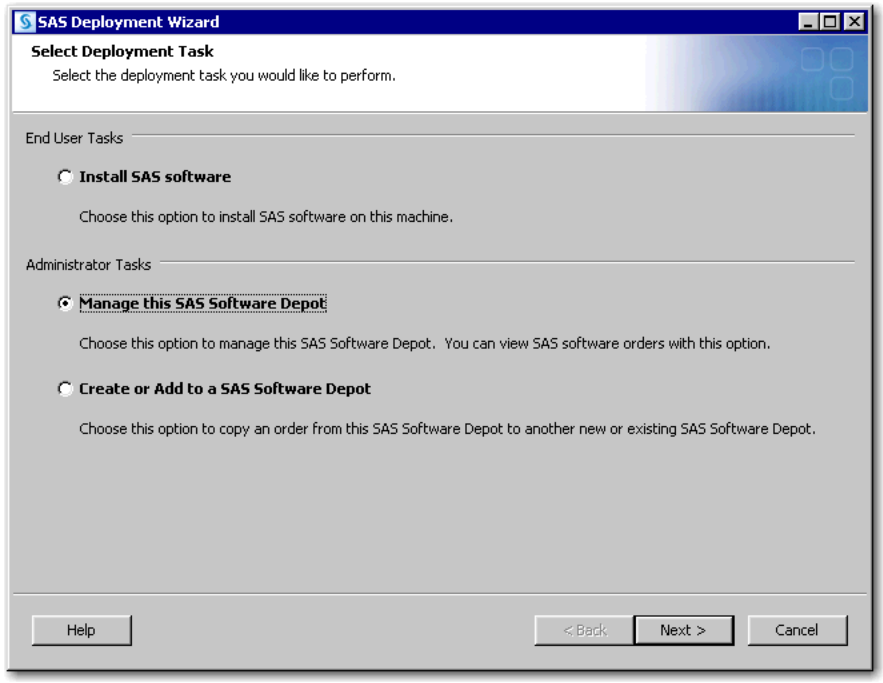
   - UNIX:

     Enter `./setup.sh` at a command prompt.

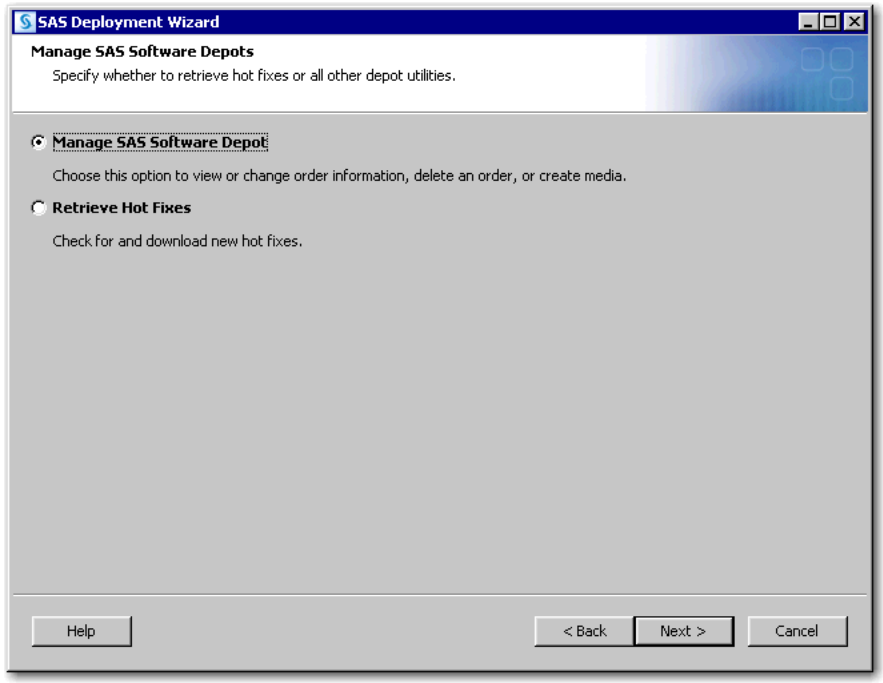
   - z/OS:

     Enter `./setup.rexx` at a command prompt.

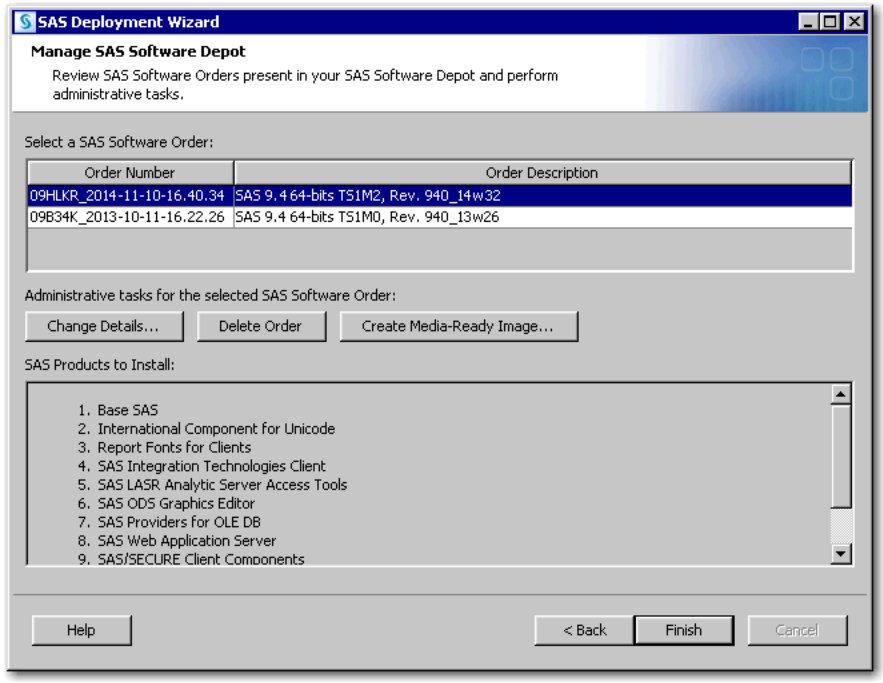
3. Select the language in which the SAS Deployment Wizard displays messages and prompts.
4. Select **Manage this SAS Software Depot**. Click **Next**.



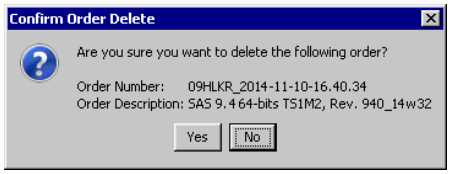
5. Select **Manage SAS Software Depot**. Click **Next**.



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.

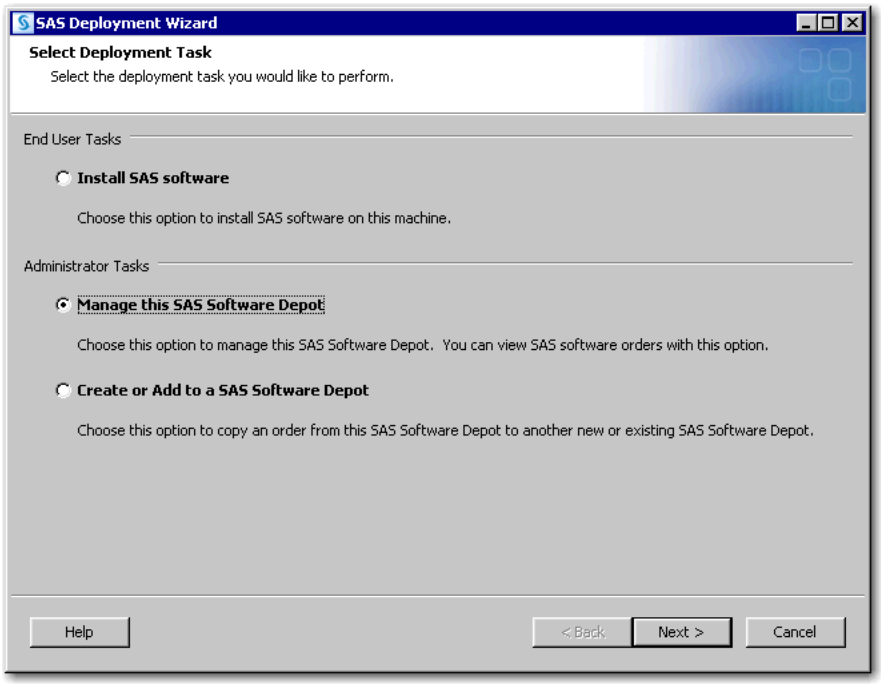
   Note: Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows XP and earlier 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:

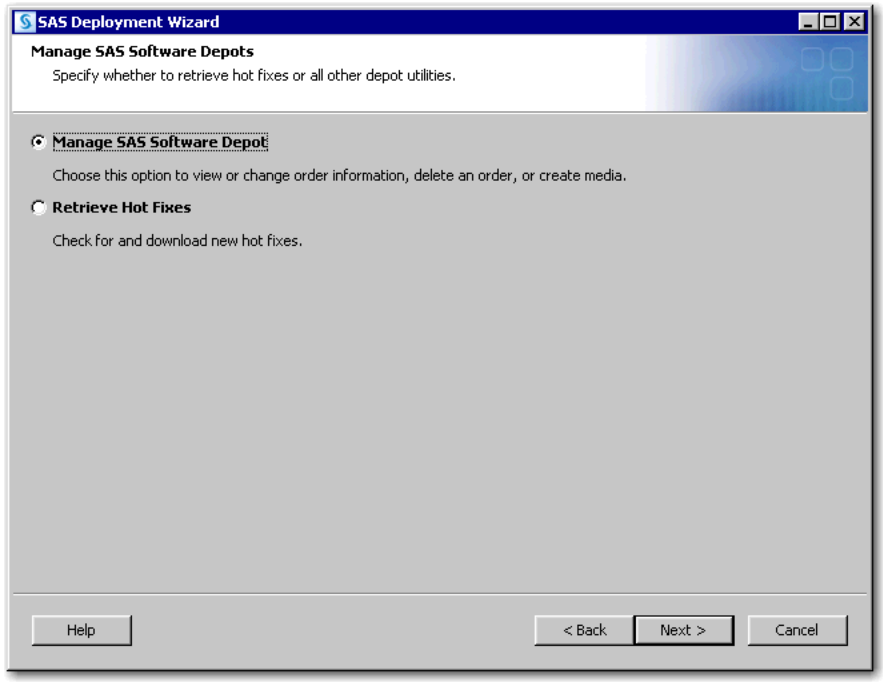
     Double-click **setup.exe**.
   - UNIX:

     Enter `./setup.sh` at a command prompt.
   - z/OS:

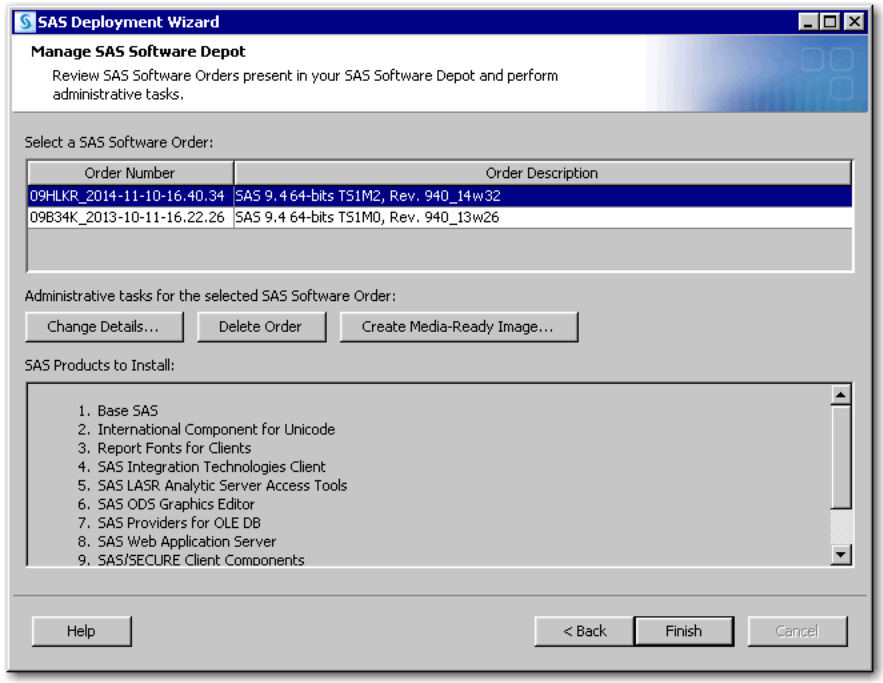
     Enter `./setup.rexx` at a command prompt.
3. Select the language in which the SAS Deployment Wizard displays messages and prompts.
4. Select **Manage this SAS Software Depot**. Click **Next**.



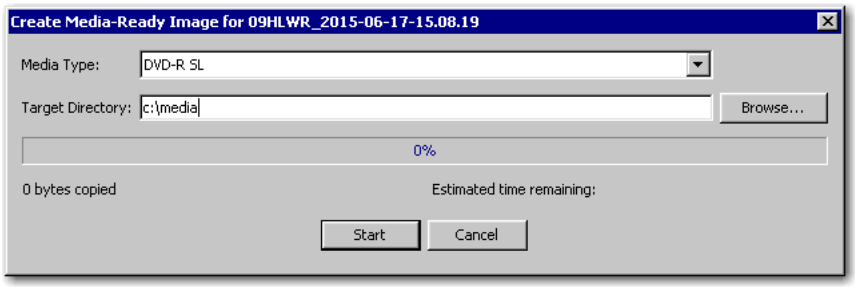
5. Select **Manage SAS Software Depot**. Click **Next**.



6. Select the order for which you want to create a disc image, and then click **Create Media-Ready Image**.



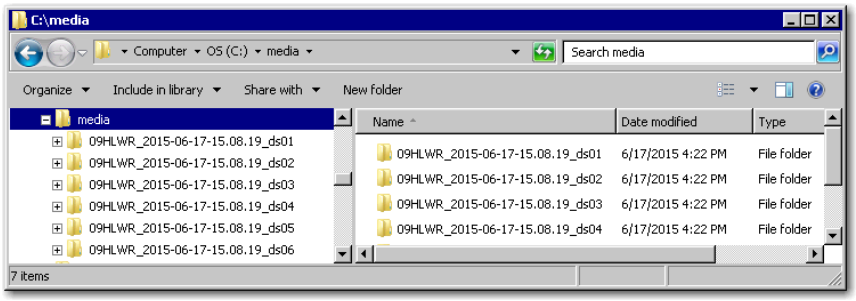
7. Select the type of media (CD or DVD) for which you want to create a disc image of your order. Provide the target directory where you want the SAS Deployment Wizard to write this image. Click **Start**.



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:

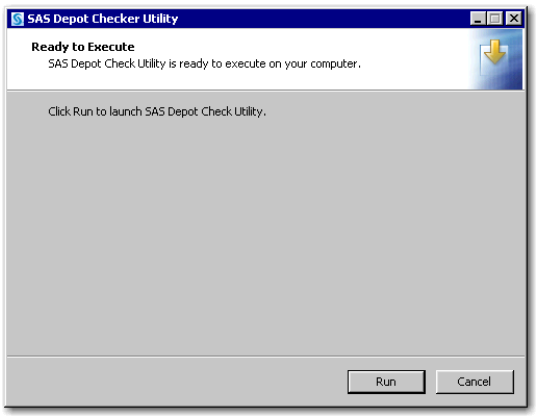
Note: You should use the same user account with which the SAS Software Depot was created to run the SAS Software Depot Check Utility.

1. In your SAS Software Depot, locate the **`utilities/depotchecker`** directory.
2. Depending on your operating system, do one of the following:

Table 4.1 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	**`SASDepotCheck.exe`**
UNIX	**`SASDepotCheck.sh`**
z/OS	**`SASDepotCheck.rexx`**

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

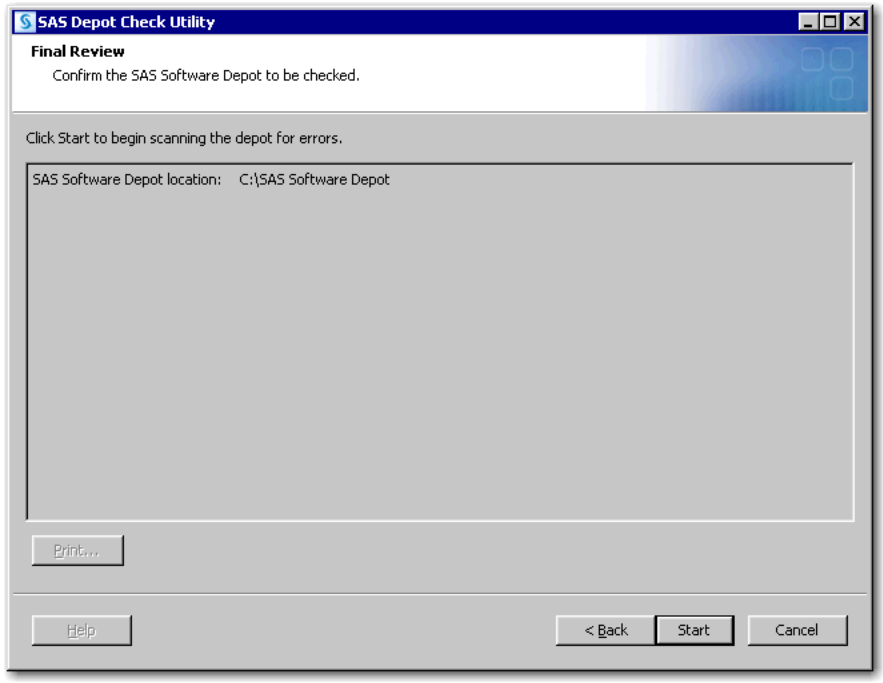


The depot check utility initializes.

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

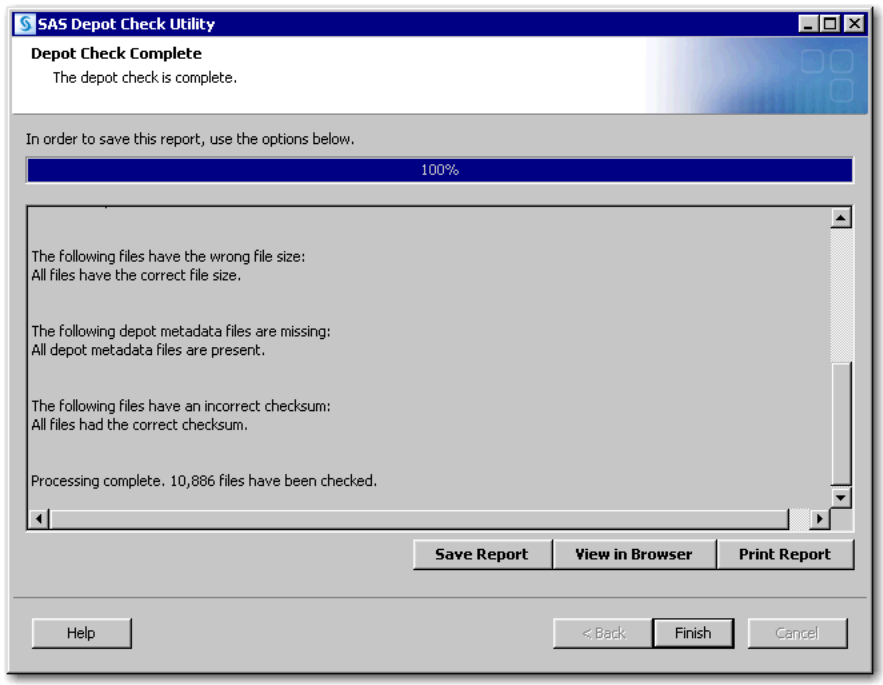
   A welcome page is displayed.

5. Specify the location of your SAS Software Depot (for example, **`C:\SAS Software Depot`**).
6. On the Final Review page, click **Start**.



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 5

Installing Required Third-Party Software

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Java Access Bridge 65
Platform Suite for SAS 65

Deployment Process Overview: Install required third-party software

Installing required third-party software is a part of deploying SAS:

1. Plan and review additional documentation.
2. Create users and groups and designate ports.
3. Create a SAS Software Depot.
4. **Install required third-party software.**
5. Install and configure SAS.

About Installing Third-Party Products

Depending on your choice of a scheduler and your accessibility needs, some SAS deployments require the following third-party products:

- Platform Suite for SAS

- Java Access Bridge

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

For more information, see SAS 9.4 Support for Other Third-Party Software Products.

Special Considerations

The SAS Deployment Tester requires JUnit. If you want to use the SAS Deployment Tester, then install JUnit. Be aware that the SAS Deployment Wizard prompt for SAS Deployment Tester asks for the path to JUnit. For more information, see SAS 9.4 Support for Other Third-Party Software Products.

For a typical planned deployment that includes a middle tier with SAS Web Server, PowerShell is required because PowerShell scripts manage SAS Web Server.

Important: On Windows, PowerShell is already installed. A Windows Server operating system has PowerShell installed, but might not have PowerShell 5 installed. If you are running Windows Server 2016 or later, PowerShell 5 is installed. However, if you are running Windows Server 2012R2 for example, PowerShell 4 might be installed. Verify that PowerShell 5 or later is installed.

On Windows, Visual C++ Redistributable Packages for Visual Studio 2013 is needed to install OpenSSL.

Visual C++ Redistributable Packages for Visual Studio 2013 can be downloaded from the Microsoft Download Center.

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.

For example, Platform Suite for SAS and Java Access Bridge are examples of third-party products 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.

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

Review the SAS Third-Party Software Requirements website.

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.

On z/OS, you must provide the installation directory to a JRE that you have already installed or install SAS without a JRE.

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 applicable third-party software checklists.

Java Access Bridge

In specific situations, the Java Access Bridge might be used by JAWS, the Windows accessibility solution. The Java Access Bridge is shipped with SAS 9.4.

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.

- If you are using Platform Suite for SAS for grid computing, you must install Platform LSF. 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.

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Installing and Configuring SAS Software

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Deployment Process Overview: Install and configure SAS

This chapter describes how to use the SAS Deployment Wizard to install and configure all of the SAS software components in your deployment plan on each host in your environment.

1. Plan and review additional documentation.
2. Create users and groups and designate ports.
3. Create a SAS Software Depot.
4. Install required third-party software.
5. **Install and configure SAS.**

Preparing to Install and to Configure

Overview of Preparing to Install and to Configure

This section includes important information about the SAS Deployment Wizard, deployment plans, installation options and considerations, validation, and testing.

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 file (plan.xml) for its initial input, the deployment wizard prompts the user for all remaining input at the start of the session so that the user does not have to monitor an entire deployment.

There are two major ways that you can run the SAS Deployment Wizard.

- interactively

  This is the standard way of providing input via fields on a deployment wizard page with a **Back** and **Next** button. You choose from three levels of prompting: Express (minimum set of prompts), Typical (basic set of prompts), and Custom (all prompts).

- non-interactively

  This includes a record and playback feature that enables you to automate a SAS installation for use on multiple machines. This feature is designed for large-scale enterprise deployments to prevent users from having to manually provide input on every page each time the SAS Deployment Wizard is run on a machine. For more information, see “Automating the SAS Installation on Multiple Machines”.

About Deployment Plans

A deployment plan instructs the SAS Deployment Wizard what software to install and configure on each machine in a SAS deployment. A deployment plan is an XML file that is used as input to the SAS Deployment Wizard.

There are two types of deployment plans: standard and customized. A standard deployment plan describes a common configuration. Standard deployment plans are provided in the SAS Deployment Wizard. A customized deployment plan is created by you and your SAS representative specifically for your site.

- If you have a customized deployment plan, an XML file (or a ZIP file containing an XML file) was emailed to you.
- If you have a standard deployment plan, you just need the name of the plan. During the installation, the standard deployment plan is available from a drop-down list on a page in the SAS Deployment Wizard.
- Your deployment plan must be a valid SAS 9.4 plan. The SAS Deployment Wizard does not accept plans from earlier SAS releases.

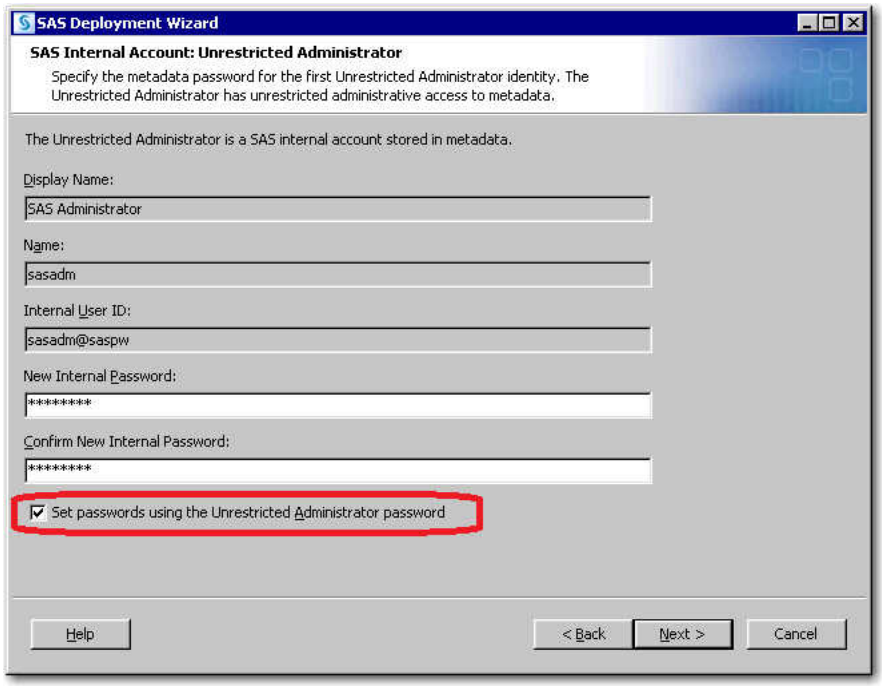
At the end of the SAS deployment, the SAS Deployment Wizard makes a copy of the deployment plan that it used. The deployment plan can be helpful when you want to add another SAS product or change your SAS configuration. The deployment wizard stores a copy of the deployment plan in the SAS configuration directory in the **`utilities`** subdirectory. It inserts a date and time stamp to the deployment plan file name. For example:

```
C:\SAS\Config\Lev1\Utilities\plan.2014-06-17-11.04.xml
```

Download the latest SAS 9.4 standard deployment plans, which also contain a corresponding architectural diagram and pre-installation checklist.

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, the SAS Deployment Wizard reuses the 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)

  Note: There are password restrictions for SAS Web Infrastructure Platform Data Server. Make sure that your password meets the criteria described in "Password Policies".
- 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.

Installing SAS on z/OS

Installing the SAS Intelligence Platform on z/OS consists of two major steps.

1. Run the SAS Deployment Wizard to first install the SAS Metadata Server as a 64-bit application.

   For more information, see the table Start-Up Commands for the SAS Deployment Wizard.

2. Run the SAS Deployment Wizard a second time to install the remainder of your SAS 9.4 order as a 31-bit application.

Note: If you are updating a deployment that runs on z/OS, you must update the deployment in the same order in which you installed SAS in the initial deployment. Before you can start the SAS Deployment Wizard, the cell where you are going to perform the update must be running.

There is more information about installing on z/OS.

The deployment wizard can be run on operating systems that do not have windowing systems. For more information, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide.

SAS Visual Analytics Administration and Reporting

Starting in October 2014 (SAS 9.4, Rev. 940_14w41), SAS provides SAS Visual Analytics Administration and Reporting with most SAS software orders.

SAS Visual Analytics Administration and Reporting is a component included in many SAS 9.4 solutions and technology packages to provide enhanced reporting and printing capabilities. Administration and reporting is supported on Linux and Windows machines only. If your site has a hardware constraint, you might be able to delay your deployment of administration and reporting until later. However, SAS Visual Analytics Apps is operable until you have deployed administration and reporting. For more information, refer to your SAS solutions documentation.

For more information, contact SAS Technical Support.

Update Your SAS Documentation Only

Starting in SAS 9.4M2, for products already installed, the SAS Deployment Wizard enables you to install only the newly released documentation. The wizard skips all SAS

product maintenance updates that have occurred since your original order and installs updates to your SAS product documentation only.

Note: This documentation-only installation feature is available for certain SAS products such as SAS Studio.

If you receive a SAS order that contains later versions of the SAS products that you are currently running, follow these steps to update your SAS product documentation only:

1. Log on to the machine on which you want to update your SAS documentation with a user ID that meets the requirements for the appropriate operating system.
   - Windows:

     Use an account that is a member of the Administrators group.
   - UNIX:

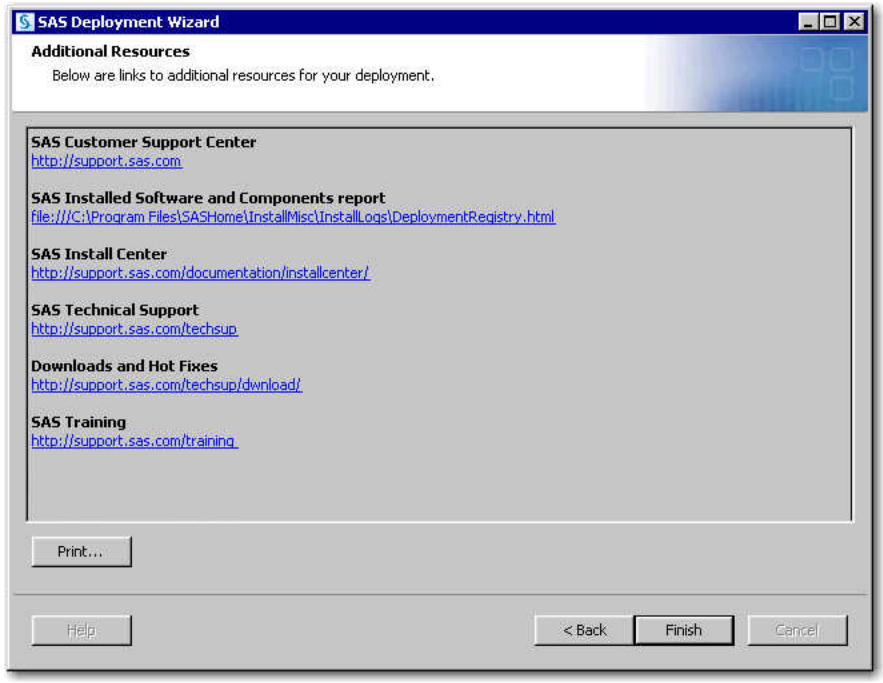
     Use the same account on all machines on which you are deploying SAS. Do not use root.
2. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.

   Table 6.1 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	`setup.exe -docupdate`
UNIX	`setup.sh -docupdate`

   You should see a welcome page.
3. Follow the wizard prompts. For more information, click **Help** .

   When you see a page similar to the following, the SAS Deployment Wizard is finished.



The deployment wizard has installed the latest SAS product documentation on your machine.

4. Click **Finish** to close the deployment wizard.
5. Rebuild and redeploy your SAS web applications using the SAS Deployment Manager. For more information, see "Administer SAS Web Applications" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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 *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 *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.

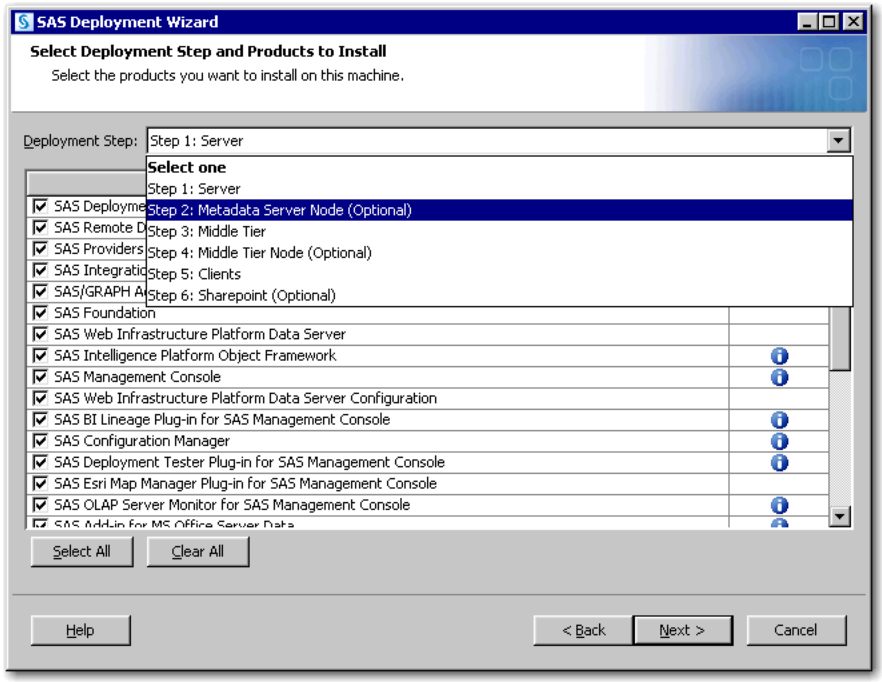
Clustering is currently supported on Windows and UNIX machines, and starting in SAS 9.4M2, on z/OS.

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* \sassvlgn. On UNIX and z/OS, the nodes are started by the Installer account. For more information, see "Prerequisites for Cluster Configuration" in *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.

Figure 6.1 *Select Deployment Step and Products to Install Page*



For more information, see "Using Metadata Server Clustering" in *SAS Intelligence Platform: System Administration Guide*.

SAS Web Application Server Clustering

Server clustering provides availability and enhances performance. In SAS 9.4, enhancements have been made to the deployment model 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 (install and configure servers on additional machines). Combining vertical and horizontal clustering is supported and can be easily configured.

Note: You cannot start a configuration or software update to a middle-tier cluster node until the primary middle-tier configuration has completed.

For more information, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.

Installation Order 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 computers in a particular order.

Note: Be sure to consult the *Deployment Steps* file that accompanies your deployment plan. This document lists in greater detail the installation order for your particular SAS order.

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

   Note: Many SAS deployments include several (real or virtual) machines, each running one or more tiers of the SAS infrastructure. Each SAS tier is deployed separately. You should perform a backup after deploying each SAS tier.

2. If you are configuring metadata server clusters, install the SAS Metadata Server nodes next.
3. Install the SAS application servers (such as the SAS Workspace Server or the 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 application server nodes next.

   Note: You cannot start a configuration or software update to a middle-tier cluster node until the primary middle-tier configuration has completed.

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

SAS Metadata Server Recommendations

Consider the following SAS Metadata Server recommendations:

- dedicate a machine

  A machine running only the SAS Metadata Server greatly simplifies tuning, management, and diagnostics.

- increase ulimit settings (SAS 9.4 only)

  On UNIX, before you run the SAS Deployment Wizard on your SAS Metadata Server machine, you should increase per-user limits (ulimit) for open file descriptors and processes.

  SAS recommends that you have a soft limit of 65536 for both the number of open file descriptors (ulimit --n) and the maximum number of processes (ulimit --u).

  Contact your system administrator for details about increasing these ulimit settings.

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

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*.

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:

```
$ 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:

  en_US.UTF-8

- On AIX:

  EN_US.UTF-8

- On HP-UX:

  en_US.utf8

Locale and Encoding Settings in the Deployment Wizard

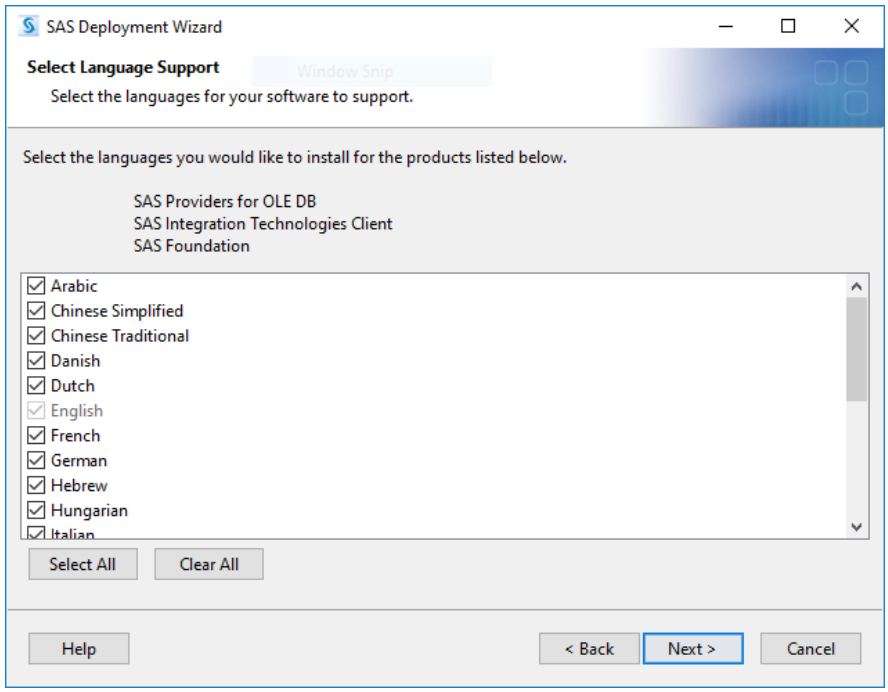
The SAS Deployment Wizard enables you to select the default locale and languages for the deployment wizard and for SAS 9.4. (A separate tool, the SAS Deployment Manager, enables you to configure the locale of SAS Java clients. For more information, see "Change Locale for SAS".)

One of the first windows in the deployment wizard is the Choose Language window.

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

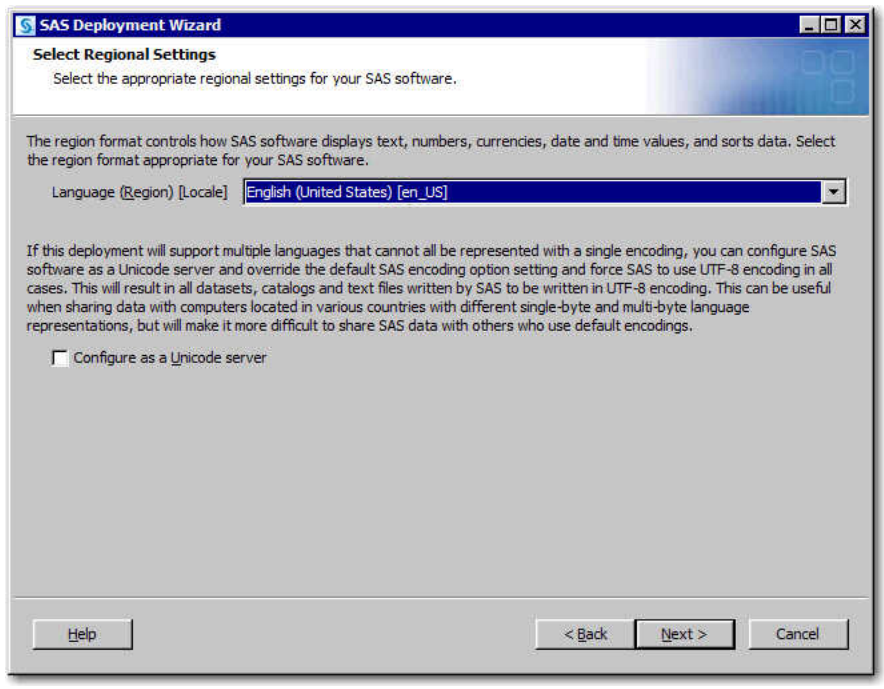
You can also set the languages that your SAS 9.4 products use.

Figure 6.2 *Select Language Support Page*



The deployment wizard also prompts you for your locale setting.

Figure 6.3 *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 UNIX 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 by default, 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.

If you do not select **Configure as a Unicode server**, 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 French (France) as your locale in the SAS Deployment Wizard, this value is added to both the French and English configuration files.

The locale is also set in the file that uses English message text for a double-byte SAS configuration. For example, if you choose Korean (Korea) as your locale, and you do not select **Configure as a Unicode server**, the SAS LOCALE and ENCODING options are added to configuration files for both Korean and English with DBCS Support.

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*.

Host Names

The SAS Deployment Wizard follows the DoD Internet Host Table Specification and does not allow the underscore character (_) in host names. Review more information about what constitutes a valid host name.

A valid top-level domain (TLD) is required for your middle-tier host names. SAS Logon Manager uses Apereo CAS single sign-on to validate the fully qualified domain names of SAS web applications. For example, .local is not a valid top-level domain. For more information, see "Central Authentication Service" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

How the SAS Deployment Wizard Names SAS Web Application Servers

The SAS Deployment Wizard creates multiple SAS Web Application Servers as needed based on the products in your SAS order. By default, each SAS web application is assigned to a specific SAS Web Application 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 order, the default servers might not be named sequentially.

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

Allowlist for Websites That Access SAS

Starting with SAS 9.4M3, websites that link directly to your SAS web applications via URLs must be added to an allowlist (or security filter) of allowed sites. This provides protection against a browser-based vulnerability referred to as cross-site request forgery (CSRF). Any website that performs activities such as retrieving reports, using a single sign-on session, or linking to a SAS web application needs to be explicitly added to the allowlist. The default configuration includes only SAS applications. Users who link to a SAS application from a company intranet or portal page that is not hosted in the SAS installation will encounter access denied messages.

The SAS Deployment Wizard prompts you for an allowlist setting. Updates to the allowlist can be made later using SAS Management Console.

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 and is configured specifically to support SAS 9.4 software. For more information, see SAS 9.4 Support for Other Third-Party Software Products and Upgrading PostgreSQL.

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 (UNIX).

  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.

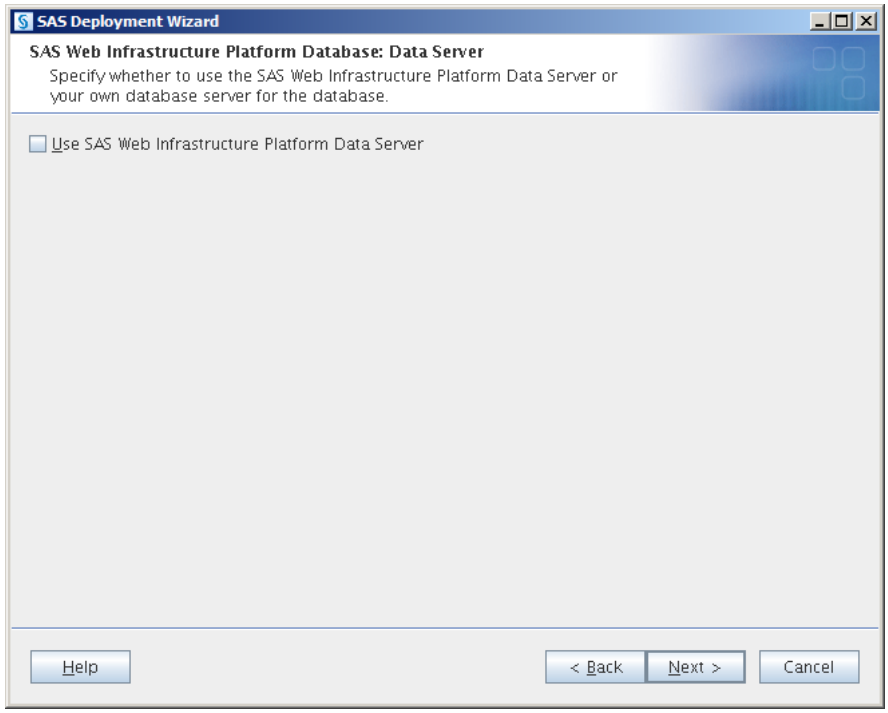
SAS enables you to use a database management system other than the SAS Web Infrastructure Platform Data Server for storing transactional data for the SAS middle tier and certain SAS solutions. (The deployment wizard asks you about this if you choose the Custom prompting level.) In SAS 9.4, the following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

- DB2
- MySQL
- Oracle
- PostgreSQL
- SQL Server

Third-party databases often have requirements that you need to know about, such as database name limits, minimum tablespace sizes, and so on. Make sure that you review Appendix 4, "Configuring an Alternate Database for SAS Web Infrastructure Platform Data Server".

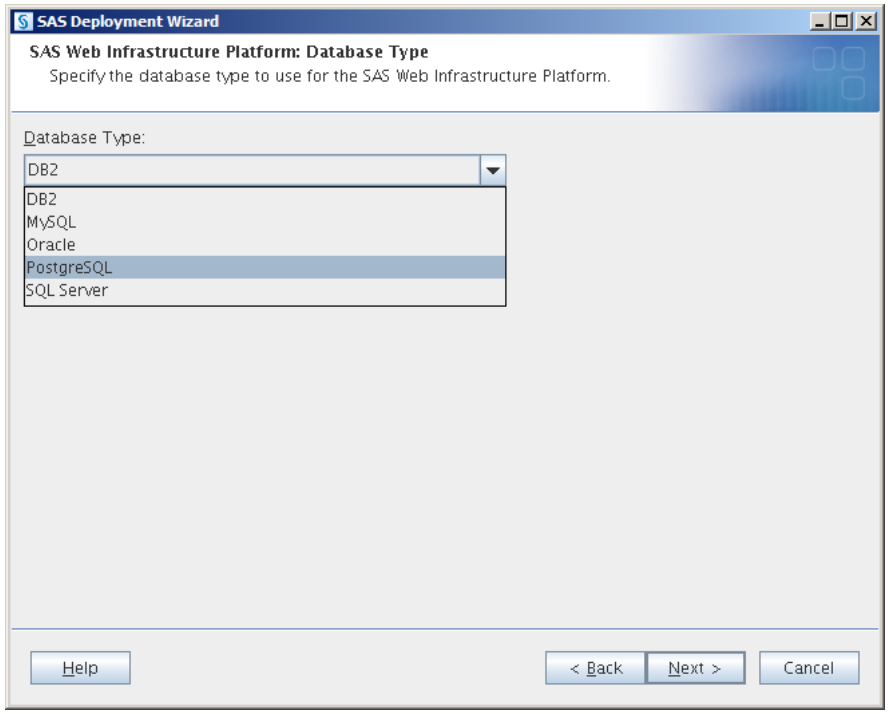
If you want to use a third-party database, you must deselect **Use SAS Web Infrastructure Platform Data Server** on the SAS Web Infrastructure Platform Database: Data Server page during SAS installation and configuration.

Figure 6.4 *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.

Figure 6.5 *SAS Web Infrastructure Platform: Database Type*



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 BI Lineage Scheduling Server When LSF Scheduler Is on a Separate Machine from the SAS Workspace Server

The most common topology involving the LSF Scheduler is to locate it on the same machine as the SAS Workspace Server.

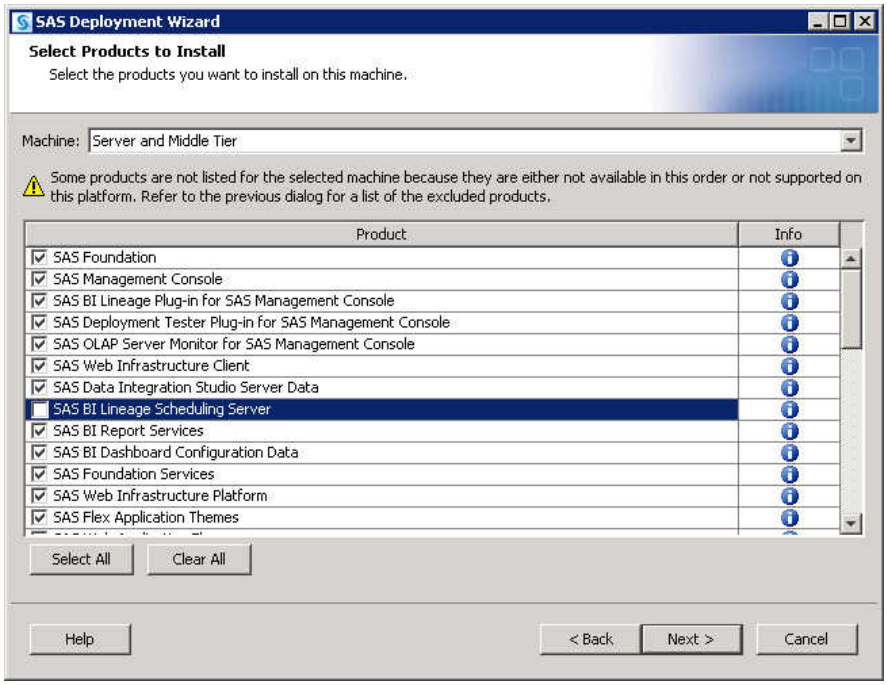
However, here is an alternative topology:

- Machine 1 hosts the SAS Metadata Server and SAS Workspace Server.
- Machine 2 hosts the LSF Scheduler and SAS BI Lineage Scheduling Server.

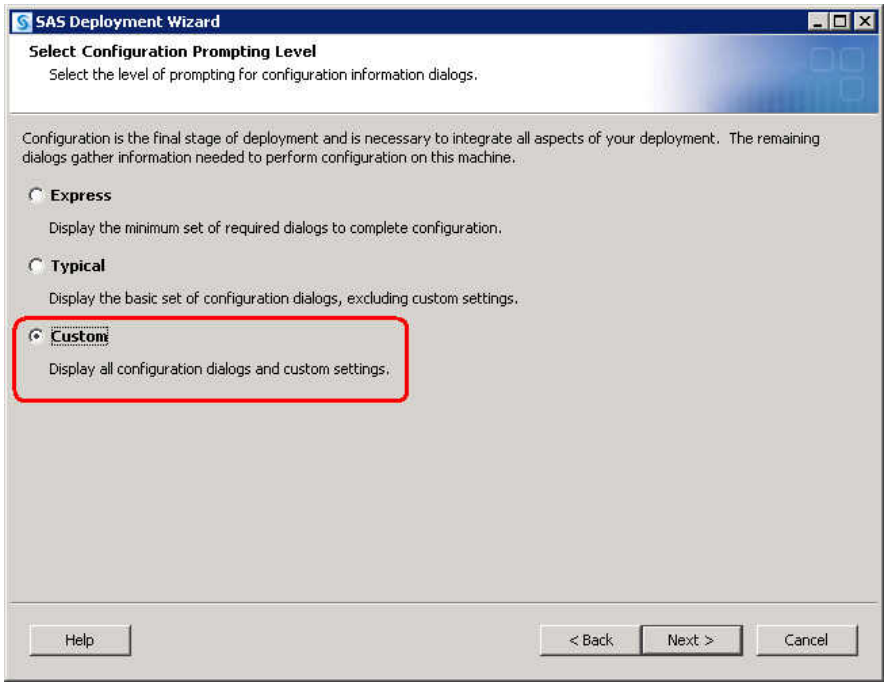
For this alternative topology, you run the SAS Deployment Wizard twice: first on machine 1 and then on machine 2.

To deploy the SAS BI Lineage Scheduling Server when the LSF Scheduler is installed on a separate machine from the SAS Workspace Server, follow these steps:

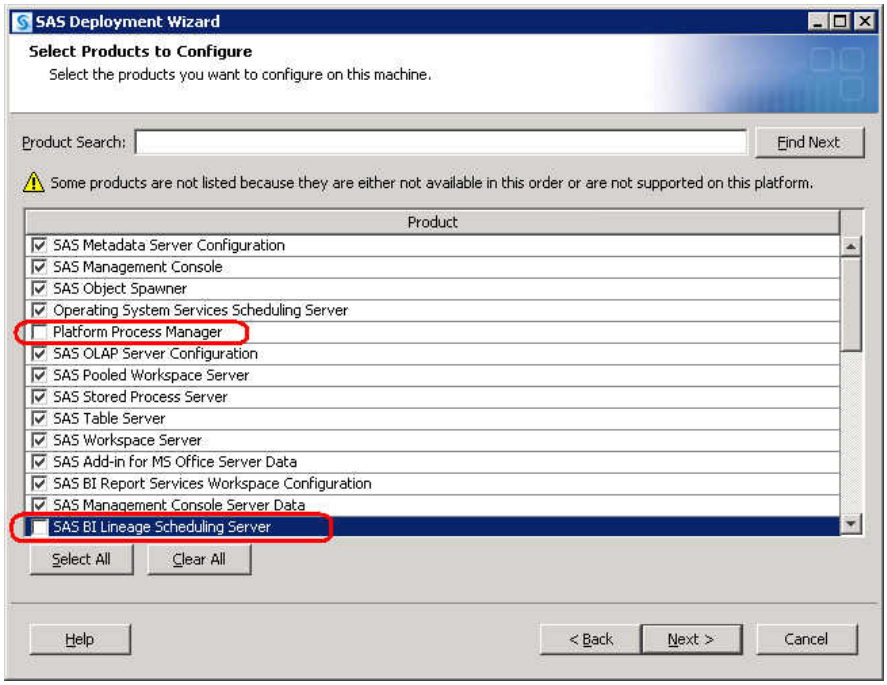
1. Log on to machine 1 (the SAS Metadata Server and SAS Workspace Server machine) and run the SAS Deployment Wizard. On the Select Products to Install page, select the **Server and Middle Tier** machine. Make sure that you deselect **SAS BI Lineage Scheduling Server**.



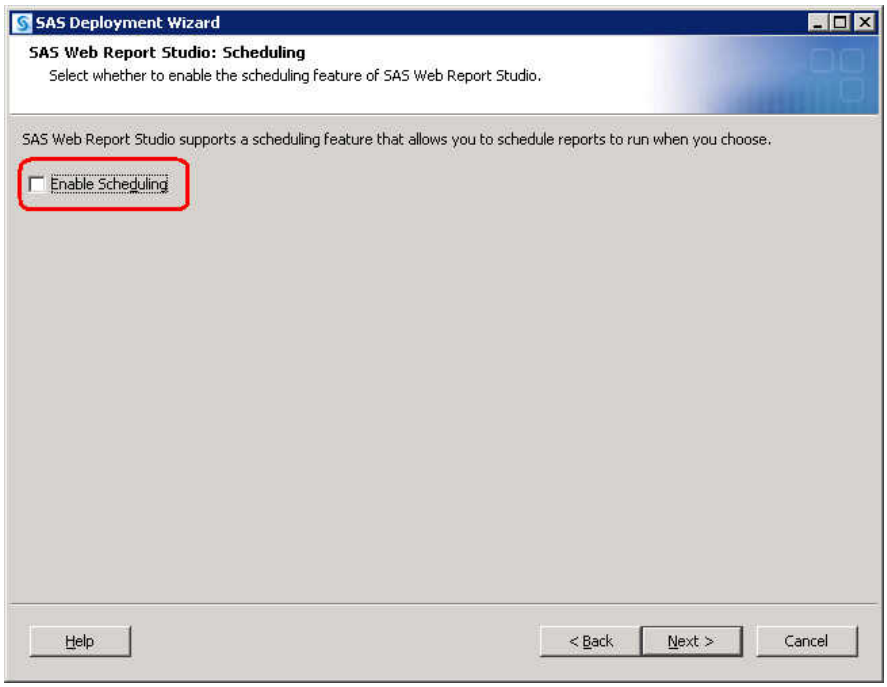
2. On the Select Configuration Prompting Level page, select **Custom** for the prompting level.



3. On the Select Products to Configure page, deselect the following:
   - **Platform Process Manager**
   - **SAS BI Lineage Scheduling Server**



4. On the SAS Web Report Studio: Scheduling page, deselect **Enable Scheduling**.



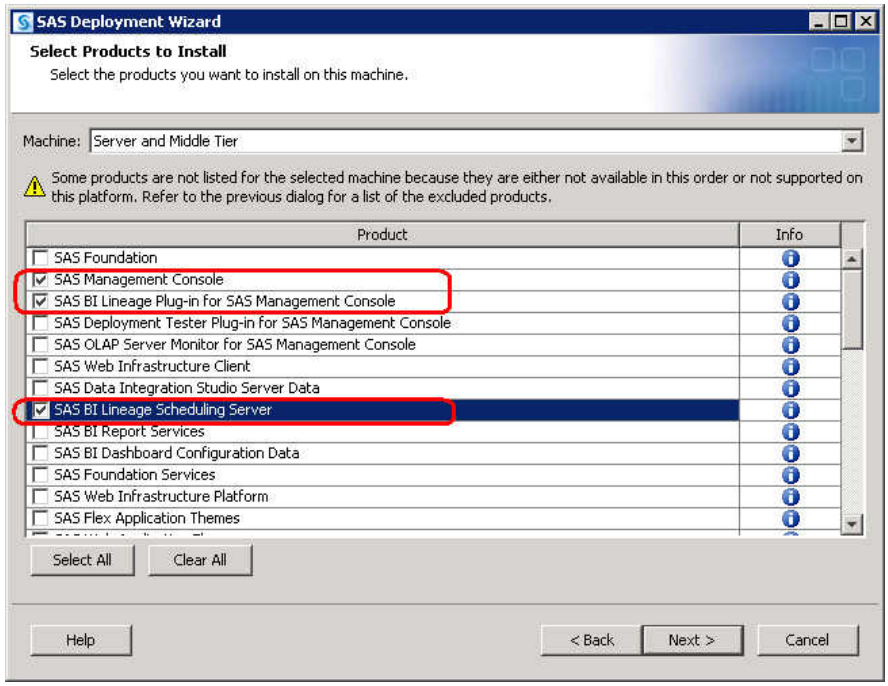
5. Answer the remaining deployment wizard prompts.

   The wizard installs and initially configures machine 1 based on the input that you have provided.

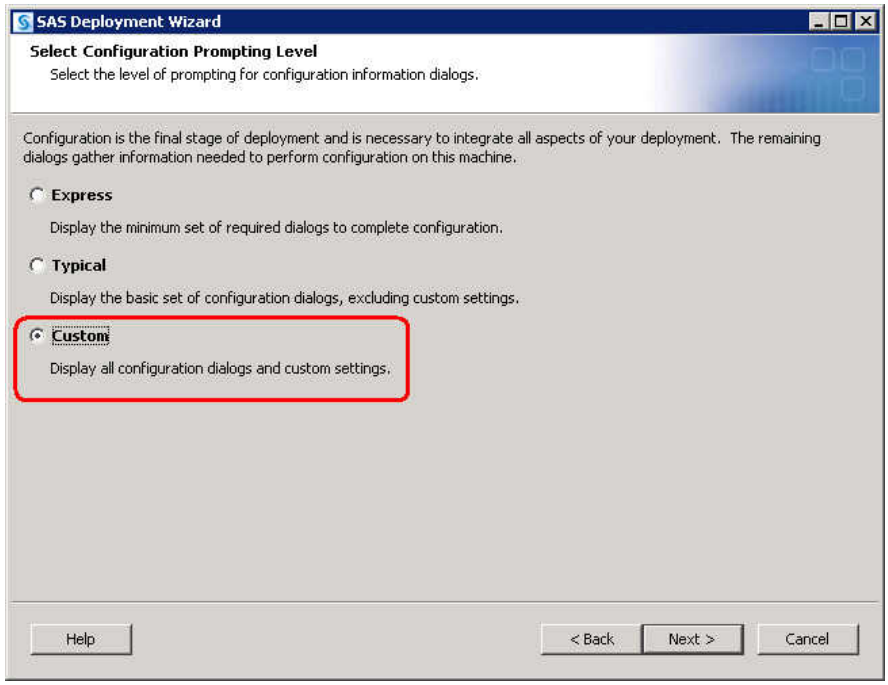
6. After the wizard completes running on machine 1, back up your metadata repositories and your SAS configuration directory before you run the SAS Deployment Wizard on the next machine. For more information, see "About the Metadata Server Backup Facility" in *SAS Intelligence Platform: System Administration Guide*.

7. Be sure to restart any servers that you stopped to perform the backup.

8. A file named Instructions.html is in the SAS configuration directory. Review this file and complete any manual configuration tasks. Perform all necessary backups. Log on to machine 2 (the SAS BI Lineage Scheduling Server and LSF Scheduler machine) and run the SAS Deployment Wizard a second time using the same deployment plan.
9. On the Select Products to Install page, select the **Server and Middle Tier** machine.
10. Select only the following products to install:
    - SAS Management Console
    - SAS BI Lineage Plug-in for SAS Management Console
    - SAS BI Lineage Scheduling Server
    - SAS Intelligence Platform Object Framework (not pictured)

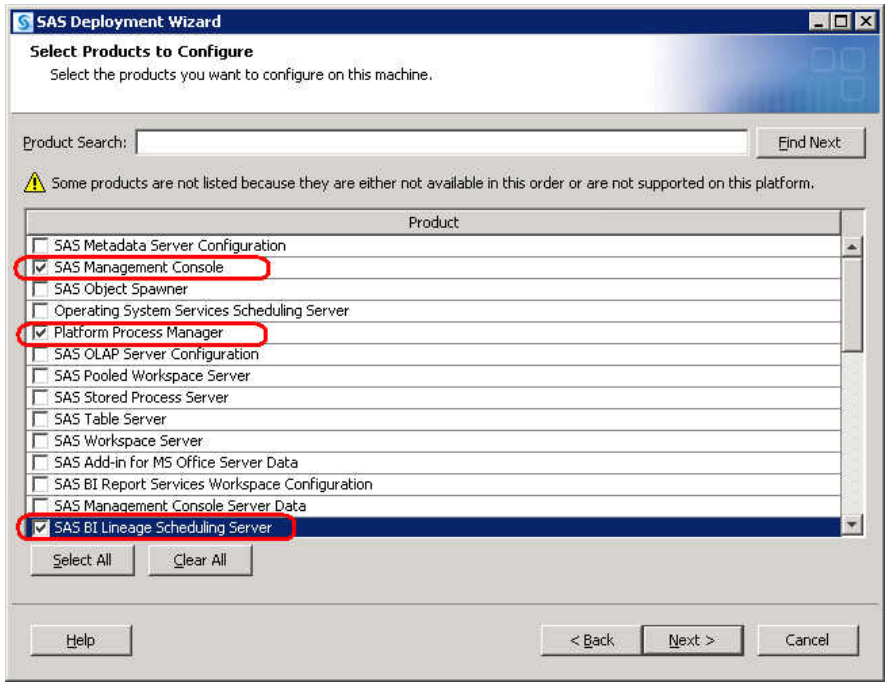


11. On the Select Configuration Prompting Level page, select **Custom** for the prompting level.



12. On the Select Products to Configure page, select only the following products:

    - SAS Management Console
    - Platform Process Manager
    - SAS BI Lineage Scheduling Server



13. Answer the remaining deployment wizard prompts.

    The wizard installs and initially configures machine 2 based on the input that you have provided.

14. If you are deploying a middle-tier machine and you opted not to automatically deploy your SAS web applications, then you must manually deploy them. For more

information, review the Third-Party Software Requirements, and select your web application server.

15. When you are finished installing and configuring SAS on each machine, proceed to the section "Validate the SAS 9.4 Servers".

Install and Configure SAS Interactively

Installing and configuring SAS interactively with the SAS Deployment Wizard consists of two main phases.

- Providing installation information such as the following:
  - installation type (planned (driven by deployment) or unplanned)
  - deployment plan location (if applicable)
  - 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 products 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 some of the more important configuration pages that you encounter during the installation and configuration phases of a SAS 9.4 deployment. The type and number of configuration-related pages that you receive depend on the prompting level that you choose, the SAS tier that you are currently deploying, and the contents of your SAS 9.4 order.

Note: To run the SAS Deployment Wizard on an operating system that is not a windowing system, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide.

To install and configure SAS interactively, complete these steps:

1. If you are using HTTPS self-signed or site-signed certificates, you must deploy SAS Intelligence Platform in the following manner:

   a. Install SAS Intelligence Platform and the new trusted CA bundle.

      Run the deployment wizard in install-only mode.

   b. Add your HTTPS self-signed and site-signed certificates to the trusted CA bundle.

      Use the trusted CA bundle tasks in the SAS Deployment Manager.

   c. Configure SAS Intelligence Platform.

      Run the deployment wizard in configure-only mode.

d. Repeat these steps on each machine in your deployment. This means that you must add certificates to the trusted CA bundle on each and every machine.

For more information, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.

2. Make sure that you have reviewed all appropriate documentation. The deployment wizard checks the version of the operating system and does not proceed if the version is incorrect.
3. Verify that you have performed the earlier required steps outlined in "Deployment Process Overview: Install and configure SAS".
4. If you use any garbage collection scripts, temporarily suspend them while the deployment wizard runs. If any of the wizard's temporary files are deleted during execution, configuration failures can occur.
5. 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 review "Add SAS Visual Analytics Administration and Reporting" before proceeding.
6. Review information about where to store your metadata repositories in "Repository Considerations".
7. If you are deploying SAS on multiple machines, make sure that you are following the process in "Installation Order Rules for Multiple Machine Deployments".
8. Log on to a machine with a user ID that meets the requirements for the appropriate operating system.
   - Windows:

     Use an account that is available in the long term (for future SAS maintenance). It must be a member of the Administrators group.
   - UNIX:

     Use the same account on all machines on which you are deploying SAS. Do not use root.
   - z/OS:

     Use the same account on all machines on which you are deploying SAS.
9. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.

Table 6.2 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	`setup.exe`
UNIX	`setup.sh`

Operating System	Command
z/OS	For the first invocation of the deployment wizard to install the SAS Metadata Server as a 64-bit application: **`setup.rexx -z64`** For the second invocation of the deployment wizard to install the remainder of your SAS 9.4 order as a 31-bit application: **`setup.rexx`** To use a temporary directory other than **`/tmp`**, specify **`-templocation`** *new-temp-dir*.

Note: In SAS 9.4M2, the deployment wizard automatically records your responses regardless of whether you run the wizard with the -RECORD option. This record of your responses is written to a file called ResponseRecord_*yyyy-mm-dd-hh.mm.ss*.log in the following location: **`C:\Users\`*`SAS-Installer`*`\AppData\Local\SAS\SASDeploymentWizard`** (Windows) and ***`home-directory`*`/.SASAppData/SASDeploymentWizard`** (UNIX and z/OS).

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".

11. Select Deployment Task

    Select the deployment task that you want to perform, and click **Next**.

    - Select **Install SAS Software**.

12. 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 (SASHome) cannot contain parentheses. Using parentheses causes SAS Environment Manager scripts to fail.

    Although your SAS installation directory (which the wizard refers to as SASHome) 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 (SASHome) 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.

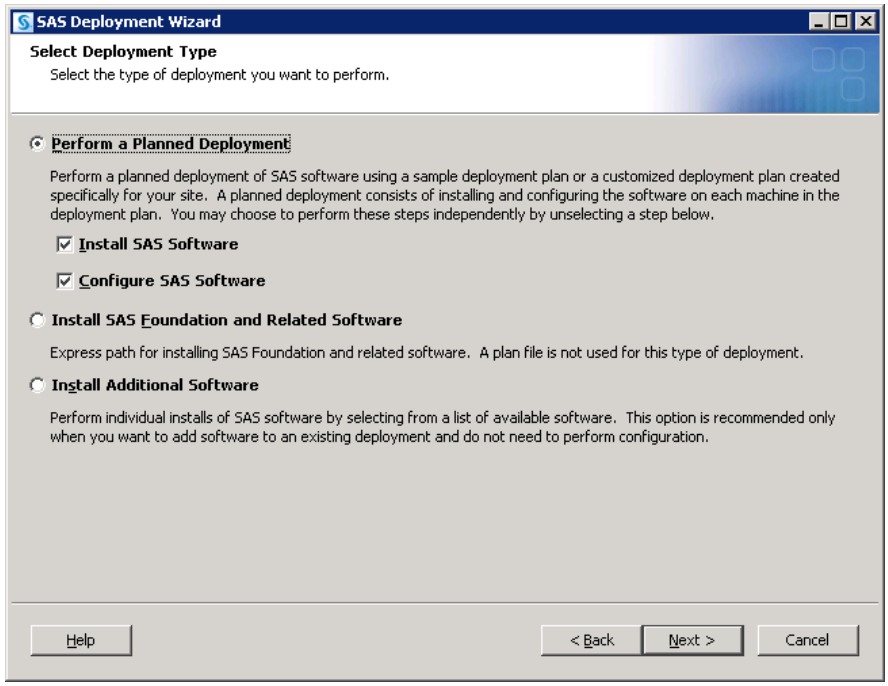
    Note: On z/OS, the length of the SAS installation directory path cannot exceed 54 characters.

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

13. 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.



14. Specify Deployment Plan

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

    - non-customized or customized deployment plan

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

    CAUTION:

    You must select a plan file that matches your topology to be deployed. Do not deselect products that are selected during initial configuration.

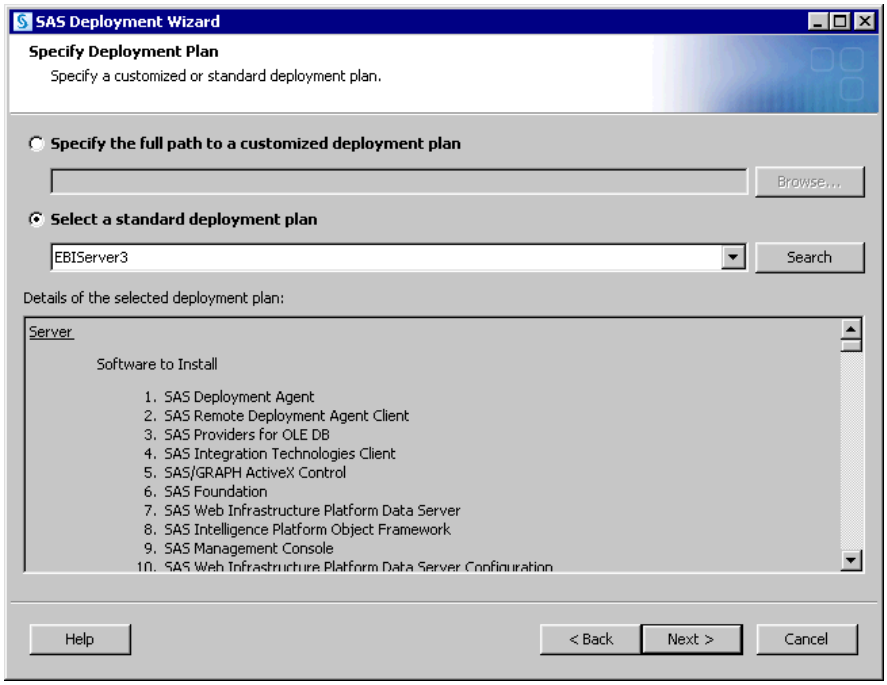
    - standard deployment plan

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

    CAUTION:

    You must select a plan file that matches your topology to be deployed. Do not deselect products that are selected during initial configuration.

    For more information, see “About Deployment Plans”.



15. 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".

      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 Appendix 1, "Deploying SAS Web Parts for Microsoft SharePoint".

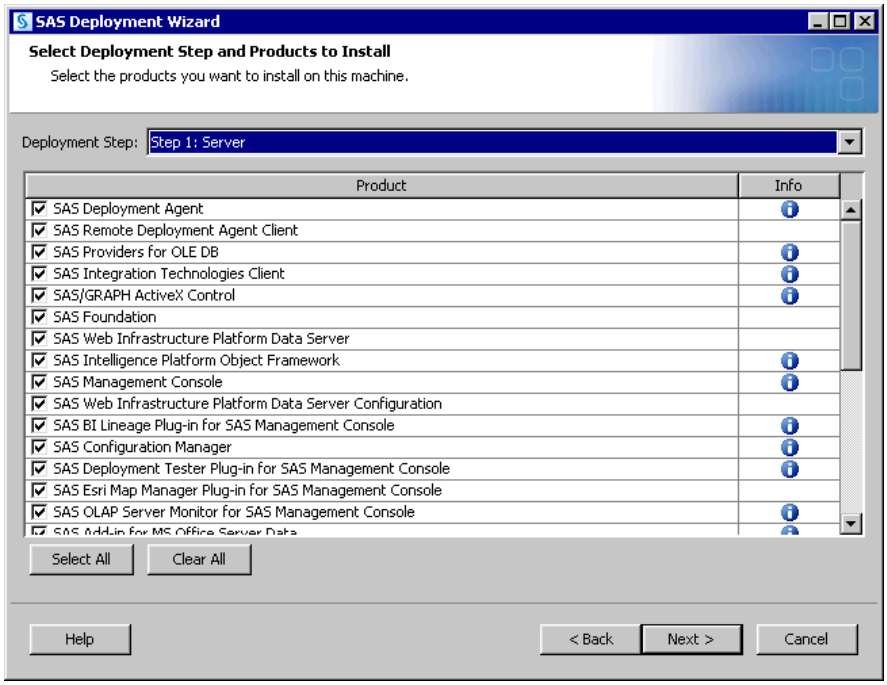
    - All products in the table are installed by default. Deselect any products that you do not want to install. When you are finished, click **Next**.

      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.



16. Select SAS Foundation Mode

    Specify which mode of SAS Foundation to install, and click **Next**.

    - You see this page when you are installing on a 64-bit machine and your order contains software for both 32-bit and 64-bit machines.
    - Select **64-bit Native Mode** to take full advantage of your 64-bit machine and the additional functionality provided by SAS Viya.
    - Select **32-bit Compatibility Mode** if you are concerned about compatibility with 32-bit software that you have installed or might eventually install.

17. Select SAS Enterprise Guide Mode

    Specify which mode of SAS Enterprise Guide to install, and click **Next**.

    - You see this page when you are installing on a 64-bit machine and your order contains software for both 32-bit and 64-bit machines.
    - Select **64-bit Native Mode** to take full advantage of your 64-bit machine.
    - Select **32-bit Compatibility Mode** if you are concerned about compatibility with 32-bit software that you have installed or might eventually install.

      Note: Some products have a dependency on 32-bit SAS Enterprise Guide. If one of those products is in the list of products to be installed and you choose to install the 64-bit version of SAS Enterprise Guide, the 32-bit version is installed also.

18. Select SAS Add-in for Microsoft Office Mode

    (Windows only) Specify which mode of SAS Add-In for Microsoft Office to install, and click **Next**. (This page appears when the deployment wizard is unable to detect the bit capacity of Microsoft Office.)

    - Select **32-bit Compatibility Mode** if you are running 32-bit Microsoft Office.

      Note: The bit capacity of SAS Add-In for Microsoft Office must match the bit capacity of Microsoft Office.

    - Select **64-bit Native Mode** if you are running 64-bit Microsoft Office.

19. 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.

20. 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.

21. 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".

22. Select Authentication Type

    (UNIX only) 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.

23. Default Product for SAS Filetypes

    (Windows only) Indicate the SAS product that your system will use by default to open SAS file types (.sas, .sas7bdat, and so on) that are shared by more than one product. Click **Next**.

    - Select **SAS Foundation** as the SAS program that will launch and open SAS files by default when you double-click the file in Windows Explorer.
    - Select **SAS Enterprise Guide** as the SAS program that will launch and open SAS files by default when you double-click the file in Windows Explorer.

24. Select Microsoft Office Applications

    (Windows only) Choose the Microsoft Office applications for which you want the SAS Add-In for Microsoft Office activated, and click **Next**.

    - When the Microsoft Office application is launched, it automatically activates SAS Add-In for Microsoft Office. A user sees either a **SAS** tab on the ribbon (Microsoft Office 2007, 2010, and 2013) or a **SAS** menu and toolbars (Microsoft Office 2003). To activate the SAS Add-In for Microsoft Office in Microsoft Excel, Word, PowerPoint, or Outlook after the installation, you can run SwitcherUtility.exe. For more information, see the Help for the SAS Add-In for Microsoft Office.

25. SAS Environments URL

    Specify the URL for the file that defines SAS environments, and click **Next**.

    - In **SAS Environments URL**, enter the URL for the file that defines SAS environments.

      The SAS environment file, named sas-environment.xml, specifies a set of SAS deployments at your site. Your administrator makes this file available on your site's network and can provide you with its URL. To log on to some client applications, the URL must be specified in this window. If the URL is not known at this time, you can continue and provide the URL later.

      If you use SAS Web Server, then the URL should resemble `protocol://hostname:port/sas/sas-environment.xml`, where *hostname* is the fully qualified host name of your machine and *port* is the default port for SAS Web Server. (For an unsecure port, use 80 on Windows and 7980 on UNIX. For a secure port, use 443 on Windows and 8343 on UNIX.)

      If you use a different web server or no web server, leave this field blank. Follow the instructions for the sas-environment.xml file in the Instructions.html document created by the SAS Deployment Wizard after your configuration is completed to find the file and deploy it on your web server.

      For more information, see "Configure the SAS Environment File" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

26. 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**. In a multiple machine deployment, the port can be (but not required to be) different for each SASHome.

      For more information, see *Manage SAS Deployment Agent Service* in the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

    - In **Specify how to secure the remote connection**, choose one of the following selections:

      Note: In a multiple machine deployment, all machines must be configured the same way.

      - 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 truststore.

      - Select **Specify existing credentials to secure the connection** if you have already implemented CA-signed, site-signed, or self-signed certificates. In

the following windows, the wizard prompts you for the keystore location and password and the truststore location and password for the SAS Deployment Agent and SAS Remote Deployment Agent Client.

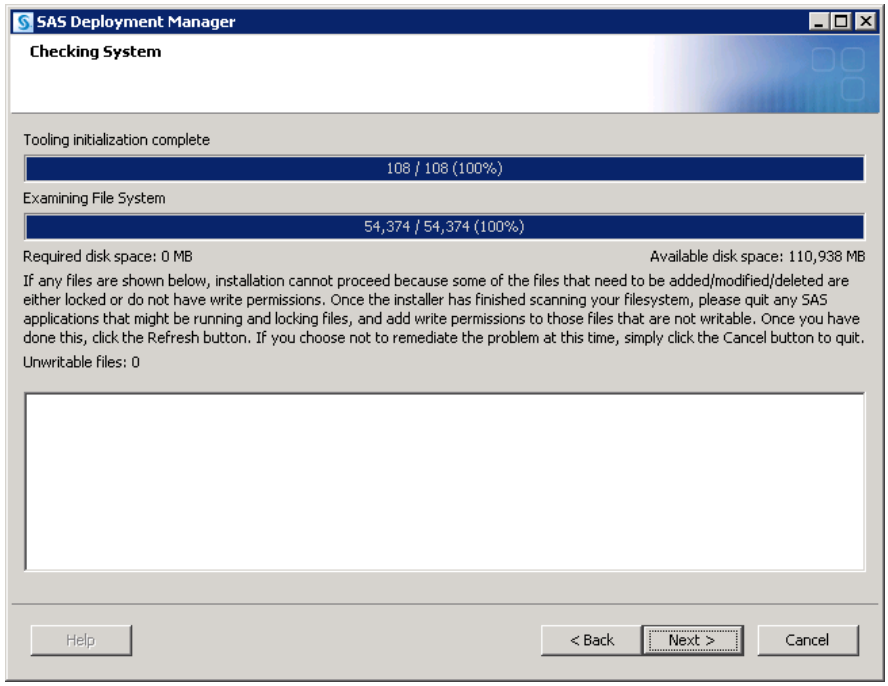
- Select **Do not secure the connection** if you do not want to secure SAS Deployment Agent communication or you have not yet implemented certificates.

  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 *Manage SAS Deployment Agent Service* in the SAS Deployment Wizard and SAS Deployment Manager 9.4: User's Guide and "Providing Your Own Certificates" in *SAS Intelligence Platform: Security Administration Guide* for information about the SAS Deployment Agent keystore and truststore, especially the tip about accepting the default and letting SAS Deployment Wizard install certificates for you.

27. 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**.



28. (z/OS only) Provide input for the following prompts:

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

    - **FTP Batch Generation**

      Specify the fully qualified host name or IP address of the z/OS mainframe machine on which you are deploying SAS. Provide a valid user ID and password with which the SAS Deployment Wizard will transfer deployment information to the mainframe machine.

    - **Specify Jobcard Information**

Specify the job account, programmer name, message class, message level, time, and region values. For more information, see your z/OS documentation.

- **Select Installation Action**

  Choose **A - Install a new SAS system**.

- **Specify New Installation Qualifier**

  Specify the path where you want to install SAS. You can choose to require Storage Management Subsystem (SMS) parameters. For more information, see your z/OS documentation.

- **Specify IBM's SMS Parameters**

  If you chose to require SMS parameters on the previous page, enter them here. For more information, see your z/OS documentation.

- **Specify Parameters**

  Specify parameters that are used in various DD statements throughout the installation. For more information, see your IBM JCL documentation.

- **Specify Entry Point**

  Specify the parameters for various ways that SAS can be run with different performance implications. Choose **SAS** (default entry point) to run the unbundled configuration. Choose **SASB** to run the bundled configuration. Choose **SASLPA** to run the bundled configuration with some modules installed in the link pack area (LPA).

- **Specify Parameters**

  Specify additional parameters for DD statements. VOLDISK designates the VOLSER that the installed data sets will go to. For more information, see your IBM JCL documentation.

- **Specify Parameters**

  Specify parameters used for reblocking the SAS load modules to a library with an optimum block size.

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

    The deployment 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 the SAS Install Center and use the operating system and SAS version to locate the appropriate SAS Foundation configuration guide.

30. 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"

Third-Party Software for SAS 9.4

31. 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.

32. 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.

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

    Note: This section describes some of the more important pages that you encounter during the configuration phase of a SAS 9.4 deployment. The options for which the SAS Deployment Wizard prompts you depends on which SAS products are identified in your deployment plan. In multiple machine deployments, it also depends on which machine you are currently deploying. For information about all SAS Deployment Wizard prompts, see the online Help for the wizard dialog box in question.

    Important: If you choose the **Custom** prompting level, you get an Invocation Options page for each SAS server. If you change the value for **Log File Name**, the UNIX sas.servers script is unable to determine whether the server is running. This does not apply to Windows.

    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 UNIX 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.

On z/OS, the mount point must exist. The SAS Deployment Wizard creates the necessary subdirectories.

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.

For more information, see "Introduction" in *SAS Intelligence Platform: Migration Guide*.

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 UNIX, the workspace server might be assigned to a SAS authentication domain named UNIXAuth.

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 UNIX 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 UNIX. 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.

For more information, see "Integrated Windows Authentication" in *SAS Intelligence Platform: Security Administration Guide*. Also, see "Configuring Integrated Windows Authentication," in the Configuration Guide for SAS Foundation for UNIX Environments.

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 "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 UNIX, 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 UNIX, 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 fully qualified host 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 **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 UNIX, 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 UNIX, 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*.

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".

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.

  UNIX:

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

  z/OS:

  Use the same account on all machines on which you are deploying SAS.

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

  For more information, see "Defining User Accounts".

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".

- 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 "Password Policies".

For more information, see "Reducing the Number of Password Prompts".

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".

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**.

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".

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, AES, and SSL.

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 **Small System**, **Medium System**, or **Large System**.

  The wizard uses your sizing estimate as a tuning hint during SAS server configuration. This option appears only during SAS Metadata Server configuration and it applies to all machines configured with this metadata server.

  You might have to further refine individual tuning parameters after you have collected and evaluated system usage information.

  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" 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 "Adding or Modifying Email Settings for SAS Application Servers" in *SAS Intelligence Platform: Application Server Administration Guide* and "Managing Alert Email Options for the SAS Metadata Server" in *SAS Intelligence Platform: System Administration Guide*.

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 "Password Policies".

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".

Query Cache Library
Enter the physical location where the SAS library exists for temporary files that are used when creating optimized tables for query lookup. Click **Next**.

- In **Query Cache Libref**, enter the SAS library reference that SAS uses to refer to the query optimizer SAS library.

  The name must be eight characters or less and should be unique within this repository. Librefs must start with a letter or underscore and contain only letters, numerals, or underscores. The typical installation libref name is wrstemp. The libref is used with the application server context name to form the SAS library name for the query optimizer SAS library.

- Select **Enable Query Cache** to allow the query optimizer to run. If not selected, then the query optimizer does not attempt to optimize queries and does not create temporary files for improving performance during rendering.

  A typical installation selects **Enable Query Cache**. The temporary files created within the query optimizer SAS library are visible to anyone with Read permission on the Renderer Optimizer directory. If you have security concerns about the authorization on this folder, you might want to not select this option.

  For more information, see "Using the Query Cache " in *SAS Intelligence Platform: Web Application Administration Guide*.

Output Management Library
Specify SAS library information for burst definition tables for reports that are distributed by email. Click **Next**.

- In **Output Management Library Directory**, enter the physical location where the SAS library exists for burst definition tables for reports that are distributed by email.

  A burst definition table contains email addresses, channels, and possibly BY group information.

- In **Output Management Library Libref**, enter the SAS library reference that SAS uses to refer to the output management library. The name must be eight characters or less and should be unique within this repository. Librefs must start with a letter or underscore and contain only letters, numerals, or underscores. The typical installation libref name is wrsdist. The libref is used with the application server context name to form the SAS library name for the output management library.

  For more information, see "Verifying Permissions for the Distribution Library " in *SAS Intelligence Platform: Web Application Administration Guide*.

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. For more information, see "Manual Configuration" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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 UNIX 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".

- 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 *SAS Intelligence Platform: Middle-Tier Administration Guide*.

  For more information, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.
- In **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 **Next**.

- Select **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 *SAS Intelligence Platform: Middle-Tier Administration Guide*.

Web Application Server: Server Configuration
Specify the SAS Web Application Server name and JVM options. Click **Next**.

- In **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.

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

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

- In **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".

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

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

Note: The port number must be specified if the allowlist 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 **`https://corporatePortal.company.com/`** links to your server, then enter **`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 an Allowlist" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

- Select **Enter advanced options for URL white list handling** to display an additional page on which you can specify advanced options for the allowlist.

SAS Content Server: Repository Directory
Specify SAS Content Server information. Click **Next**.

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

  For more information, see "Administer the SAS Content Server" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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

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 **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 `-Dcom.sas.server.isclustered=true` and restart the initial application server node. For more information, see "Add a Horizontal Cluster Member" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

SAS Environment Manager: Administration Database Configuration
Specify SAS Environment Manager information. Click **Next**.

- In **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 *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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

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

- In **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 Transport Service: Whitelist Mobile Devices
Specify whether to enforce an allowlist for SAS Visual Analytics Apps, and click **Next**.

- Select **Enforce whitelist for mobile devices** to use an allowlist to control access to SAS Visual Analytics Apps.

  A deployment enforces either the denylist or the allowlist. If the allowlist is not selected to be enforced, the denylist is enforced by default. If the allowlist is enforced, only devices that are on the allowlist can use SAS Visual Analytics Apps. If the denylist is enforced, any device that is not on the denylist can use SAS Visual Analytics Apps. Although only one list is enforced, you can make changes to both lists.

  For more information, see "Enable or Prevent Access by Using the Allowlist and Denylist" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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 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 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 SAS 9.4M2 or earlier, 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 in order 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*.

34. 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.

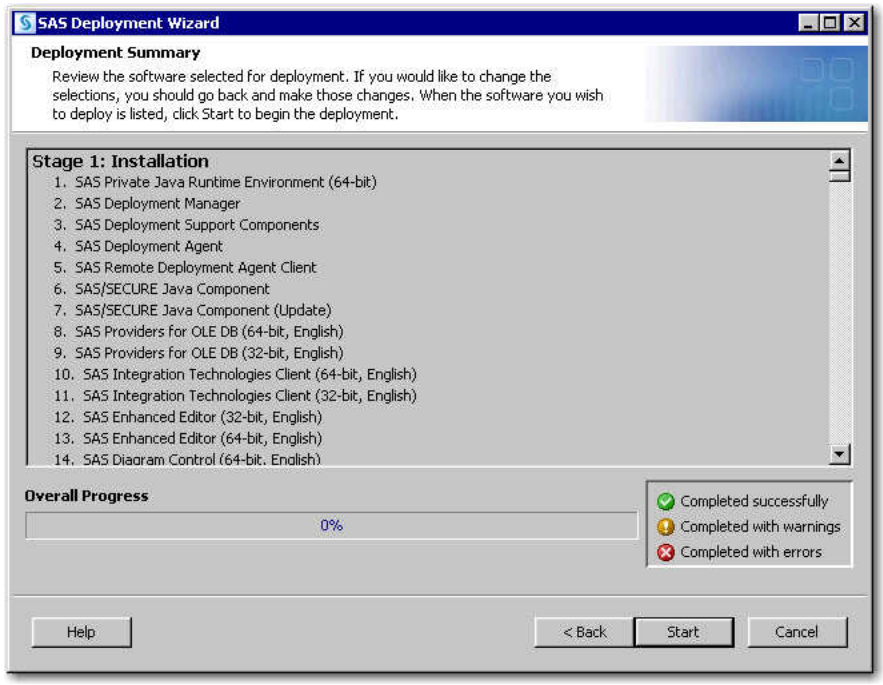
CAUTION:
If you encounter a situation in which the deployment wizard reports a configuration failure, leave the error message displayed. Do not continue. Consult additional documentation and, if necessary, contact SAS Technical Support. Moving past an error most often results in having to delete your deployment and start over.

On UNIX, 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.

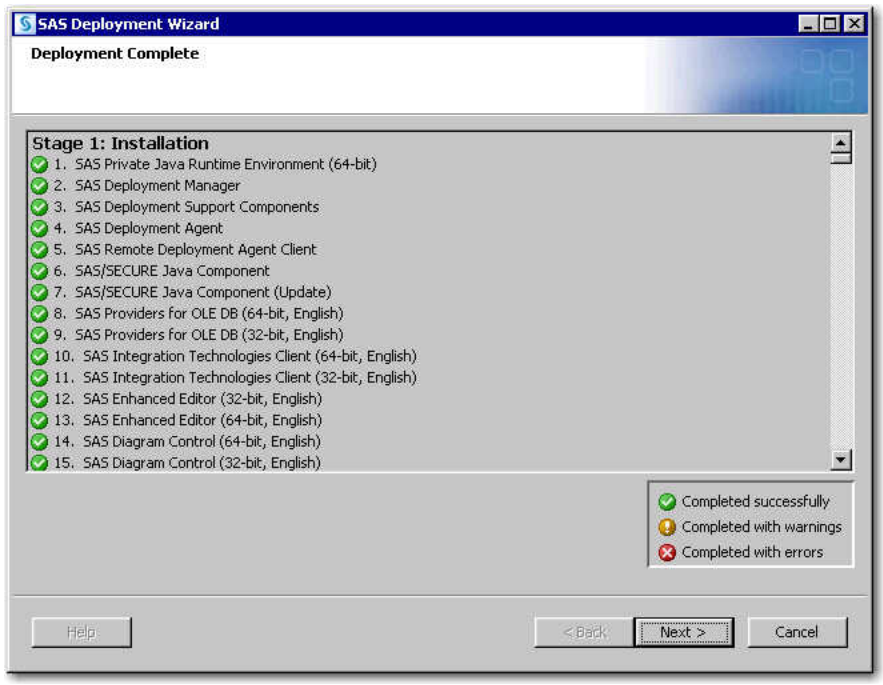
For more information about this functionality including any risks, see Microsoft documentation about security and automatic logons. You should weigh the risk of convenience of automatic logon after restart against the security policies in place at your site.



35. Deployment Complete

The Deployment Complete page displays the configuration results for each SAS product.

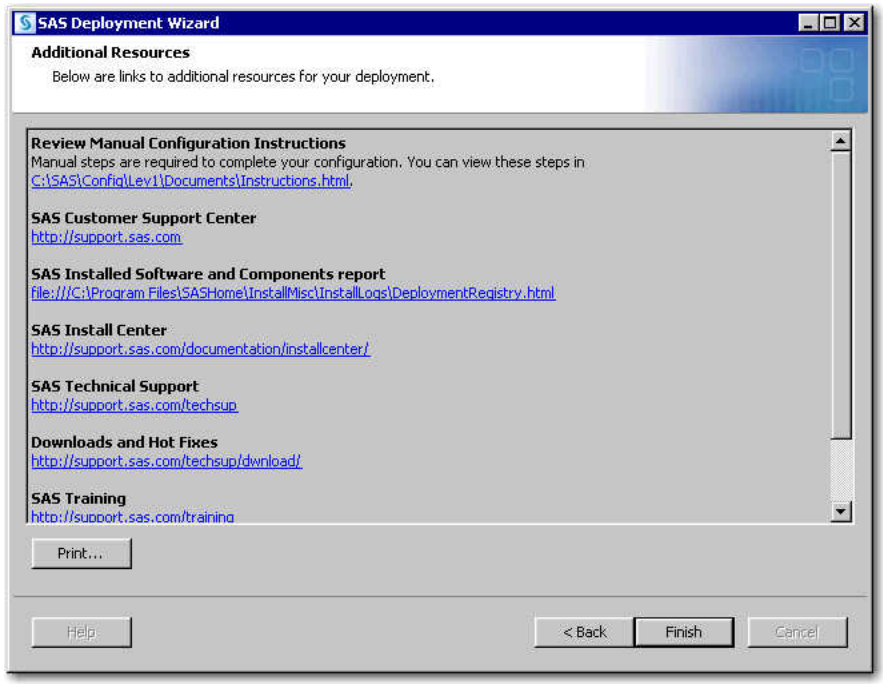
- A green check mark next to every item on this page indicates that your deployment completed successfully. Click **Next**.
- If you received errors during your deployment, then Contact SAS Technical Support. Mention the files listed in "Review SAS Deployment Tool Documents, Reports, and Logs".



36. Additional Resources

    Use the links displayed to review more information about your SAS deployment.

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



37. Configuration Guidelines and Details

    Review configuration guidelines and details for post-deployment steps. Click **Next**.

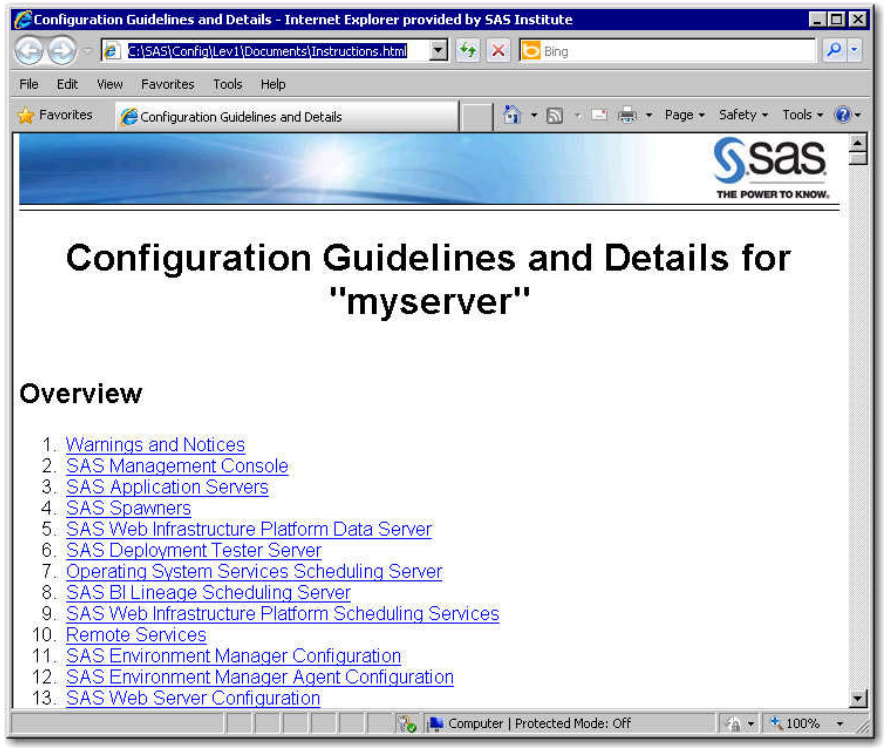
    - To complete your SAS deployment, review the configuration guidelines and details and perform the steps listed.

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:
  - UNIX and z/OS:

    /opt/SAS/Lev1/Documents/Instructions.html
  - Windows:

    C:\SAS\Config\Lev1\Documents\Instructions.html



38. For multi-machine deployments, back up your metadata repository and your SAS configuration directory before you run the SAS Deployment Wizard on the next machine called for by your deployment plan. For more information, see "About the Metadata Server Backup Facility" in *SAS Intelligence Platform: System Administration Guide*.
39. If you are deploying a middle-tier machine and opted not to automatically deploy your SAS web applications, then you must manually deploy them. For more information, review Third-Party Software Downloads, and select the product name of your web application server.
40. When you have completed any manual configuration tasks, and you have made the necessary backups, repeat the steps listed in this topic on each machine defined in your deployment plan.
41. When you are finished installing and configuring SAS on each machine called for in your deployment plan, back up your deployment.

    For more information, see "About the Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide*.

42. Be sure to restart any servers that you stopped for purposes of creating a backup, and then proceed to the next section.

Validate the SAS 9.4 Servers

There are a few simple steps required to confirm that the various SAS servers that you have deployed are running properly. The following table summarizes server validation information:

Table 6.3 *Validation Summary for the SAS Server Tier*

Server	Validation Method
SAS Metadata Server	You can successfully log in using SAS Management Console.
Object Spawner	If either the Stored Process Server or one of the Workspace Servers validates, then the Object Spawner is running.
OLAP Server	In SAS Management Console, right-click, and select **Validate** The default path is: **Server Manager ⇨ SASApp ⇨ Logical OLAP Server**.*
Pooled Workspace Server	In SAS Management Console, right-click, and select **Validate**. The default path is: **Server Manager ⇨ SASApp ⇨ Logical Pooled Workspace Server**.*
Stored Process Server	In SAS Management Console, right-click, and select **Validate**. The default path is: **Server Manager ⇨ SASApp ⇨ Logical Stored Process Server**.*
Workspace Server	In SAS Management Console, right-click, and select **Validate**. Enter external account credentials. The default path is: **Server Manager ⇨ SASApp ⇨ Logical Workspace Server**.*
SAS DATA Step Batch Server	You can successfully launch SAS when running the sasbatch script (Windows and UNIX). On z/OS, use the Schedule Manager's Deploy SAS DATA Step Program to browse the appserver_autoexec_usermods.sas file created in the server context.
Grid Server	You can successfully launch the grid test program. For more information, see "Verifying SAS Job Execution" in *Grid Computing in SAS*.

* Use the server context name that you entered during the deployment. In the table, the server context name is SASApp.

Validation is intended for an out-of-the-box, basic deployment. For more complex server configurations, refer to the appropriate SAS documentation for the server in question.

To validate the SAS server tier that has been deployed using the SAS Deployment Wizard, follow these steps:

1. Log on to the machine hosting one or more SAS servers.
2. Start SAS Management Console using the command for the appropriate operating system.
   - Windows:

     Start ⇨ SAS ⇨ SAS Management Console 9.4
   - UNIX:

     Enter the following command:

     SAS-installation-directory`/sasmc`

     For example:

     `/opt/sas/SASManagementConsole/9.4/sasmc`
   - z/OS:

     Use a Windows or UNIX machine on which SAS Management Console is installed. Connect to the z/OS machine(s) where the SAS 9.4 server tier is running.
3. Log on to the SAS Metadata Server using valid credentials such as the SAS Administrator.
4. In SAS Management Console, on the Plug-ins tab, expand the **Server Manager** node.
5. Expand the SAS Application Server node. (The default name is **SASApp**.)
6. Select the server that you want to validate, such as the **SASApp - Logical OLAP Server**.
7. Right-click, and select **Validate**.

   You should see the following message: `Validation Successful!`
8. Repeat steps 6 and 7 for the other SAS servers:
   - Pooled Workspace Server
   - Stored Process Server
   - Workspace Server
9. When validating the SAS Workspace Server, if you are prompted for credentials, enter the credentials for the SAS Spawned Servers Account (sassrv). Alternatively, you can enter a user ID and password that meet all of these requirements:
   - The account is known to the host of the SAS Workspace Server.

     (An ID that ends in @saspw does not meet this requirement.)
   - The account has the Windows right **`Log on as a batch job`** (if the server is on Windows).
   - The account has a corresponding metadata identity.
10. To validate the SAS DATA Step Batch server on Windows and UNIX, SAS should successfully launch when you run the following command, appropriate for the server host operating system:
    - Windows:

Start menu ⇨ Run ⇨ *SAS-configuration-directory*SASApp\BatchServer\sasbatch.bat

For example:

Start menu ⇨ Run ⇨ C:\SAS\AllServers\Lev1\SASApp\BatchServer\sasbatch.bat

- UNIX:

  Enter the following command:

  SAS-configuration-directory`/SASApp/BatchServer/sasbatch.sh`

  For example:

  `/opt/sas/AllServers/Lev1/SASApp/BatchServer/sasbatch.sh`

11. To validate the SAS DATA Step Batch Server on z/OS, use the Schedule Manager's Deploy SAS DATA Step Program to browse the appserver_autoexec_usermods.sas file created in the AppServer context. When the JCL pane comes up and contains JCL, the deployment of the SAS DATA Step Batch server is successful.
    a. From SAS Management Console, right-click the **Schedule Manager** plug-in (on the **Plug-ins** tab), and choose **Deploy SAS DATA Step Program**.
    b. Click **Browse**, and navigate to the appserver_autoexec_usermods.sas file under a server context such as SASApp (for example, *SAS-configuration-directory*`/SASApp`).
    c. You should see JCL in the bottom list box.
12. To verify that your Grid Servers are operational, follow the steps in "Verifying SAS Job Execution" in *Grid Computing in SAS*.
13. Repeat these steps on each machine in your deployment plan on which you have deployed one or more SAS servers.

About SAS Deployment Tester

SAS 9.4 provides a SAS Management Console plug-in that you can use to test your SAS deployment. For more information, see the SAS Management Console Help for the SAS Deployment Tester and "Using the Deployment Tester" in *SAS Intelligence Platform: System Administration Guide*.

Automating the SAS Installation on Multiple Machines

Overview of Automating the SAS Installation on Multiple Machines

The SAS Deployment Wizard provides a record and playback feature that enables you to automate a SAS installation across multiple machines. This feature is designed for large-scale enterprise deployments where SAS 9.4 clients need to be deployed across many machines. Using the record and playback feature prevents users from having to manually

provide input on every page every time the SAS Deployment Wizard is run on a machine.

To run the deployment wizard on operating systems that do not have windowing systems, see the SAS Deployment Wizard and SAS Deployment Manager 9.4: User's Guide.

The SAS Deployment Wizard can be run in one of the three playback modes. Each mode requires you to launch the wizard from the command line with a particular option. After the wizard finishes, you review the log file to verify that the installation completed successfully. Users can choose among three playback modes when playing back a SAS Deployment Wizard response file.

Note: This same record and playback feature works for the SAS Deployment Manager to automate configuration actions across multiple machines in a SAS deployment.

CAUTION:
If you choose to use the SAS Deployment Manager's record and playback feature to perform a task that involves passwords, passwords are written to the response file. For greater security, delete the response file (or remove the passwords from the response file) when you are finished. A response file exists only if you use the record and playback feature instead of completing the task manually as documented in the preceding steps.

The following summarizes the SAS Deployment Wizard record and playback process:

1. Create a response file.

   Run the SAS Deployment Wizard once in record mode to create a response file. SAS is not installed or configured; the only output is a response file.

   See "Recording a SAS Deployment Wizard Response File".

   Play back the response file to install SAS.

   Run the SAS Deployment Wizard to install and configure SAS using the values you previously recorded in the response file.

   See "Playing Back a SAS Deployment Wizard Response File".

2. Verify that the installation completed successfully.

   Check the SAS Deployment Wizard log file for the presence of any errors.

   See "Verifying the Playback Install".

Recording a SAS Deployment Wizard Response File

To use the SAS Deployment Wizard in playback mode, your first step is to create a response file. A response file is a text file that contains values for the SAS Deployment Wizard to use to install and configure SAS when running in one of the three playback modes. You create a response file by running the SAS Deployment Wizard in record mode. While in record mode, you interact with the SAS Deployment Wizard as if you are installing and configuring SAS. However, the SAS Deployment Wizard does not install or configure any software while in record mode. The only output is the response file.

The SAS Deployment Wizard stores any passwords that you choose to record in the response file using a fixed-key, 32–bit proprietary encryption algorithm.

The SAS Deployment Wizard resides at the root of the SAS Software Depot directory or in the root of the SAS media that you are installing from. The following command runs the SAS Deployment Wizard in record mode:

- Windows:

  setup.exe -record

- UNIX:

  setup.sh -record

- z/OS:

  setup.rexx -record

  Note: Starting with SAS 9.4M2, the deployment wizard automatically records your responses, regardless of whether you run the wizard with the **-record** option. The record of your wizard inputs is written to a file called ResponseRecord_*yyyy-mm-dd-hh.mm.ss*.log in the following location: **C:\Users*SAS-Installer*\AppData\Local\SAS\SASDeploymentWizard** (Windows) and ***home-directory*/.SASAppData/SASDeploymentWizard** (UNIX).

To run the SAS Deployment Wizard, you must be a user who is known to the target machine and who will be available for the long term (to perform future SAS maintenance). On Windows, the Installer user should be a member of the Administrators group. On UNIX, use the same account on all machines. For more information, see "Required External User Accounts for SAS".

Note: While in quiet mode, if the deployment wizard encounters errors or missing parameters, it halts the SAS deployment.

By default, the SAS Deployment Wizard names the response file sdwresponse.properties and writes the file to the current user's home directory. For example, the default path and file name on Windows is as follows:

C:\Documents and Settings*current-user***\sdwresponse.properties**

To specify a response file that does not use the default file name, use the **-responsefile** option. For example, on Windows, you might enter a command similar to this:

```
setup.exe -record -responsefile "C:\Program Files\SAS
\response.properties"
```

If you want, you can force the wizard to deploy SAS during recording mode by using the **-deploy** option. For example, on Windows, you might enter a command similar to this:

```
setup.exe -record -deploy -responsefile "C:\Program Files\SAS
\response.properties"
```

For information about verifying your deployment, see "Verifying the Playback Install".

TIP You can use an existing response file as a source for creating a new response file. To do this, use the following command: **setup.exe -inputresponsefile *response-file***.

Playing Back a SAS Deployment Wizard Response File

Overview of Playing Back a SAS Deployment Wizard Response File

There are three playback modes that give users varying levels of automation with the SAS Deployment Wizard.

Table 6.4 Playback Modes for the SAS Deployment Wizard

Mode	Level of Automation	Description
Quiet	High	No visual feedback from the SAS Deployment Wizard. See "Installing SAS in Quiet Mode".
Partial prompt	Medium	Users see only SAS Deployment Wizard pages for values not contained in the response file. See "Installing SAS in Partial Prompt Mode".
Full prompt	Low	Users see all SAS Deployment Wizard pages with response file values supplied. Users can confirm these values or change them. See "Installing SAS in Full Prompt Mode".

Best Practices for Response File Playback

When playing back a SAS Deployment Wizard response file, keep these best practices in mind.

- Use response files on other machines with caution.

  Remember that recording a deployment captures responses that represent the machine on which you have recorded the deployment. Machines are not identical. Therefore, SAS recommends that response files be used on other machines with caution.

- Do not use response files from other SAS orders.

  New deployment options can be introduced with updates to the SAS order. A response file from an earlier SAS order does not have data for these new deployment options. For this reason, SAS recommends that response files should be used only for software in the same order. Using a response file from one order while deploying another order might result in unintended discrepancies that might be difficult to troubleshoot.

- Use the same configuration prompting level.

  When using playback, the deployment wizard should use the same level of configuration prompting as was used in record mode. Manual revision of the response file should be attempted only with extreme caution by users with experience with SAS configuration or with the aid of a SAS consultant or SAS Technical Support.

Installing SAS in Quiet Mode

The SAS Deployment Wizard gives you flexibility in how you automate the SAS installation. The highest level of automated installation is running the SAS Deployment Wizard in quiet mode. In quiet mode, there is no user interface in which you provide installation inputs. The SAS Deployment Wizard uses inputs that you have already provided in the form of a response file to determine how to install and to configure SAS.

The following command runs the SAS Deployment Wizard in quiet playback mode:

- Windows:

  setup.exe -quiet -wait

- UNIX:

  setup.sh -quiet

- z/OS:

  setup.rexx -quiet -wait

Note: For information about **-wait**, see "Monitoring the SAS Deployment Wizard during Playback".

To run the SAS Deployment Wizard, you must be a user who is known to the target machine and who will be available for the long term (to perform future maintenance). On Windows, the Installer user should be a member of the Administrators group. On UNIX, use the same account on all machines. For more information, see "Required External User Accounts for SAS".

When running in quiet mode, the SAS Deployment Wizard's action is to look for its response file by default in the current user's home directory. For example, the default path and file name on Windows is as follows:

C:\Documents and Settings*current-user***\sdwresponse.properties**

To specify a response file that does not use the default name, use the **-responsefile** *absolute-pathname* option. For example, on Windows, you might enter a command similar to this:

setup.exe -quiet -responsefile "C:\Program Files\SAS \response.properties" -restartdomain *domain-name***-restartuserid** *user-name***-restartpassword** *password*

For Windows machines, in the event that the machine must be rebooted, use the restart options to avoid having to manually log back on to the machine. For example, you might enter a command similar to this:

setup.exe -quiet -responsefile "C:\Program Files\SAS \response.properties"

See the following topics for more information:

- "Verifying the Playback Install"
- "Monitoring the SAS Deployment Wizard during Playback"

Installing SAS in Partial Prompt Mode

The SAS Deployment Wizard gives you flexibility with how you automate the SAS installation. You can fully automate the SAS installation (quiet mode), or you can choose certain parts of the installation to automate (partial prompt mode).

When you run the SAS Deployment Wizard in partial prompt mode, the user sees only those wizard pages for which there are no response file values. There might be situations where it is permissible to automate most of the installation inputs, but it is necessary to

prompt for certain sensitive information. For example, storing user account credentials—even in an encrypted form—might violate a site's corporate security policy. It would require the user to interact with the SAS Deployment Wizard for those pages where user account credentials are entered.

The SAS Deployment Wizard resides at the root of the SAS Software Depot directory or in the root of the SAS media that you are installing from. The following command runs the SAS Deployment Wizard in partial prompt playback mode:

- Windows:

  `setup.exe -partialprompt`

- UNIX:

  `setup.sh -partialprompt`

- z/OS:

  `setup.rexx -partialprompt`

To run the SAS Deployment Wizard, you must be a user who is known to the target machine and who will be available for the long term (to perform future maintenance). On Windows, the Installer user should be a member of the Administrators group. On UNIX, use the same account on all machines. For more information, see "Required External User Accounts for SAS".

When running in partial prompt mode, the SAS Deployment Wizard's action is to look for its response file by default in the current user's home directory. For example, the default path and file name on Windows is as follows:

`C:\Documents and Settings\`*current-user*`\sdwresponse.properties`**

To specify a response file that does not use the default name, use the **`-responsefile`** option. For example, on Windows, you might enter a command similar to this:

```
setup.exe -partialprompt -responsefile "C:\Program Files\SAS
\response.properties"
```

For more information, see "Verifying the Playback Install".

Installing SAS in Full Prompt Mode

There are three levels of automation from which you can choose when running the SAS Deployment Wizard in playback mode: quiet, partial prompt, and full prompt. Full prompt mode is the least automated of the three modes. When running in full prompt mode, the SAS Deployment Wizard requires user confirmation for all of its pages. However, in full prompt mode, the user is prompted with default values that are stored in the response file.

The SAS Deployment Wizard resides at the root of the SAS Software Depot directory or in the root of the SAS media that you are installing from. The following command runs the SAS Deployment Wizard in full prompt playback mode:

- Windows:

  `setup.exe -responsefile` *absolute-pathname*

- UNIX:

  `setup.sh -responsefile` *absolute-pathname*

- z/OS:

  `setup.rexx -responsefile` *absolute-pathname*

To run the SAS Deployment Wizard, you must be a user who is known to the target machine and who will be available for the long term (to perform future maintenance). On Windows, the Installer user should be a member of the Administrators group. On UNIX, use the same account on all machines. For more information, see "Required External User Accounts for SAS".

When running in full prompt mode, the SAS Deployment Wizard expects you to specify a path and file name to a valid response file. For example, on Windows, enter the following command:

```
setup.exe -responsefile "C:\Program Files\SAS
\response.properties"
```

For more information, see "Verifying the Playback Install".

Verifying the Playback Install

When running in quiet mode, the SAS Deployment Wizard logs the following message after a successful completion:

```
Deployment completed successfully
```

If the SAS Deployment Wizard encounters incorrect or missing input in the response file, it records a message in its log file and returns an error code of -1. The SAS Deployment Wizard log file resides in the following location:

- Windows:

  C:\Documents and Settings*current-user***\Local Settings\Application Data\SAS\SAS Deployment Wizard\SDW.log**

- UNIX and z/OS:

  $HOME/.SASAppData/SASDeploymentWizard/SDW_*year-month-day-hour.minutes.seconds***.log**

Use the **-loglevel** *n* option to control the amount of information written by the SAS Deployment Wizard to its log. A change in the logging level is in effect for the current SAS Deployment Wizard invocation only. If you do not specify a log level, then the wizard uses the default (zero). *n* can be one of the following three values:

0
: (default) specifies the least amount of information written to the log. Zero is acceptable for most SAS Deployment Wizard sessions.

1
: specifies a medium amount of information written to the log. This value is generally used when working with SAS Technical Support to troubleshoot deployment issues.

2
: specifies the greatest amount of information written to the log and should not be specified except when instructed to by SAS Technical Support.

For example, on Windows, to increase the SAS Deployment Wizard logging level, you might enter a command similar to this:

```
setup.exe -partialprompt -responsefile "C:\Program Files\SAS
\response.properties" -loglevel 1
```

Monitoring the SAS Deployment Wizard during Playback

Running the SAS Deployment Wizard in quiet mode provides the sought-after effect of suppressing the wizard's user interface. One drawback with quiet mode is not being able to see the interface, which enables you to monitor the install and to see whether any errors occur. To address this concern, you can use the Task Manager on Windows or periodically issue the **ps** command on UNIX and z/OS to track whether the SAS Deployment Wizard is running.

On Windows, specify the **-wait** option when invoking the SAS Deployment Wizard in quiet mode to cause setup.exe to display and remain in the Windows Task Manager process list.

For example:

```
setup.exe -quiet -wait -responsefile "C:\Program Files\SAS
\response.properties"
```

If you did not use **-wait**, monitor the process named **java.exe**.

Note: Use of network management software (such as SMS or Tivoli) might require you to use the **-wait** option when running the SAS Deployment Wizard in quiet mode in order for the software to determine when the SAS Deployment Wizard finishes executing. Refer to your network management platform documentation for more information.

On UNIX and z/OS, as with most processes, you issue the **ps** command to monitor the SAS Deployment Wizard running in quiet mode. For more information, see "More about Monitoring the SAS Deployment Wizard on UNIX and z/OS".

More about Monitoring the SAS Deployment Wizard on UNIX and z/OS

Remember that output from a **ps** command can be misleading because the process name returned is not always named **setup.sh**. The name might differ because the actual script that the SAS Deployment Wizard is running at any given time varies. However, the process ID remains the same.

For example, if you were to run the SAS Deployment Wizard and immediately issue a **ps** command (before the language dialog box is displayed), you would see output similar to this:

```
31762 pts/2 S 0:00 /bin/sh /depot/setup.sh
```

Note that the shell, **/bin/sh**, runs the initial script, **/depot/setup.sh**. The shell is the parent process, and, in this example, has a process ID of 31762. When **setup.sh** is finished executing, it passes control to the script, **deploywiz.sh**. If you were to look at the process list while the SAS Deployment Wizard is running, you would see something similar to the following:

```
31762 pts/2 S 0:00 /bin/sh/tmp/_setup31762/products/
deploywiz__9220__prt__xx__sp0__1/deploywiz.sh -
startuplocation /depot -templocation /tmp/_setup31762
```

The shell **/bin/sh** is still running and retains the same process ID. However, this shell is running a different script now, **deploywiz.sh**.

Chapter 7

What to Do Next: Administration Tasks

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Overview of Administration Tasks

Before you perform the administration tasks in this chapter, you should have successfully completed the following tasks:

- Use the SAS Deployment Wizard to install and configure your software on each machine in your environment.
- Complete the post-installation tasks that are described in your Instructions.html file, which is located in the **Documents** subdirectory of your configuration directory. These tasks include performing manual configuration steps (if applicable), validating your SAS servers, validating your web applications, and backing up your system.

After the SAS Intelligence Platform has been installed, configured, and validated, you will have a functional system. You can begin performing administration tasks that are necessary to fully implement SAS Intelligence Platform in your environment. These include the following tasks:

- "First-Priority Setup Tasks" are necessary to protect the integrity of your system. You should perform these tasks first, as soon as possible after you have completed your installation.
- "Standard Setup Tasks" enable the users in your organization to begin using SAS Intelligence Platform client applications to access and analyze your data.
- "Optional Setup Tasks" address specific requirements in your environment.
- "Ongoing System Administration Tasks" keep the SAS Intelligence Platform operational.

First-Priority Setup Tasks

Summary of First-Priority Setup Tasks

The following tasks are necessary to protect the integrity of your system. Complete these steps as soon as possible after installation, before you complete any of the other tasks that are outlined in this chapter.

Table 7.1 *First-Priority Setup Tasks*

Task	Description
Check for and apply SAS hot fixes.	A best practice is to check for and apply SAS hot fixes immediately after deployment and before putting your SAS system into production. Doing so ensures that you have the latest important SAS hot fixes relevant to your site. For more information, see SAS 9.4 Guide to Software Updates and Product Changes.
Check for and apply SAS security updates.	A best practice is to check for and apply SAS security updates immediately after deployment and before putting your SAS system into production. Doing so ensures that you have a secure site. See Security Bulletins for more information.

Task	Description
Secure the SAS configuration on each server machine.	For a secure deployment, the configuration directory on each server machine must be protected by operating system controls. These controls prevent inappropriate access to repository data sets, server scripts, server logs, and configuration files. On Windows systems, all configuration directories, files, and scripts are owned by the user who performs the installation. You must update the permissions as shown in "Recommended Operating System Protections for Windows Machines". These recommendations assume that your SAS servers and spawners run as services under the Local System account. On UNIX and z/OS systems, the SAS Deployment Wizard automatically applies the appropriate permissions. The default permissions are shown in "Default Operating System Protections for UNIX and z/OS Machines".
Establish a formal, regularly scheduled backup process.	Establish a formal, regularly scheduled backup process that includes your metadata repositories as well as the associated physical files. SAS includes a server-based facility that performs SAS Metadata Server backups automatically on a scheduled basis. By default, these backups are scheduled to run at 1:00 a.m. every day except Sunday. As a best practice, you should modify your backup configuration to specify a storage device other than the device that is used to store the metadata repositories and the server configuration files. Be sure to include this backup location in your regular system backups. See Chapter 12, "Backing Up and Recovering the SAS Metadata Server". It is important to back up the physical data that is associated with the metadata so that related information is synchronized if a restore becomes necessary. The Deployment Backup and Recovery tool, new with SAS 9.4, provides an integrated method for backing up and recovering SAS content across multiple tiers and machines. The backup includes the SAS Metadata Server and resources such as the SAS Content Server and server configuration files. If this tool has been configured, scheduled backups are run each Sunday at 1:00 a.m. by default. See Chapter 28, "Using the Deployment Backup and Recovery Tool". For guidance in setting up a backup process, see: • Chapter 11, "About Backing Up and Restoring Your SAS Content" • "Setting Up Your Backups" in *SAS Intelligence Platform: System Administration Guide*

Recommended Operating System Protections for Windows Machines

On Windows server machines, you should apply the following operating system protections to your configuration directory. All of these directories are located in ***SAS-configuration-directory*\Lev1**.

Table 7.2 *Recommended Operating System Protections on Windows*

Directories	Users	Recommended Permissions
SAS-configuration-directory	System and Administrators	Full Control
	All other users	List folder contents, Read

Directories	Users	Recommended Permissions
***SAS-configuration-directory*\Lev1**	System and Administrators	Full Control
	SAS Spawned Servers (sassrv)	On Windows Vista, Windows 7, and Windows Server 2008: Special permissions to Read and Execute* On Windows XP: Read and Execute*
	Deployment Backup and Recovery Tool user account, also referred to as the backup user (for example, sasbackup)***	Read and Write
	All other users	List folder contents, Read
SASMeta\MetadataServer	System and Administrators	Full Control
	SAS Metadata Server: Service Login Account (for example, sassvlgn)**	Full Control
		Remove all other users and groups
SASMeta\MetadataServer\Backups (or other SAS Metadata Server backup location)	Deployment Backup and Recovery Tool user account, also referred to as the backup user (for example, sasbackup)***	Read
Lev1\SASApp	System and Administrators	Full Control
	SAS Spawned Servers (sassrv)	Windows Vista, Windows 7, and Windows Server 2008 only: Special permissions to Read and Execute*
	All other users	List folder contents, Read
Lev1 subdirectories: **Documents**, **ReportBatch**, **SASMeta**, **Utilities**, **Web**	System and Administrators	Full Control
	All other users	List folder contents, Read

Directories	Users	Recommended Permissions
Lev1 subdirectories: • **ConnectSpawner** • **Logs** • **ObjectSpawner** • **SASApp\OLAPServer** • **ShareServer**	System and Administrators	Full Control Remove all other users and groups
SASApp subdirectories : **PooledWorkspaceServer**, **StoredProcessServer**	System and Administrators	Full Control
	SAS Spawned Servers (sassrv)	On Windows Vista, Windows 7, and Windows Server 2008 only: Read and Execute, List folder contents, and Read*
	All other users	No access
SASApp subdirectories: **PooledWorkspaceServer\Logs**, **StoredProcessServer\Logs**	System, Administrators, and SAS Spawned Servers (sassrv)	Full Control*
SASApp subdirectories: • **ConnectServer\Logs** • **Data\wrsdist** • **Data\wrstemp** • **PooledWorkspaceServer\sasuser** • **StoredProcessServer\sasuser** • **WorkspaceServer\Logs**	System, Administrators, and SAS Spawned Servers (sassrv)	Full Control
sasv9_meta.cfg file	System and Administrators	Read and Write Remove all other users and groups

* The SAS Deployment Wizard automatically sets these permissions for sassrv.

** On Windows, this account is required for SAS Metadata Server clustering on Windows.

*** On Windows, this account is required when using a central vault for the Deployment Backup and Recovery Tool or when using SAS Metadata Server clustering.

Note:

- These recommendations assume that your SAS servers and spawners run as services under the Local System account. If servers and spawners are run under a different account, then grant that account the permissions that are recommended for System.

  For example, if the SAS Metadata Server is run under the SAS Metadata Server: Service Login Account, then grant that account Full Control of **SASMeta\MetadataServer**, as shown in the preceding table.

- If you have configured SAS Metadata Server clustering or middle-tier clustering, be sure to set the appropriate protections on all of the configured nodes.
- You might have selected the custom installation option to place all of your log files in a single directory. If you selected this option, then you need to grant the SAS Spawned Servers (sassrv) user Full Control of the central log destination (for example, ***SAS-configuration-directory*\Lev1\Logs**).
- If users are using SAS Enterprise Guide to create stored processes, then the SAS Spawned Servers (sassrv) account must have Write access to the directory in which stored processes are stored.
- If you enable logging for a SAS Workspace Server, then you need to grant all users of the SAS Workspace Server Full Control of the log directory. (See "Create a Log File for Workspace Server Troubleshooting" in *SAS Intelligence Platform: System Administration Guide*.)

For information about the configuration directory structure, see "Overview of the Configuration Directory Structure" in *SAS Intelligence Platform: System Administration Guide*.

Default Operating System Protections for UNIX and z/OS Machines

The following table shows the default operating system protections that are provided automatically for configuration directories on UNIX and z/OS machines. All of these directories are located in ***SAS-configuration-directory*/Lev1**.

Table 7.3 *Default Operating System Protections on UNIX and z/OS*

Directories	Users	Default Permissions
SAS-configuration-directory	SAS Installer	Read, Write, and Execute
***SAS-configuration-directory*/Lev1** **Lev1** subdirectories: **Documents**, **ReportBatch**, **SASApp**, **SASMeta**, **Utilities**, **Web**	All other users	Read and Execute
Lev1 subdirectories: • **ConnectSpawner** • **Logs** • **ObjectSpawner** • **SASApp/OLAPServer** • **SASMeta/MetadataServer** • **ShareServer**	SAS Installer	Read, Write, and Execute
	All other users	No access
SASApp subdirectories: **PooledWorkspaceServer**, **StoredProcessServer**	SAS Installer	Read, Write, and Execute
	sas group	Read and Execute

Directories	Users	Default Permissions
SASApp subdirectories: • **ConnectServer/Logs** • **Data/wrsdist** • **Data/wrstemp** • **PooledWorkspaceServer/Logs** • **PooledWorkspaceServer/sasuser** • **StoredProcessServer/Logs** • **StoredProcessServer/sasuser** • **WorkspaceServer/Logs**	SAS Installer	Read, Write, and Execute
	sas group	Read, Write, and Execute
sasv9_meta.cfg file	SAS Installer	Read and Write
	All other users	no access

Note:

- Make sure that the SAS Spawned Servers account (sassrv) is a member of the sas group, which has the necessary permissions to server configuration files and log directories.
- You might have selected the custom installation option to place all of your log files in a single directory. If you selected this option, then you need to grant either the sas group or the SAS Spawned Servers (sassrv) user Read, Write, and Execute permission on the central log destination (for example, ***SAS-configuration-directory*/Lev1/Logs**).
- If users are using SAS Enterprise Guide to create stored processes, then the SAS Spawned Servers (sassrv) account must have Write access to the directory in which stored processes are stored.
- If you enable logging for a SAS Workspace Server, then you need to grant all users of the SAS Workspace Server Read, Write, and Execute permission on the log directory. (See "Create a Log File for Workspace Server Troubleshooting" in *SAS Intelligence Platform: System Administration Guide*).
- For information about the configuration directory structure, see "Overview of the Configuration Directory Structure" in *SAS Intelligence Platform: System Administration Guide*.

Standard Setup Tasks

The following administration tasks are essential to enable the users in your organization to begin using SAS Intelligence Platform client applications to access and analyze your data.

Table 7.4 Standard Setup Tasks

Task	Description
Add users and manage access.	Standard security setup activities include the following: • creating SAS administrators and regular SAS users • managing access to metadata, data, and application functionality For more information, see "Selected Tasks" in *SAS Intelligence Platform: Security Administration Guide*.
Establish connectivity to your data sources.	To enable the client applications in the SAS Intelligence Platform to access your data sources (including SAS data sets, third-party relational databases, and data from Enterprise Resource Planning systems), you must create metadata objects that represent your data. For example, to enable users to access data in a library of SAS data sets, you must define metadata objects that represent the SAS library and each of the tables in the library. For more information, see Chapter 4, "Connecting to Common Data Sources".
Set up your metadata folder structure.	SAS Intelligence Platform clients use a hierarchy of SAS folders to store metadata for content such as libraries, tables, OLAP schemas, jobs, information maps, and reports. The initial structure provides private folders for individual users and a separate area for shared data. Within these folders, you should create a customized folder structure that meets your specific needs. For more information, see Chapter 18, "Working with SAS Folders". *Note:* Be sure to secure access to the folders as described in the *SAS Intelligence Platform: Security Administration Guide*.

Optional Setup Tasks

It might be necessary for you to modify your initial configuration to meet specific requirements in your environment. Optional administration and configuration tasks include the following:

Table 7.5 Optional Setup Tasks

Task	Description
Install sas.servers as a boot script.	On UNIX machines, you can choose to install the sas.servers script as a boot script so that the SAS servers start automatically when you start the machine. The comments in the sas.servers script contain installation instructions that are specific to your operating environment. For more information, see "Using the sas.servers Script on UNIX or z/OS to Start or Stop All Servers" in *SAS Intelligence Platform: System Administration Guide*.
Optimize the performance of the SAS Metadata Server.	To optimize the performance of the SAS Metadata Server, you might want to adjust the maximum number of threads used by the server. See "Configuring the Number of Threads Used by the Metadata Server" in *SAS Intelligence Platform: System Administration Guide*. For other performance-related tasks, see Chapter 15, "Managing Metadata Server Memory".

Task	Description
Modify the configuration of your processing servers.	Here are some server configuration changes that you might want to make for performance optimization or other reasons: • Define a cluster of load-balanced SAS Workspace Servers in order to balance a load across SAS Workspace Servers that you have installed on multiple hosts. This type of configuration is most useful when you have a large number of users (such as data integration specialists) using a SAS Workspace Server for relatively long-running jobs. For more information, see "Understanding Server Load Balancing" in *SAS Intelligence Platform: Application Server Administration Guide*. • Modify load balancing or algorithms for SAS Stored Process Servers and SAS Pooled Workspace Servers. For more information, see "Understanding the Load Balancing Algorithms" in *SAS Intelligence Platform: Application Server Administration Guide*. • If your SAS server metadata contains characters other than those typically found in the English language, then you must start your SAS server with an ENCODING= or LOCALE= system option that accommodates those characters. For more information, see "Encoding and Locale Information" in the *SAS Intelligence Platform: Application Server Administration Guide*. • If you are submitting large jobs (for example, JAVA GRAPH jobs) on z/OS servers, then you might need to specify a larger region size. For more information, see "Managing Memory" in the *SAS Companion for z/OS*. • If you want your BI output to always use the time zone of the server's operating system, then you can specify the TIMEZONE system option in a restricted configuration file on the server tier. This option prevents users from specifying different time zones. For more information, see "TIMEZONE= System Option" and "Restricted Options" in the *SAS System Options: Reference*.
Optimize web application performance.	For information about configuring middle-tier components for better efficiency and performance, see the *SAS Intelligence Platform: Middle-Tier Administration Guide*.
Adjust server logging.	You can change your server configurations to obtain additional logging information for troubleshooting, performance management, or other purposes. For more information, see Chapter 10, "Administering Logging for SAS Servers" and *SAS Logging: Configuration and Programming Reference*.
Enable job and report scheduling.	To enable SAS scheduling features, you can install and configure scheduling software, configure operating system scheduling, or configure in-process scheduling. For more information, see *Scheduling in SAS*.
Increase Java heap memory allocation for desktop applications.	To process large amounts of data, you might need to modify the Java heap memory allocation that is configured for SAS Management Console, SAS Data Integration Studio, SAS OLAP Cube Studio, SAS Information Map Studio, and SAS IT Resource Management. See "Managing the Java Heap Used by Desktop Applications" in *SAS Intelligence Platform: Desktop Application Administration Guide*.
Set up change management for SAS Data Integration Studio users.	If you want to implement change management for SAS Data Integration Studio, then you must set up project repositories and at least one change-managed folder. For more information, see "Administering SAS Data Integration Studio" in *SAS Intelligence Platform: Desktop Application Administration Guide*.
Collect ARM log information for SAS Data Integration Studio batch jobs.	If you want to collect ARM log information for SAS Data Integration Studio jobs that are run on a batch basis, then you must enable logging for the batch server that executes the jobs. For more information, see "Collecting ARM Log Information for SAS Data Integration Studio Jobs" in *SAS Intelligence Platform: System Administration Guide*.

Ongoing System Administration Tasks

The following table lists important system administration tasks that you need to perform on an ongoing basis to keep the SAS Intelligence Platform operational.

Table 7.6 *Ongoing System Administration Tasks*

Task	Documentation Reference
Start, stop, pause, resume, and refresh the servers that are used in the system.	Chapter 6, "Operating Your Servers"
Check the status of a server of or of a metadata repository.	Chapter 7, "Checking the Status of Servers"
Monitor the activity of servers.	Chapter 9, "Monitoring the Activity of SAS Servers"
Perform regular full backups of the SAS Metadata Server.	Chapter 11, "About Backing Up and Restoring Your SAS Content"
Use server logs and configure logging options.	Chapter 10, "Administering Logging for SAS Servers" and *SAS Logging: Configuration and Programming Reference*
Create a new metadata repository.	Chapter 17, "Managing SAS Metadata Repositories"
Promote individual metadata objects or groups of objects.	Chapter 20, "Promotion Tools Overview"

Note: The preceding table includes only the tasks that are documented in this guide. Other important administration tasks are described in the following documents:

- *SAS Intelligence Platform: Security Administration Guide*

  You can use "Checklist for a More Secure Deployment" in *SAS Intelligence Platform: Security Administration Guide* to ensure that your environment remains secure on an ongoing basis.
- *SAS Intelligence Platform: Data Administration Guide*
- *SAS Intelligence Platform: Application Server Administration Guide*
- *SAS Intelligence Platform: Desktop Application Administration Guide*
- *SAS Intelligence Platform: Middle-Tier Administration Guide*
- *SAS Intelligence Platform: Web Application Administration Guide*
- *Scheduling in SAS*
- *SAS/SHARE User's Guide*
- *SAS/CONNECT User's Guide*

You can access these documents.

Best Practices for Ensuring the Integrity of Your System

Keep Necessary Documentation Available

SAS administrators should keep the following documentation available for each environment:

- the operational document specific to your environment to assist in transferring information to new administrators or for vacation coverage
- an updated store of user IDs and passwords
- a complete log of changes and events that take place in the SAS environment. This log is helpful if issues are encountered. The following changes should be included in the log:
  - host name changes
  - updates
  - patches

Start and Stop SAS Servers in the Correct Order

It is critical that the SAS servers be started and stopped in the recommended order as documented in "Overview of Server Operation" in *SAS Intelligence Platform: System Administration Guide*. The SAS_lsm tool described in Usage Note 58231: Utility that manages multi-tiered SAS services for Unix/Linux deployments is one of the options to ensure that this recommendation is followed consistently.

Back Up Your Environment

Maintain a regular schedule of deployment backups, as described in Chapter 28, "Using the Deployment Backup and Recovery Tool".

Use operating system commands to back up your file system contents on a regular basis when server processes are stopped. Verify that your backup process is successful. Verify that you can restore from your backup.

Maintain a daily schedule of SAS Metadata Server backups, as described in Chapter 12, "Backing Up and Recovering the SAS Metadata Server".

By default, the SAS Metadata Server retains backups for 7 days. If you have enough available storage in the backup location, it is recommended that you increase that setting to retain at least 30 days of metadata backups. This ensures that a valid backup is available if a metadata corruption issue is encountered. If there is insufficient storage available in the backup location to support this, it is possible to store metadata backups at an alternative location. You should perform a file system backup of the metadata backup location nightly to allow for the recovery of older backups that were removed by the metadata server in accordance with your file system backup retention policy.

Test Alert Email Configuration

SAS Metadata Server automatically sends an email to the designated email address when specific errors occur. This enables the SAS administrator to take timely action to correct the issue.

To test the alert email:

1. Log on to SAS Management Console.
2. Expand **Metadata Manager**, and right-click the active server.
3. Select **Properties**, and click **Send Test Message**.
4. The settings for the alert email are in the omaconfig.xml and sasv9.cfg files that are located in the ***sas-config-dir*/SASMeta/MetadataServer** directory.

For more information, see Backup Alert Notifications in *SAS Environment Manager 2.5 Administration: User's Guide*.

Regularly Assess Your Environment for Available Hot Fixes

SAS makes hot fixes available for the customer to download and install. For more information, see the following resources:

- SAS Hot Fix Analysis, Download and Deployment Tool
- SAS Hot Fix Announcements Communities Page
- How to learn about hot fixes to SAS software

Update SAS Licenses and SSL Certificates

SAS licenses and SSL certificates must be updated before the expiration date.

Monitor Your Environment for System Resource Limitations

Based on the system resource limitations defined in the system requirements documentation, monitor your environment for available disk space, CPU, I/O, file descriptors, ulimits, and memory. Use system tools and the Environment Manager provided by SAS to monitor your server health and issue alerts as described in "Using SAS Environment Manager to Monitor SAS Servers" in *SAS Intelligence Platform: System Administration Guide*.

For Linux, see System Requirements for SAS 9.4 Foundation for Linux for x64.

For Windows, see System Requirements for SAS 9.4 Foundation for Microsoft Windows.

Perform Regular Metadata Maintenance

Perform regular maintenance of metadata as described in "Running the Metadata Analyze and Repair Tools" in *SAS Intelligence Platform: System Administration Guide*.

Long-Running SAS Sessions

To monitor long-running SAS sessions:

1. Check for long-running SAS sessions that might be abandoned and are no longer connected to a user session or a batch process.
2. Check SAS Enterprise Guide sessions that are left running overnight by users. These can lock the SAS tables.

These sessions might interfere with the nightly backup processes. Both of these tasks can be successfully scripted. Your SAS consultants can help you find and adapt such scripts in your environment.

Clean Up Abandoned SASWork Directories

The SAS Cleanwork Utility for UNIX or Windows can be used for this task.

- For the UNIX environment, see "SAS Usage Utilities: cleanwork" in *SAS Companion for UNIX Environments*.
- For the Windows environment, see "Cleanwork Utility" in *SAS Companion for Windows*.

Run Scripts to Archive Log Files

Compress and archive log files periodically to save disk space. If you have servers that need to be restarted in order to rotate their logs, schedule a daily task to restart each of them. Log files are essential for troubleshooting issues, so retain the archived log files for a period of time to ensure that they are not needed by SAS Technical Support.

SAS Visual Analytics Monitoring

If you have installed SAS Visual Analytics on your machine, monitor the Autoload feature to ensure that it is periodically refreshing the tables when SAS Visual Analytics is running.

Monitor the audit reports to review information about the usage of your SAS Visual Analytics environment.

SAS Grid Monitoring

If you have a grid environment, monitor the distribution of the interactive and batch workload to ensure that the health of your grid is good. For further guidance, see SAS Grid Manager.

Maintenance of the SAS Shared Services Database

For more information about the SAS Shared Services database, see the following resources:

- Tuning the PostgreSQL Data Server in *SAS 9.4 Web Applications: Tuning for Performance and Scalability*
- Monitoring Database Usage with SAS Environment Manager

Maintenance of the PostgreSQL Database

To perform regular maintenance on the PostgreSQL database, see "Tuning the PostgreSQL Data Server" in *SAS Web Applications: Tuning for Performance and Scalability*.

Allow Only the SAS Metadata Server to Access Your Metadata Repositories

The **MetadataRepositories** and **rposmgr** subdirectories, which are located in the SAS configuration directory, are critical to the operation of your system. These data sets contain metadata that defines your servers, users, access levels, enterprise data sources, and data structures. They also contain metadata for resources that are created and used by SAS applications, including information maps, OLAP cubes, report definitions, stored process definitions, and jobs.

To safeguard the integrity of your system:

- Never move, delete, modify, or directly read the data sets in the **MetadataRepositories** and **rposmgr** directories. These data sets should be accessed only by SAS Metadata Server processes.
- Do not place other files in these directories.

Use Best Practices for Working with SAS Folders

The folders that appear on the **Folders** tab of SAS Management Console are used by client applications to store BI content and system information. Inappropriate renaming, deleting, or moving of these folders or their contents could cause client applications to malfunction.

When interacting with folders in SAS Management Console, be sure to follow the best practices that are provided in Chapter 18, "Working with SAS Folders". If you need to move or copy the contents of these folders, use the procedures that are provided in Chapter 20, "Promotion Tools Overview".

Use Usermods Files When Customizing Autoexec Files, Server Configuration Files, and Start-up Scripts

If you need to customize a configuration file, autoexec file, or start-up script for a SAS server, do not directly modify the file or script. Instead, add your customizations to the corresponding file that is named *server-name*_usermods.cfg, autoexec_usermods.sas, *server-name*_usermods.bat, or *server-name*_usermods.sh.

Use of these files prevents your customizations from being overwritten when a new SAS release is installed.

Be Aware of the SAS Virtualization Environment Policy

Do not make changes that affect the responsiveness of virtual machines that are running SAS servers. For more information, see SAS Product Support for Virtualization Environments.

Appendix 1

Deploying SAS Web Parts for Microsoft SharePoint

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Overview of Deploying SAS Web Parts for Microsoft SharePoint

What Is SAS Web Parts for Microsoft SharePoint?

Web parts are an integrated set of controls that enable you to provide customized, dynamic content on your website. By using Microsoft Windows SharePoint Server, you can add SAS content directly to your website. SAS Web Parts for Microsoft SharePoint is supported on Microsoft 64-bit machines.

SAS Web Parts for Microsoft SharePoint includes the following components:

- SAS Web Parts Service

  This service runs in a separate Microsoft Internet Information Server (IIS) application from SharePoint, and can be installed on the same machine where SharePoint resides or on a separate machine. SAS Web Parts Service for Microsoft SharePoint provides communication between SAS Web Parts and your SAS servers. This web service can be hosted on your SharePoint server or another Microsoft Windows machine that is running Microsoft Internet Information Server.

  The SAS Web Parts Service must be able to connect to your SAS servers via SAS Integration Technologies. Therefore, a firewall cannot exist between the SAS Web Parts Service and the SAS servers. Because the SAS Web Parts connect to the service via SOAP over HTTPS, a firewall can exist between the SAS Web Parts Service and SharePoint. In the most common and simple deployments, this service runs on the SharePoint server.

- SAS Web Parts

  This component is deployed on the SharePoint server, and consists of the following parts:

- SAS Content Viewer Web Part is used for dashboards, for key performance indicators (KPIs) to enable users to monitor organizational performance, and for SAS stored processes.
- SAS Central Web Part lists your SAS Visual Analytics report favorites and history.

For more information about SAS Web Parts for Microsoft SharePoint, refer to the SAS Web Parts for Microsoft SharePoint:Administrator's Guide.

Preparing to Deploy

Before you start installing and configuring SAS Web Parts for Microsoft SharePoint, make sure that you have done the following:

- Decide how you will deploy SAS Web Parts for Microsoft SharePoint:
  - automatic deployment

    The SAS Deployment Wizard installs and configures SAS Web Parts for Microsoft SharePoint for you.
  - manual deployment

    You manually install and configure SAS Web Parts for Microsoft SharePoint using a command line deployment script.

    For more information about manually installing SAS Web Parts for Microsoft SharePoint, refer to the SAS Web Parts for Microsoft SharePoint:Administrator's Guide.
- Determine which machine each component is deployed on.

  For more information, review the topology diagram that accompanies your deployment plan, and see "What Is SAS Web Parts for Microsoft SharePoint?"
- Choose the type of user access that you plan to implement.

  For more information, see "Configuring SAS Web Parts for Microsoft SharePoint User Access".
- For information about self-signed certificates, refer to SAS Usage Note 39912.

Configuring SAS Web Parts for Microsoft SharePoint User Access

Users of SAS Web Parts for Microsoft SharePoint can access content in the SAS servers in one of two modes:

- actual identity (default)
- shared identity

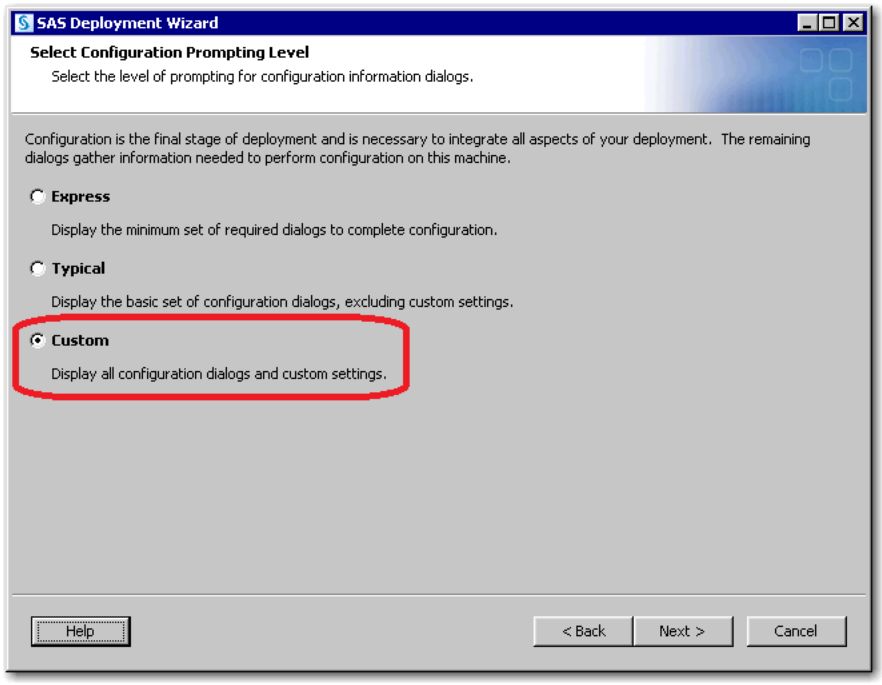
Actual identity controls user access to SAS Web Parts explicitly through a SAS metadata identity and the permissions associated with that identity. Users might have permissions in SharePoint to view a page, but they can be denied access to the web part's content if they are not granted permission to access the dashboard or stored process in SAS metadata. For information about creating metadata identities and assigning permissions, see "About User Administration" in *SAS Intelligence Platform: Security Administration Guide*.

Shared identity controls user access to SAS Web Parts through a single identity defined in SAS metadata that all users share. Authentication of the individual user is managed by SharePoint.

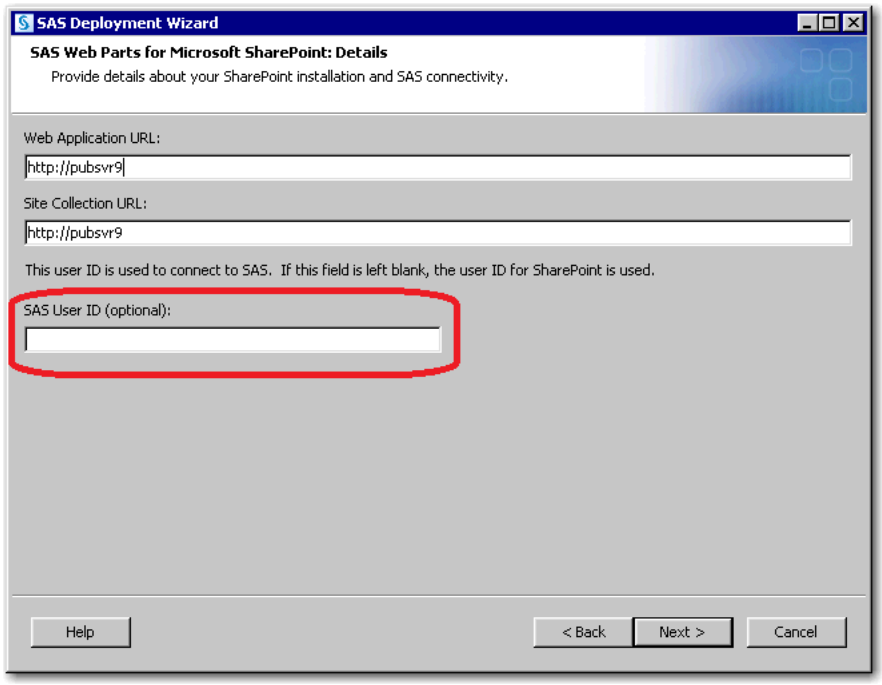
CAUTION:

When using shared identity, it is important in SharePoint to grant access to only those users who are allowed to view SAS content.

To enable shared identity, you have to select the **Custom** option for the prompting level in the SAS Deployment Wizard:



On the SAS Web Parts for Microsoft SharePoint Details page, enter the shared identity in the **SAS User ID** field:



If you are implementing shared identity, make sure that you perform the following tasks:

- If using shared identity, designate a user account and define it in SAS metadata.

  For more information, see "Add Users" in *SAS Management Console: Guide to Users and Permissions*.

- Grant the shared identity access to SAS Folders in SAS Management Console.

  For more information, see "Access Management Tasks" in *SAS Management Console: Guide to Users and Permissions*.

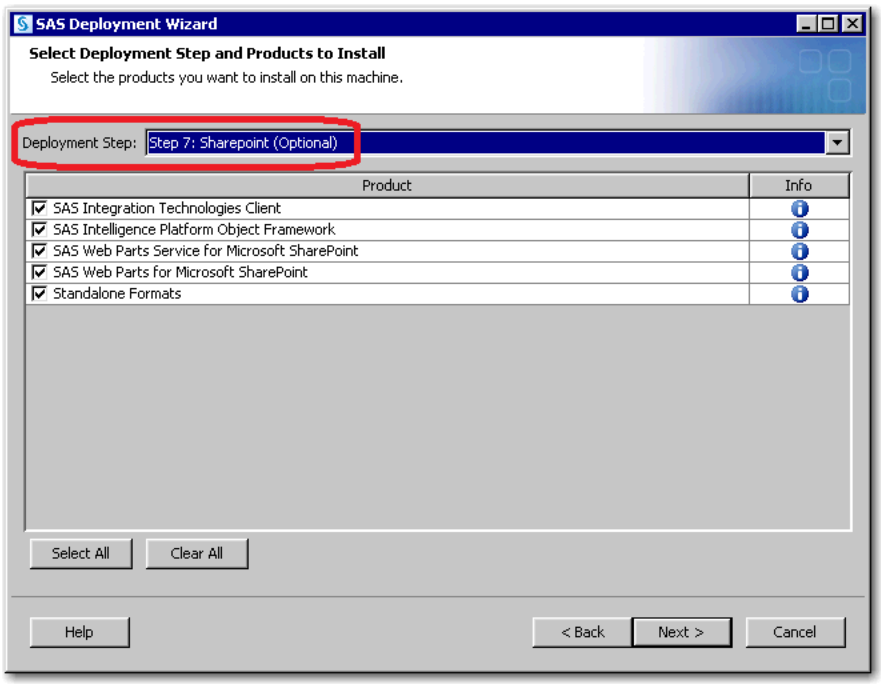
Automatically Deploy SAS Web Parts for Microsoft SharePoint

This topic provides an overview for how you use the SAS Deployment Wizard to automatically install and configure SAS Web Parts for Microsoft SharePoint. For more information about automatically deploying SAS Web Parts for Microsoft SharePoint, see "Install and Configure SAS Interactively".

1. Follow the instructions for deploying SAS listed in "Install and Configure SAS Interactively", along with the following steps listed in this topic.

   The steps that follow pertain to actions that you take while running the SAS Deployment Wizard.

2. On the Select Deployment Step and Products to Install page, select the deployment plan for the **SharePoint** machine.



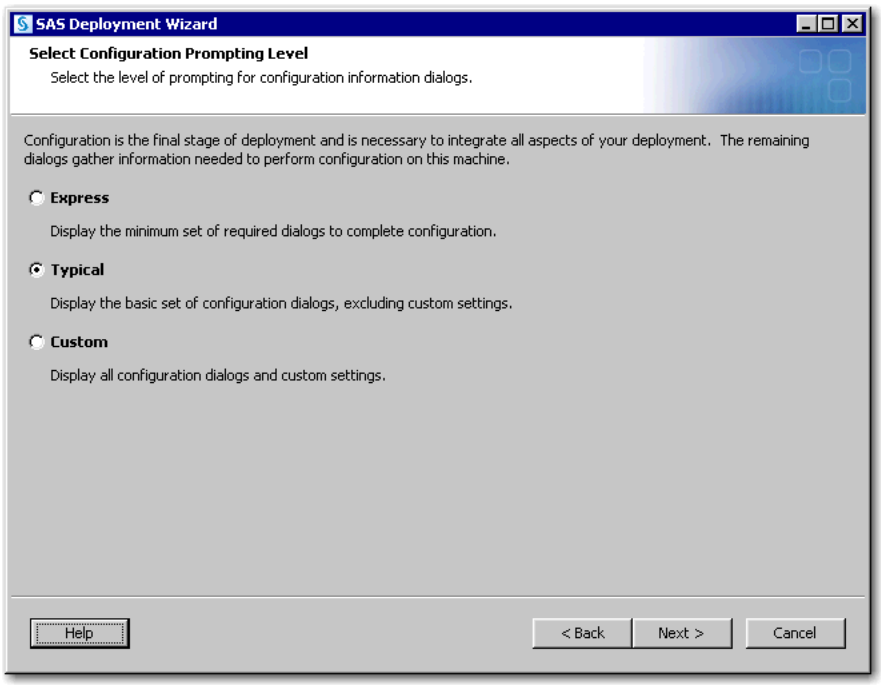
3. Choose **Express** or **Typical**.

   Choose **Custom** if you want to change the default values for the following properties:

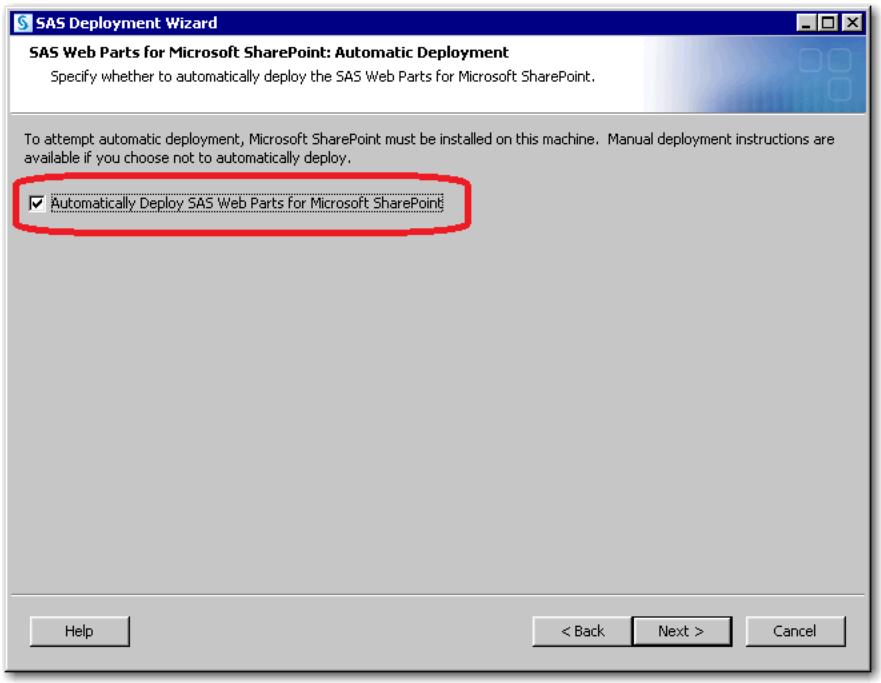
   - site name
   - port

- installation directory for the SAS Web Parts Service
- application pool
- web application URL
- site collection URL
- user access to a shared identity

  For more information, see "Configuring SAS Web Parts for Microsoft SharePoint User Access".

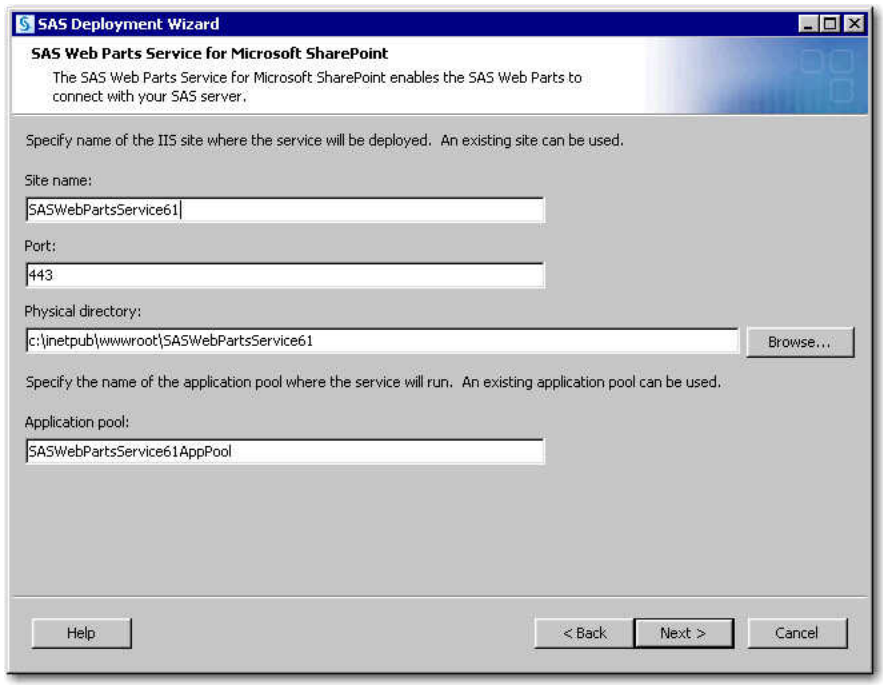


4. Choose the option **Automatically Deploy SAS Web Parts for Microsoft SharePoint** to deploy and automatically configure the application.



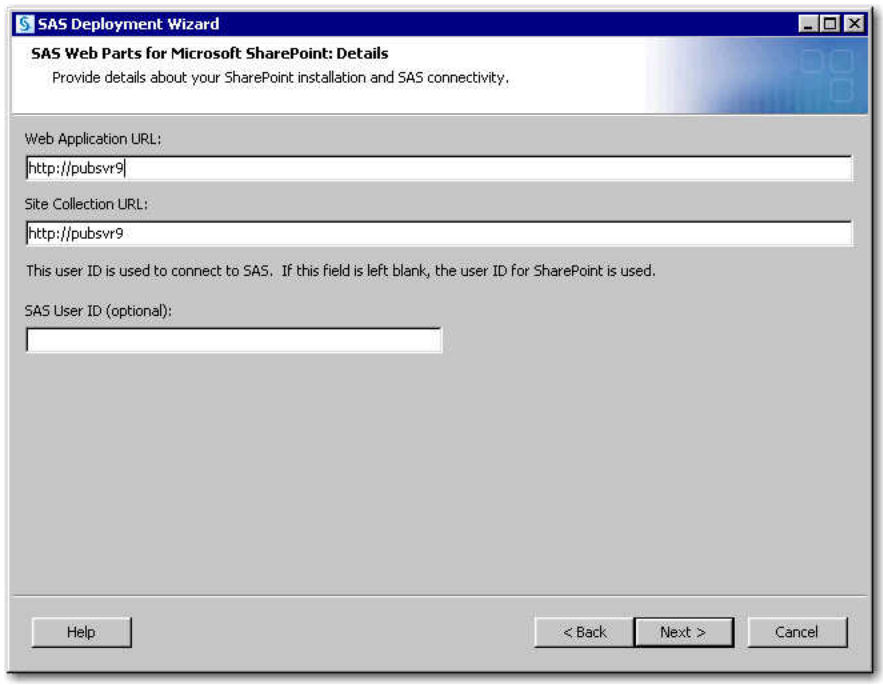
5. If you chose the custom prompting level earlier, you eventually see the SAS Web Parts Service for Microsoft SharePoint page. On this page you can change various default settings. Make any necessary changes and click **Next**:

   - In the **Site name** field, specify the name of the site for the SAS Web Parts Service. This site is added to the configuration of Internet Information Services.
   - In the **Port** field, specify the port where the SAS Web Parts Service should run. The SAS Web Parts Service must run under HTTPS and must be a different port than any previous SAS Web Parts Service installations.
   - In the **Physical directory** field, specify the site directory for the SAS Web Parts Service. If this directory does not exist, it is created for you.
   - In the **Application pool** field, specify the application pool for the SAS Web Parts Service. If this pool does not exist, it is created for you.



6. If you chose the custom prompting level earlier, you eventually see the SAS Web Parts for Microsoft SharePoint Details page. On this page you can change various default settings. Make any necessary changes and click **Next**:

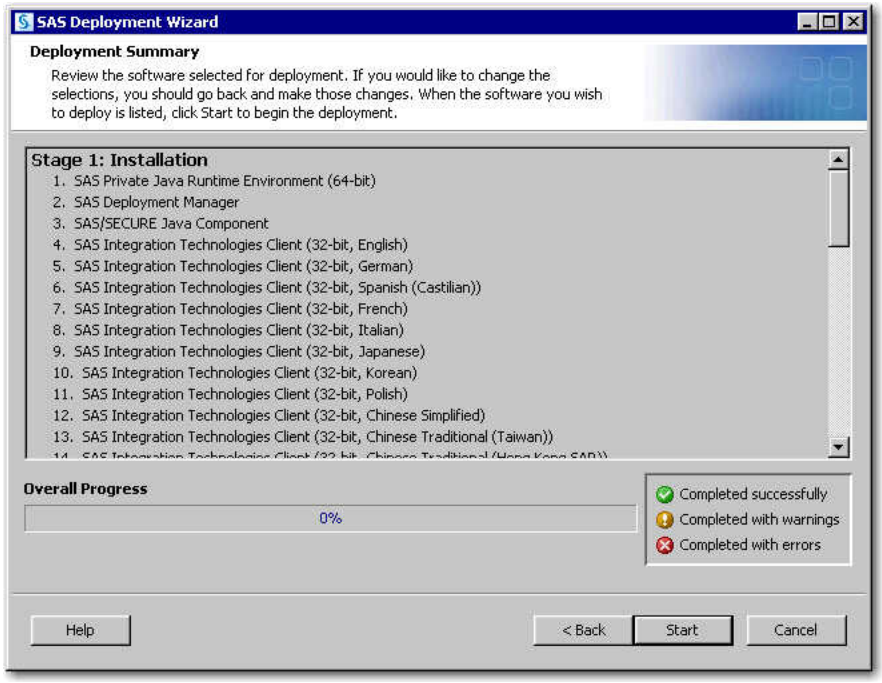
   - In the **Web Application URL** field, specify the web URL of the SharePoint server. This URL is the web application where the web parts are installed.
   - In the **Site Collection URL** field, specify the site collection URL of the SharePoint server. This site collection is where the web parts are activated.
   - In the **SAS user ID** field, specify the user ID to connect to SAS. If this field is left blank, the user ID for SharePoint is used.



7. 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 automatically installing SAS Web Parts for Microsoft SharePoint files and writing the configuration to the current machine.
   - Click **Back** to navigate to earlier wizard pages to change installation and configuration information previously entered.
   - Click **Cancel** to terminate the wizard session. Note that you will lose installation and configuration information previously entered.



8. When you see the Deployment Complete page, click **Next**.
9. On the Additional Resources page, click **Finish** to close the deployment wizard.
10. Next, secure SAS Web Parts for Microsoft SharePoint.
11. If you are using SAS Visual Analytics 7.5 or higher, you need to perform steps for Microsoft SharePoint to work with SAS Visual Analytics. See "Post-Deployment Tasks for SAS Web Server" in *SAS Visual Analytics: Installation and Configuration Guide (Distributed SAS LASR)*.

Configure HTTPS Connections for SAS Web Parts for Microsoft SharePoint

The connection between SAS Web Parts and the SAS Web Parts Service requires Hypertext Transfer Protocol Secure (HTTPS) to encrypt the communication. HTTPS uses Secure Socket Layer (SSL) and public key cryptography, which is based on the implementation of a public and private key pair.

To enable HTTPS, an SSL server certificate must be attached to the SAS Web Parts Service. If your organization has a standard procedure for obtaining an SSL server certificate, follow those guidelines and attach that certificate to the service.

Another alternative is to use a self-signed SSL certificate for the SAS Web Parts Service. Because the secure communication occurs only between SAS Web Parts and SAS Web Parts Service, the self-signed certificate needs to be imported only into the Microsoft SharePoint machine's certificate store. Refer to your Microsoft Internet Information Server (IIS) documentation for instructions on how to create and install the self-signed certificate, and complete the following steps:

1. On the machine hosting the SAS Web Parts Service, use the IIS Manager to create a self-signed certificate and associate it with the SASWebPartsService website.

2. On the SharePoint Server host, import the self-signed certificate into the browser's Trusted Root Certification Authorities store.

For more information about how to create and install a self-signed certificate, review the SAS Note.

Appendix 2

Troubleshooting Your Initial SAS 9.4 Deployment

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Overview of Troubleshooting Your Initial SAS 9.4 Deployment

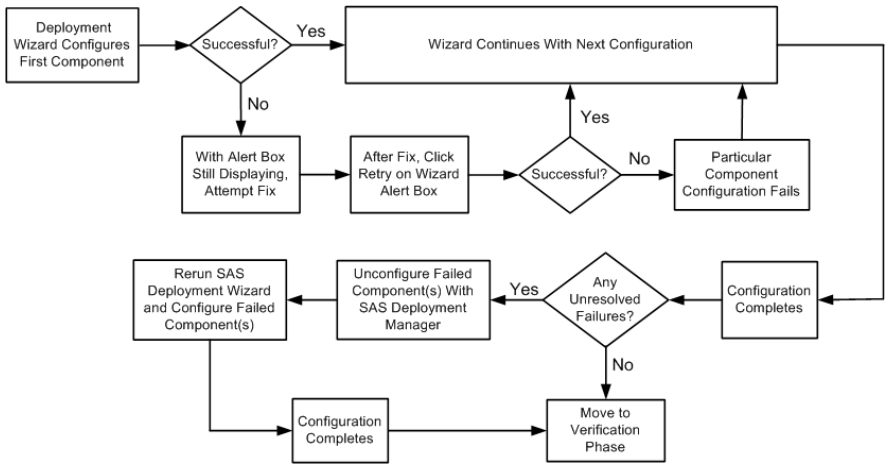
The SAS Deployment Wizard performs two major functions. Using inputs that you have provided, the wizard installs SAS, and then initially configures SAS. There are many components to a SAS Intelligence Platform deployment, but if one component happens not to deploy properly, it does not mean that you have to repeat the entire deployment. In most cases you can continue with the rest of the SAS deployment, and later troubleshoot the component that failed to deploy.

For more troubleshooting information, see Usage Note 42197: A list of papers useful for troubleshooting system performance problems.

If you encounter a configuration error while running the SAS Deployment Wizard, follow these steps:

1. Read the configuration alert box and, leaving the alert box displayed, take any steps that it suggests.
2. After you have performed the steps, go back to the configuration alert box and click **Retry**.
3. If the configuration alert box re-appears and you are unable to resolve the issue, keep the deployment wizard as it is, and contact SAS Technical Support.

Figure A2.1 Configuration Troubleshooting Flowchart



There can be situations when the configuration failed before the SAS Deployment Manager is properly configured. When this occurs, running the deployment manager is not an option. In these situations, you must do the following:

- Stop the metadata server (if it is running).
- Restore the most recent backup of the metadata repository and repository manager that you created before deploying.
- Restore the most recent backup of the web application server directories.
- If any servers that failed to configure were installed as services on Windows, manually remove their service definitions.

  For more information, see your Microsoft Windows documentation.
- Manually delete the configuration directories for the SAS components that failed to configure.

Review SAS Deployment Tool Documents, Reports, and Logs

During configuration of SAS 9.4 the SAS automated deployment tools create various documents, reports, and logs that can help you identify any remaining configuration tasks and errors. Use the following documents to perform any manual configuration steps and correct any configuration errors:

- Instructions.html

  contains a list of SAS manual steps that must be performed to complete your deployment. Instructions.html resides under the SAS configuration directory in the **Lev*n*/Documents** subdirectory (for example: **C:\SAS\Config\Lev1\Documents**).
- DeploymentSummary.html

  contains a list of the deployment tasks performed by the SAS Deployment Wizard and a brief status for each. The deployment summary is one source for a list of all the SAS products installed and configured in addition to information such as servers started, web applications built, and web applications deployed.

DeploymentSummary.html resides under the SAS configuration directory in the **Lev*n*/Documents** subdirectory (for example: **C:\SAS\Config\Lev1\Documents**).

- ConfigurationErrors.html

  contains a list of configuration errors that require further attention. ConfigurationErrors.html resides under the SAS configuration directory in the **Lev*n*/Documents** subdirectory (for example: **C:\SAS\Config\Lev1\Documents**).

- UpdateInstructions.html

  contains a list of SAS manual steps that must be performed to complete adding maintenance to your deployment. UpdateInstructions.html resides under the SAS configuration directory in the **Lev*n*/Documents** subdirectory (for example: **C:\SAS\Config\Lev1\Documents**).

- Configuration logs (as needed)

  provide a finer list of errors for each SAS component that the SAS Deployment Wizard migrates and configures. There is one log file for each SAS component. The configuration logs reside under the SAS configuration directory in the **Lev*n*/Logs/Configure** subdirectory (for example: **C:\SAS\Config\Lev1\Logs\Configure**).

- SDW_*YYYY-MM-DD-HH-MM-SS*.log

  logs SAS Deployment Wizard messages, which can be used for general troubleshooting. The deployment wizard log is written to the following path:

  - Windows:

    \Users*user*\AppData\Local\SAS\SASDeploymentWizard

  - Windows (Windows XP and earlier):

    \Documents and Settings*user*\Local Settings\Application Data\SAS\SASDeploymentWizard

  - UNIX:

    ***home-directory*/.SASAppData/SASDeploymentWizard**

- ResponseRecord_*yyyy-mm-dd-hh.mm.ss*.log

  In SAS 9.4M2, the deployment wizard automatically records your responses, regardless of whether you run the wizard with the **-record** option. The deployment wizard response record is written to the same paths for the SAS Deployment Wizard message log (listed earlier).

- SDM_*YYYY-MM-DD-HH-MM-SS*.log

  logs SAS Deployment Manager messages, which can be used for general troubleshooting. The deployment manager log is written to the following path:

  - Windows:

    \Documents and Settings*user*\Local Settings\Application Data\SAS\SASDeploymentWizard\9.4

  - Windows (Windows XP and earlier):

    \Users*user*\AppData\Local\SAS\SASDeploymentWizard

  - UNIX:

    ***home-directory*/.SASAppData/SASDeploymentWizard**

Troubleshooting the SAS Server Tier

The following table lists some SAS server-tier errors and what to do to resolve them.

Table A2.1 *Troubleshooting the SAS Server Tier*

Error	Explanation	Resolution
On UNIX and Linux platforms, a SAS server process fails.	There can be various causes.	Check **`/var/log/messages`** to determine the cause of the failure.
The SAS Deployment Wizard attempts to install Microsoft .NET Framework 3.5 during the System Requirements phase, and a failure occurs.	The Microsoft .NET Framework is now a part of the Windows operating system.	Follow the instructions in SAS Note 48410.
When you attempt to run a SAS server for the first time, you receive an error message about the IOMServerAppender not finding a location for storing temporary utility files.	There is no temporary directory defined on the host machine's operating system.	Use the method appropriate for the server machine's operating system to define a temp directory. For more information, see "IOMServerAppender" in *SAS Logging: Configuration and Programming Reference*.
Pooled workspace server fails to start during the configuration of SAS Web Infrastructure Platform.	On Windows, the SAS installer might not have domain-qualified the SAS Spawned Servers user account (sassrv). This account is entered as a login in the SAS General Servers group, so it is required to have a domain prefix as are all Windows logins. Without domain qualifying the login, connections by this account become PUBLIC connections. By default, PUBLIC users cannot access the repository, which prevents the pooled workspace server from launching successfully. On UNIX, there might be a problem with the host name value returned by TCP.	On Windows, using SAS Management Console, edit the login associated with the SAS General Servers group and add a domain to it (for example: myhost\sassrv). You can edit logins in the **Plug-ins** tab of SAS Management Console (**User Manager** ⇨ **SAS General Servers** ⇨ **Accounts** ⇨ **Edit**). On UNIX, modify **`/etc/hosts`** or use the **`-hostknownby`** option. For more information, see "General Options" in *SAS Intelligence Platform: Application Server Administration Guide*.

Error	Explanation	Resolution
You cannot validate the logical workspace server from SAS Management Console (SASApp) using the Server Manager plug-in.	By default, the unrestricted user is a SAS internal account. The workspace server needs an operating system user account and an identity in metadata to be able to authenticate itself to the machine on which it runs.	Re-try the validation from SAS Management Console. You should be prompted for user account credentials. Enter credentials for a user account that the workspace server can authenticate and that has (on Windows) the **Log in as a batch job** user rights. One account that meets these requirements is the SAS Spawned Servers account (sassrv).
After you have updated the user's credentials to allow access, you are denied access when trying to connect to or validate a server or spawner.	The credentials cache must be cleared before you try to connect or validate again.	To clear the credentials cache, in SAS Management Console, click **File** ⇨ **Clear Credentials Cache**. If the object spawner denies access to a server because of the lack of ReadMetadata permissions, and the user is then granted the needed permission, you must reset the object spawner's authorization cache before the user tries to connect again. To do so, expand the Server Manager tree in SAS Management Console. Next, expand the object spawner, right-click the host node, and choose **Connect** in the pop-up menu. After you have connected, right-click the host node again, and choose **Refresh Spawner** in the pop-up menu.
You cannot start a pooled workspace server *and* cannot start a stored process server.	Most likely, something is wrong with the object spawner. The metadata server might not be able to authenticate the object spawner.	Make sure that the object spawner is running. For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*. If you cannot start the object spawner, make sure that the metadata server is running. Check the log for the object spawner and determine whether the spawner is able to find the server's definition. For more information, see "Using SAS Management Console to Monitor SAS Servers" in *SAS Intelligence Platform: System Administration Guide*. Also check the event log on Windows or the syslog on UNIX or z/OS. You can correct the credentials used to authenticate the spawner in the ***SAS-configuration-directory*/ObjectSpawner/metadataConfig.xml** file, or reconfigure the spawner using the SAS deployment tools. For more information, see "Overview of Managing Your SAS Deployment". Make sure that no one has assigned user admin capabilities to the SAS Trusted User account (sastrust@saspw, by default). On UNIX, check the Object Spawner log just after it starts for an entry similar to: `Objspawn is executing on host machine.name.domain.com (10.101.0.98)`. If you see something similar to: `Objspawn is executing on host localhost (127.0.0.1)` or, if you see a host name that you cannot ping from a remote machine, you might need to replace the **-dnsMatch** option with the **-hostknownby** option. Refer to the SAS Note.

Error	Explanation	Resolution
You cannot start your SAS server.	The file sas.servers might not be automatically generated. This does not imply any issue with your configuration and does not indicate something is wrong.	Generate the sas.servers file manually by running ***SAS-installation-directory*/SASDeploymentManager/9.4/products/cfgwizard__94340__prt__xx__sp0__1/Config/level_root/generate_boot_scripts.sh.unx.orig**. For more information, see "Using the sas.servers Script on UNIX or z/OS to Start or Stop All Servers" in *SAS Intelligence Platform: System Administration Guide*.
You see an error message about the location of the JUnit JAR file not being specified for SAS Deployment Tester.	The SAS Deployment Tester tests other products that use JUnit for validation. Without JUnit, these products might operate properly, but you will not be able to validate them using the SAS Deployment Tester.	On Windows, the JUnit JAR file is available from the Third-Party Software Requirements for Use with SAS 9.4 site. Place the JUnit JAR file in the **C:** directory. For example: **C:\junitx.x.x\junit.jar**. On UNIX, modify **provider.config** in ***SAS-configuration-directory*/DeploymentTesterServer/Config** and update the **ReadOnlyVar._junitJar** parameter (for example, **ReadOnlyVar._junitJar=/apps/sas/third_party/junit/junitx.x.x/junit-x.x.x.jar**).
A Deployment Tester error message in the Windows Event Viewer reads: `System error 1067`	The Deployment Tester cannot start because it is configured to run as a Windows Local Service instead of a Local System account.	The workaround is to use the Windows Services snap-in to change the Deployment Tester Service logon from LocalService to LocalSystem. For more information, see SAS Note 35418.

Troubleshooting SAS Web Applications

The following table lists some SAS web application errors and what to do to resolve them.

Table A2.2 *Troubleshooting the SAS Web Applications*

Error	Explanation	Resolution
SAS Web Report Studio or the SAS Information Delivery Portal displays a "Cannot find server" error.	Either your servlet container or web application server is not running. There is problem with the URL that you are using to start the application.	Make sure that your servlet container or web application server is running. If it is not running, start it. This will probably solve the problem. If the server is already running, the problem could be with the URL that you are using to start the web application. Use the correct URL: **`http://`***host-name***`:`***port-number***`/`***application-name*. Make sure that the host name is the fully qualified name of the host on which your servlet container or web application server is running. Make sure that the port number identifies the port on which the server is listening. For the SAS Web Application Server, this will normally be port 8080. Finally, make sure that the application name in the URL matches the actual name of the web application (including case).
Each time your web application requests a new page, there is a long delay.	When a Java Server Page (JSP) is requested for the first time, you can expect a significant delay. When all of your JSPs have been converted to compiled servlets, the problem will be resolved.	Tune your servlet container or web application server.
The SAS Information Delivery Portal displays a "Could not authenticate user" error.	The user is not registered in the metadata repository. On Windows, if the user that is trying to log on is registered in the metadata, but the user name is not domain qualified, the user will not be able to log on.	In SAS Management Console, add a login to the Person object that contains at least a user name. On Windows, make sure the user name has the form *host**user-ID* or *domain**user-ID*. For more information, see "About User Administration" in *SAS Intelligence Platform: Security Administration Guide*.
You receive a server error when accessing the Help menu from a SAS web application.	SAS Help Viewer Metadata Configuration is not configured.	Rerun the SAS Deployment Wizard to install and configure SAS Help Viewer Metadata Configuration. For more information, see "Install and Configure SAS Interactively".
An error page appears when you access the Help menu from a SAS application or the Help menu item for a SAS application is not displayed.	The online Help for the SAS application was not installed or the SAS Help Viewer Metadata Configuration web application was not rebuilt after the online Help was installed.	Verify that the online Help was installed. If not, install it using the SAS Deployment Wizard. Once the Help is installed, rebuild the SAS Help Viewer Metadata Configuration web application using the SAS Deployment Manager and redeploy the SAS Help Viewer Metadata Configuration EAR. For more information, see "Install and Configure SAS Interactively" and "Rebuild the SAS Web Applications" in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

Error	Explanation	Resolution

You cannot access your SAS web applications.	When you perform a SAS 9.4M8 deployment and your SAS middle tier is installed with multiple SAS Web Application Server instances with no clustering, and one of the instances is on a different host, you might need to perform an additional step after deployment in order to access your web applications.	Here is an example of this type of topology:
		Host1 - SAS Metadata Server, SAS Application Server, SAS Web Server, SAS Web Application Server
		Host2 - SAS Application Server, SAS Visual Analytics Middle Tier (SASServer12_1 SASServer1_1)
		When you validate your SAS web applications and you cannot access them, verify the following JVM options in the sas-config-dir/Levn/Web/WebAppServer/SASServer/n_m/bin/setenv.sh file:
		-Dsas.scs.cas.host=webserverhost.example.com
		-Dsas.scs.cas.port=port_number
		-Dsas.scs.cas.scheme=protocol-http or https
		If any of those values are null, change them to the correct values. Save the file. Restart your SAS Web Application Server. The server.log file shows the following lines to indicate JVM options that need to be modified:
		`Caused by: java.net.MalformedURLException: unknown protocol: null`
		`at java.net.URL.<init>(URL.java:652) ~[?:?]`
		`at java.net.URL.<init>(URL.java:541) ~[?:?]`
		`at java.net.URL.<init>(URL.java:488) ~[?:?]`
		Also, you see the following lines in the vfabrictcsvr_configure log file showing null values being set at the top of the log file:
		`INFO (main) [org.apache.catalina.startup.VersionLoggerListener]`
		`Command line argument: -Dsas.scs.cas.host=ctnsrv25.na.sas.com`
		`INFO (main) [org.apache.catalina.startup.VersionLoggerListener]`
		`Command line argument: -Dsas.scs.cas.port=null`
		`INFO (main) [org.apache.catalina.startup.VersionLoggerListener]`
		`Command line argument: -Dsas.scs.cas.scheme=null`

On Windows, an error page appears when you navigate to SAS Studio.	The service fails to start successfully because it cannot load a critical JAR file that is simultaneously being modified by the installer.	Restart the SASStudioWebAppServer service.

Appendix 3

Managing Your SAS Deployment

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Overview of Managing Your SAS Deployment

The following sections discuss how to use the SAS 9.4 deployment tools to add, update, or configure a SAS product, remove a SAS product configuration, and renew your software license for certain SAS solutions.

For information about removing a SAS installation, see "Overview of Uninstalling the SAS Intelligence Platform".

Adding, Updating, and Upgrading SAS Software

What Is Adding, Updating, and Upgrading?

This document uses the terms "adding," "updating," and "upgrading" in the following ways:

- "Adding" refers to installing and configuring a SAS product that is new to your system. Here are some common scenarios:
  - You ordered the SAS product but did not install it.
  - You are deploying new products from a new SAS order.
- "Updating" refers to installing and configuring a SAS product with a maintenance release. Information related to updates resides mainly in *SAS Guide to Software Updates and Product Changes*.
- "Upgrading" refers to installing and configuring new versions of SAS products that are already deployed on your system (for example, upgrading to SAS Web Report Studio 4.3 from 4.2). Upgrading should not be confused with migration or promotion.

  For more information, see *SAS Guide to Software Updates and Product Changes*.

Summary of Adding, Updating, and Upgrading SAS Software

When you are adding, updating, or upgrading your SAS 9.4 deployment, the SAS Deployment Wizard is able to determine whether the order from which you are running the wizard contains SAS software with a newer, older, or identical release level than what is already deployed in the SAS installation directory (commonly referred to as SASHome).

If the wizard determines that there is newer SAS software in the current order than what is already deployed, then the wizard automatically goes into *update mode*. Update mode forces you to install updates to your software before you can perform any other deployment task. For example, if you are adding new products or language support to an existing SAS deployment, you install those in an additional SAS Deployment Wizard session after the wizard (in Update mode) has first updated the products on your machine to match the versions in your SAS order.

CAUTION:
Consult *SAS Guide to Software Updates and Product Changes* before performing any SAS updates.

For more information, see the following:

- "How the SAS Deployment Wizard Adds, Updates, and Upgrades Software"
- "Adding SAS Products"
- "Configuring SAS Products"
- *SAS Guide to Software Updates and Product Changes*

How the SAS Deployment Wizard Adds, Updates, and Upgrades Software

This topic describes in greater detail how the SAS Deployment Wizard adds, updates, and upgrades SAS software.

The wizard compares the release level of the SAS software in the current order to the SAS software that is deployed on the machine. Three possibilities exist:

- The software in the order has a *newer* release level than the software deployed on the machine.
- The software in the order has an *older* release level than the software deployed on the machine.
- The software in the order has an *identical* release level as the software deployed on the machine.

Upgrades and updates consist of a new version or an incremental update (also referred to as maintenance) to an installed product. If the deployment wizard detects that one or more products in the order have a newer release level than any products deployed in the specified SASHome on the machine, the wizard goes into Update mode. (SASHome is shorthand for the SAS installation directory. For example, **`C:\Program Files\SAS`**). The wizard displays an Updates page of all the products deployed on the machine for which there are updates in the current order.

The Updates page is in two sections that list new product versions and new product updates (or maintenance).

Consider this example. In your order, SAS Providers for OLE DB (64-bit) represents a new product version (9.4 to 9.41). SAS Threaded Kernel Core Routines (64-bit) represents an update (9.4 to 9.41_M4). If you choose to proceed with your deployment from this order, to the specified SASHome, the wizard requires that you install these updates to bring your existing deployment to the release level from which your new order was mastered. When you click **Next**, the wizard automatically upgrades the products to the release levels that are shown on the Updates page.

CAUTION:

Consult *SAS Guide to Software Updates and Product Changes* before performing any SAS updates.

When running in Update mode, the wizard does not prompt for a deployment plan, SAS installation data file, or language. The wizard simply installs the newest versions and updates of the products already deployed in the specified SASHome. If language support is updated for a specific product (such as SAS, SAS Enterprise Guide, or SAS Add-In for Microsoft Office), the wizard installs updates only for the languages previously installed. If you are adding new products or language support to an existing SAS deployment, you install those in an additional SAS Deployment Wizard session, after the update is installed and any customization or validation is performed.

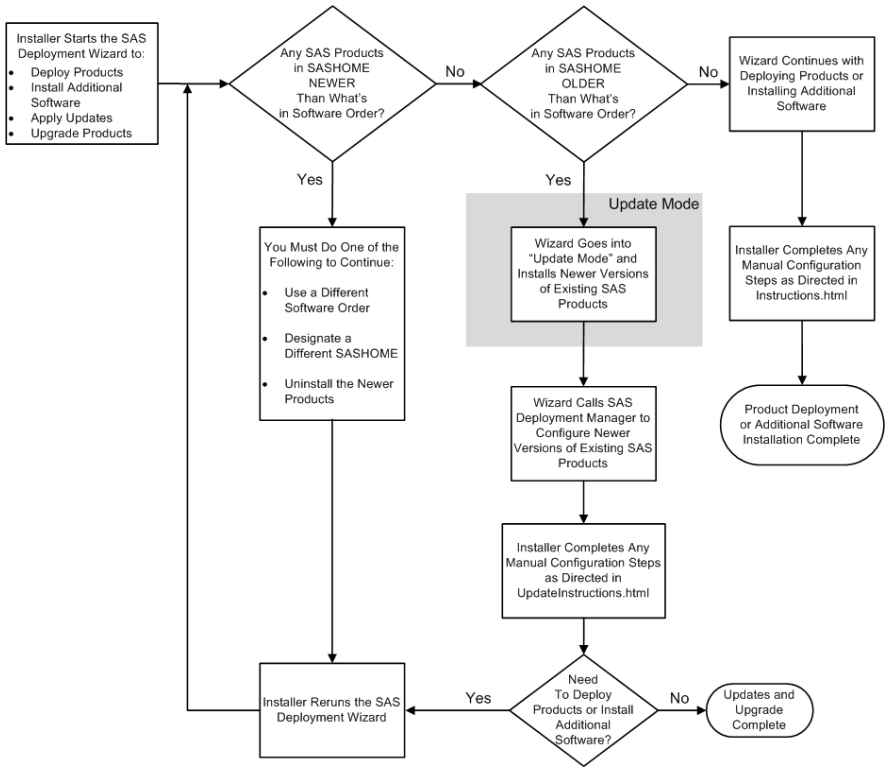
If the deployment wizard detects that one or more products in the order has an older release level than any products deployed in the specified SASHome on the machine, the wizard does not go into Update mode. Instead, the wizard presents you with an alert box listing those products in your order that are older than the ones deployed on your machine.

SAS wants to make sure that you are always installing software from an order corresponding to a release level that is identical to or newer than the one used to originally deploy your SAS software. Your options are to use a different software order, designate a different SASHome directory, or uninstall the products that are newer.

If the deployment wizard detects that all the products in the order have an identical release level to all products deployed in the specified SASHome on the machine, the wizard does not go into Update mode. Instead, the wizard presents pages that enable you to perform normal deployment tasks such as deploying products, installing additional software, and so on.

The following diagram summarizes how the SAS Deployment Wizard manages deploying products, installing additional software, and applying updates:

Figure A3.1 *SAS Deployment Wizard Flowchart*



Updating Reporting Components

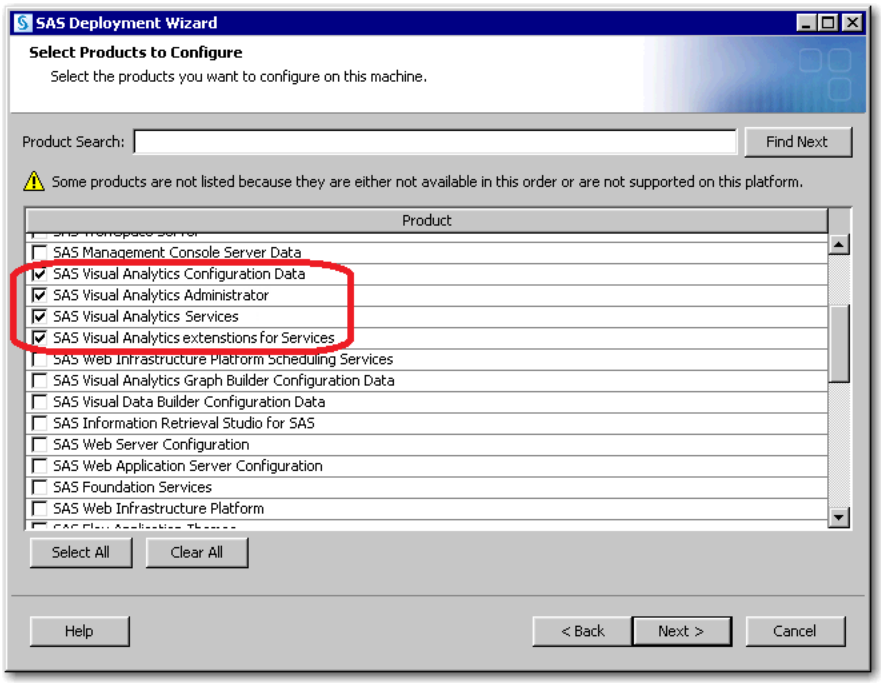
When you add SAS Visual Analytics components to your SAS system, you must update any existing SAS Visual Analytics components that are deployed on your SAS system. This enables them to work with the new components. The reason that you must update them is because SAS Intelligence Platform and SAS Visual Analytics share a group of common reporting components.

When the wizard's Select Products to Configure page is displayed, you must manually select the following common reporting components:

- **SAS Visual Analytics Administrator**
- **SAS Visual Analytics Configuration Data**
- **SAS Visual Analytics Extensions for Services**
- **SAS Visual Analytics Services**

Note: The new SAS Visual Analytics components that you are adding are already selected. The wizard configures them by default.

Figure A3.2 *Select Products to Configure Page with Common Reporting Components Selected*



If you are upgrading your SAS system to a new release as well as adding SAS Visual Analytics components, you must run the wizard twice. During the first run, the wizard detects the common reporting components and goes into Update mode to automatically install the latest versions of these components. (For a more detailed explanation of Update mode, see "How the SAS Deployment Wizard Adds, Updates, and Upgrades Software".) When you run the wizard the second time, be sure to select the common reporting components previously listed.

Adding SAS Products

Overview of Adding SAS Products

The SAS Deployment Wizard enables you to change your SAS 9.4 deployment. Here are some of the most common scenarios:

1. You are configuring new products from your initial SAS 9.4 order.

   You ordered the software and did not install it. Or, you installed the software, but chose not to configure it.

2. You are deploying additional products from a new SAS 9.4 order.

   The additional products are not a part of your original SAS 9.4 order. You made another order and have to download and deploy the new order.

3. You are re-installing and reconfiguring (redeploying) a SAS product.

   You want to unconfigure a SAS product from one machine or tier and configure it on another.

4. You are applying updates (maintenance) to a SAS product that requires also updating its configuration.

You were unable to finish applying the updates. You need to rerun the SAS Deployment Manager to complete the updates to your configuration.

Most SAS products require that you install and configure them in a two-step process. You shut down your SAS metadata, compute, and middle-tier (web) servers. You run the SAS Deployment Wizard to install the new products. Then, you restart some servers and rerun the deployment wizard to configure the newly installed products.

A few products, such as SAS Drivers for ODBC, do not require the configuration step. You simply shut down your SAS metadata, compute, and middle-tier (web) servers, install the new products, and then restart what you shut down.

CAUTION:

Copying SASHome and SAS configuration directories is prohibited. SAS does not support manually copying SAS installation (SASHome) and SAS configuration directories to other machines. Manually copying SAS software prevents you from applying future software maintenance and updates.

About SAS Software Orders and SAS Software Depots

A SAS Software Depot is a file system that consists of a collection of SAS installation files. It 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, SAS installation data files, order data, and product data.

A SAS Software Depot is designed to contain your initial SAS 9.4 software order and additional orders that you make in the future. When you download an additional order to your pre-existing software depot, you download only those products that you do not already have. If you are downloading an additional order and creating a new software depot, then your download time could be longer.

When you add a new SAS software order to your pre-existing SAS Software Depot, you run the SAS Download Manager and specify the location of the original depot. For more information, see “Create a SAS Software Depot Using the SAS Download Manager”.

If you decide that you want to create a new SAS Software Depot for your new software order, you also run the SAS Download Manager. However, make sure that you have fulfilled the necessary requirements described in “Prerequisites for Creating a SAS Software Depot”.

Add SAS Products That Do Not Require Configuration

Some SAS products such as SAS/ACCESS Interface to Oracle do not require the SAS Deployment Wizard to configure them. If the products that you are adding to your SAS deployment do not require configuration, follow these steps:

1. Verify that you have installed all the necessary third-party software outlined in “ About the Java Runtime Environment”.

   Note: During the SAS installation, the SAS Deployment Wizard prompts you for paths to the requested third-party software. You must have the necessary third-party software installed on the current machine, or the SAS Deployment Wizard will not let you continue with the installation. In this situation, you have to end the SAS Deployment Wizard session and install the required third-party software before you can continue.

2. Make sure that your SAS Software Depot is accessible to all the machines on which you are installing SAS. If this is not possible, then you have to copy the entire depot to a location that the target machine can access.

   For information about copying your depot to a location that is not on your network, see "Create a Disc Image of Your Order".

3. If you are installing a SAS 9.4 product that is not a part of your original order, make sure that you have downloaded the additional order.

   For more information, see "About SAS Software Orders and SAS Software Depots".

4. Shut down your SAS metadata, compute, and middle-tier (web) servers.

   For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*.

5. Log on to the machine as the SAS Installer user.

   This is the user with which your SAS deployment was installed. For more information, see "Required External User Accounts for SAS".

6. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.

   Important: Start the SAS Deployment Wizard with the NOHOTFIX option as shown in the table. This option prevents the installation of all hot fixes, which is necessary when adding a Foundation-only product to a planned deployment. Installing hot fixes for other products is in a subsequent step.

   Table A3.1 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	`setup.exe -nohotfix -record -deploy`
UNIX	`setup.sh -nohotfix -record -deploy`
z/OS	To use a temporary directory other than `/tmp` specify `-templocation new-temp-dir`

   For more information, see "Creating SAS Software Depots".

   You should see a welcome page similar to the following:

7. Select the language that you want the SAS Deployment Wizard to use when it displays text.
8. Select **Install SAS Software**.
9. If you have more than one SAS software order in your depot, the wizard prompts you to select the order that you want to install.
10. If the wizard detects that there are SAS software products in your order that are more recent than what you have deployed on your machine, then the wizard automatically goes into Update mode. At this point, stop the SAS Deployment Wizard. Restart the SAS Deployment Wizard without the NOHOTFIX option. For more information, see Table A3.1. Then, perform the following steps:

    a. Install the updates using the SAS Deployment Wizard.

    CAUTION:
    Consult *SAS Guide to Software Updates and Product Changes* before performing any SAS updates.

    b. Perform any required manual configuration steps.

    c. Stop the SAS Deployment Wizard again. Then, restart the SAS Deployment Wizard with the NOHOTFIX option. For more information, see Table A3.1.

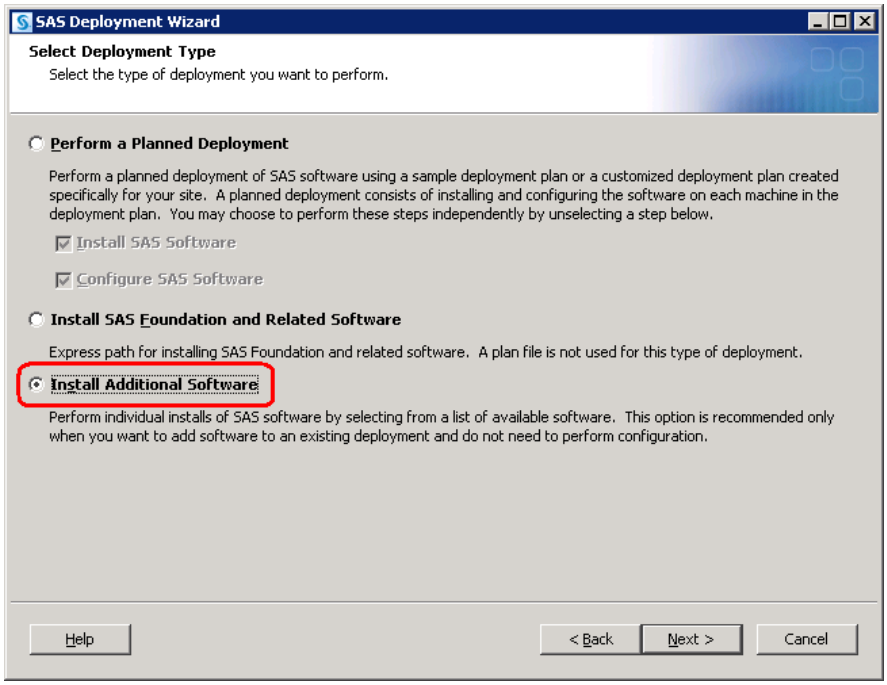
    Note: If you performed an update on a machine, you should update all of the machines in your SAS deployment first. After you have updated all of the machines in your SAS deployment, deploy your additional SAS products.

    For more information, see "Summary of Adding, Updating, and Upgrading SAS Software".

11. On the Select Deployment Type page, choose the following option:

    - **Install Additional Software**

      This option provides a list of available software from which you select what to install. Software installed using this option can be configured only manually.



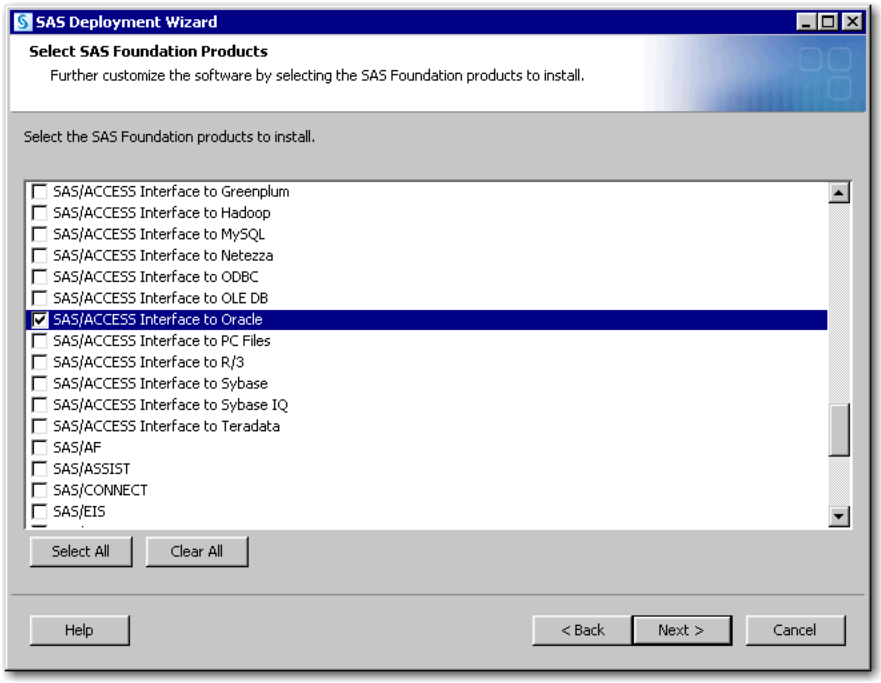
12. (UNIX and z/OS only) Specify the location (SASHome) where you want to install SAS.

13. On the Select Products to Install page, select the products that you want to install.

    Remember that the deployment wizard will not configure any of your selections. The wizard installs only the software.

    Note: If the product that you are adding is a SAS Foundation product, then select **SAS Foundation**, and select **Next**. The subsequent page lists the SAS Foundation products from which you choose the product that you want to add.

14. Some products listed on the Select Products to Install page, such as SAS Foundation, include multiple sub-products, which you see on the next page. In these situations, select from those additional products, such as **SAS/ACCESS Interface to Oracle**, and click **Next**.



15. Specify the location of the SAS installation data file that contains information about the software that you have licensed for the current machine.

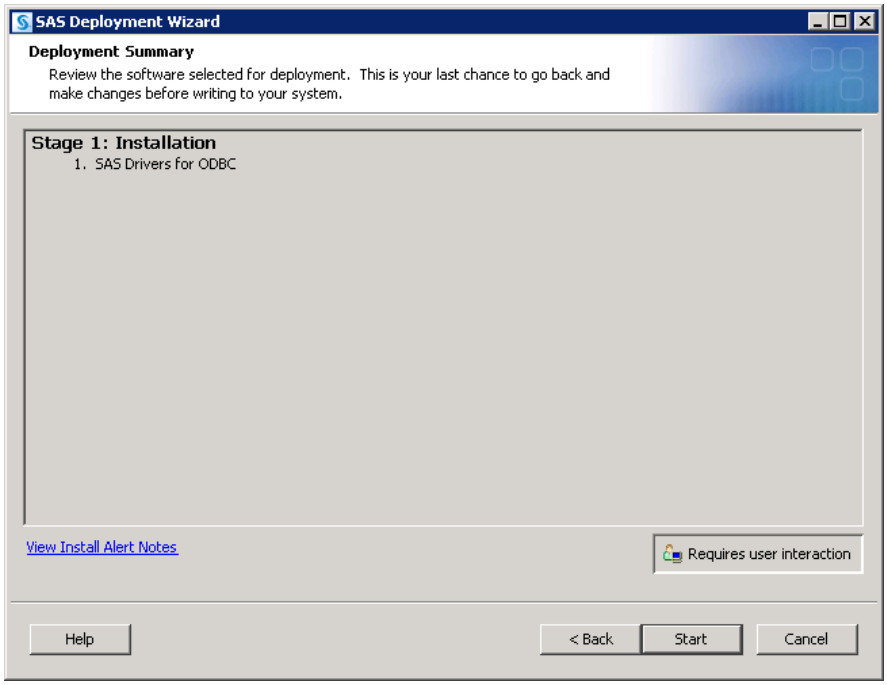
    CAUTION:

    Be careful to use the correct 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.

16. When you see the Deployment Summary page, the deployment wizard has finished collecting installation 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.

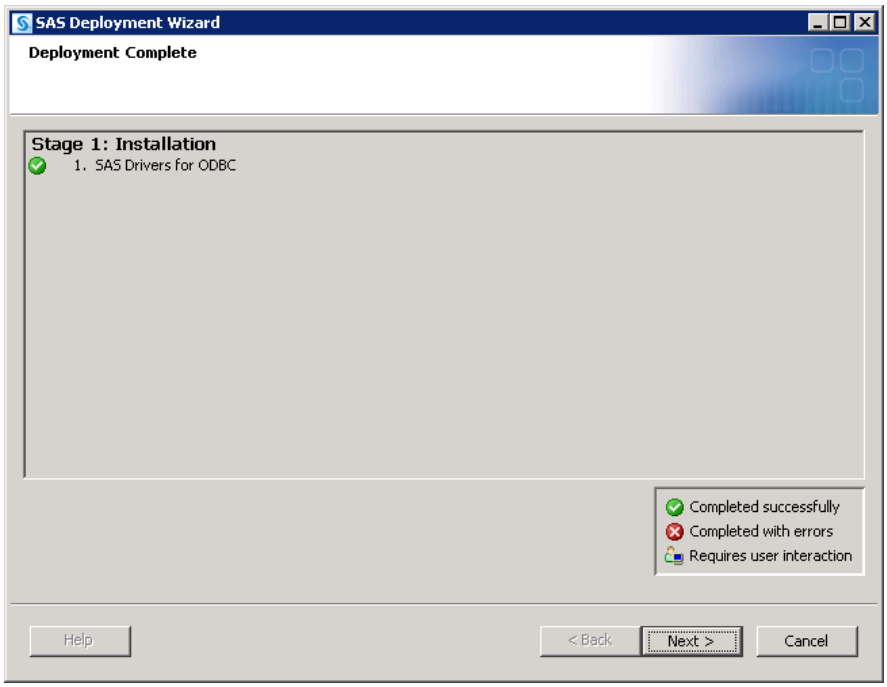
    Make one of the following choices:

    - Select **Start** to begin installing SAS files to the current machine.
    - Select **Back** to navigate to earlier wizard pages to change installation information previously entered.
    - Select **Cancel** to terminate the wizard session. Note that you will lose installation information previously entered.



17. Provide the remaining information as the wizard prompts you for it. For more information, see "Install and Configure SAS Interactively".

    When you see a page similar to the following, the SAS Deployment Wizard is finished:



18. Click **Next** to go to the Additional Resources page.
19. Click **Finish** to close the deployment wizard.
20. Apply hot fixes for the specific product being added to the SAS Compute Server. Locate hot fixes for your product or use the SAS Hot Fix Analysis, Download and Deployment (SASHFADD) tool.

Note: The SASHFADD tool assumes you are downloading and installing hot fixes for every product installed on every server in your deployment. Because you are adding software only on the compute tier, the SASHFADD tool should identify only hot fixes related to the product that you are adding.

21. Apply security updates. See Security Bulletins for more information.
22. Restart your SAS metadata, compute, and middle-tier (web) servers.

    For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*.
23. To verify that your SAS product was actually installed, please run a registry report. For more information, see SAS Note 35968.

Add SAS Products That Require Configuration

Important: Before you perform any of the following steps, you should create a restore point for your deployment by backing up your SAS 9.4 deployment. For more information, see SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.

Most SAS products that you add to your deployment require that you install and configure them in a two-step process: You shut down your SAS metadata, compute, and middle-tier (web) servers. Then, you run the SAS Deployment Wizard to install the new products. Then, you restart some servers and rerun the deployment wizard to configure the newly installed products.

If the products that you are adding to your SAS deployment require configuration, follow these steps:

1. Verify that you have installed all the necessary third-party software outlined in " About the Java Runtime Environment".

   Note: During the SAS installation, the SAS Deployment Wizard prompts you for paths to the requested third-party software. You must have the necessary third-party software installed on the current machine, or the SAS Deployment Wizard will *not* let you continue with the installation. In this situation, you will have to end the SAS Deployment Wizard session and install the required third-party software before you can continue.
2. Make sure that your SAS Software Depot is accessible to every tier and to all the machines on which you are installing SAS. Follow the order specified in "Installation Order Rules for Multiple Machine Deployments". If accessibility is not possible, then you will have to copy the entire depot to a location that the target machine can access.

   For information about copying your depot to a location that is not on your network, see "Create a Disc Image of Your Order".
3. If you are installing a SAS 9.4 product that is not a part of your original order, make sure that you have downloaded the additional order.

   For more information, see "About SAS Software Orders and SAS Software Depots".
4. Remove any existing SAS Environment Manager Agent configuration. For more information, see "Remove a Configuration".
5. Make sure that you use a deployment plan that contains any add-on products and all original products for each machine that you are configuring. The deployment plan

needs to match the revision level of the new order containing the products to be added.

CAUTION:

You must select a deployment plan that matches your topology to be deployed. Do not deselect products that are selected during initial configuration.

Table A3.2 *Where Is My Deployment Plan?*

SAS 9.4 Products Being Added	Location of My Deployment Plan
Products are part of an order in the same release as my original SAS 9.4 deployment, which is installed on a machine where a SAS 9.4 server, middle tier, or data tier already resides.	The plan is located in the **Lev*n*** ⇨ **Utilities** directory. When adding a planned component, your SAS consultant should be contacted to obtain a new customized deployment plan.
Products are part of an order in a newer release than my original SAS 9.4 deployment, which is installed on a machine where a SAS 9.4 server, middle tier, or data tier already resides.	The plan is located in the **Lev*n*** ⇨ **Utilities** directory. When adding a planned component, your SAS consultant should be contacted to obtain a new customized deployment plan.
Products are not part of the previously used order, but they are part of an order at the same release as my last order used in the SAS 9.4 deployment.	You must create a new plan file that matches the current deployment topology. Use the new order.
Products are part of the previously used order, but they are part of an order that is at a more current release than my last order used in the SAS 9.4 deployment.	You must create a new plan file that matches the current deployment topology. Use the new order.

6. On the Local Machine Name page, only one local machine can be specified per configuration. The SAS Deployment Wizard pauses adding products if the host name that you used in the initial configuration does not match the operating system host name. The SAS Deployment Wizard asks you to address the discrepancy before continuing. Here are the causes and solutions for a mismatch:

   - SAS Deployment Wizard is running on a different machine than the machine that created the configuration directory. Cancel and run the SAS Deployment Wizard on the machine that performed the original configuration.
   - SAS Deployment Wizard is running on the same machine that created the configuration directory. However, the command to identify the configuration host name returns a different but equivalent value. Determine the correct value to use from the MACHINE_NAME_FROM_METADATA option. Cancel and run the SAS Deployment Wizard with this correct value. For example, on Windows:

     ```
     cd sas-software-depot-location
     sasdm -confighostname correct-host-name
     ```

     Or, you can find the correct value in the topology report from the SAS Content Assessment system evaluation application. Cancel and run the SAS Deployment Wizard with this correct value.
   - SAS Deployment Wizard was used to install a product from a machine other than the machine that performed the original configuration. This second host name

value was recorded in metadata, causing a mismatch. Please contact SAS Technical Support to determine how to proceed.

After you provide the local machine name, you are asked to validate that the fully qualified local host name matches the originally configured host name. The fully qualified local host name is the host name for the local host as defined on the Local Machine Name page. A default value is derived from the host's system configuration, but that value can be overridden. The originally configured host name is the host name specified in the original configuration for this configuration directory. Changing this value while configuring new products is not supported. If this value does not match the value for fully qualified local host name, the configuration process does not continue and you receive an error message. If you want to change the persisted host name for this configuration directory, see "Using the SAS Deployment Manager to Update Host Name References" in *SAS Intelligence Platform: System Administration Guide*.

7. Shut down your SAS metadata, compute, and middle-tier (web) servers.

   For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*.

8. Close all SAS clients, such as SAS Management Console.

9. You should back up your SAS 9.4 deployment. For more information, see "About the Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide* and SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.

10. If you have a multiple-machine SAS deployment, it is important to run the SAS Deployment Wizard using your new deployment plan on every machine. Follow this order:

    a. Metadata server or servers

    b. SAS servers

    c. SAS data servers

    d. SAS middle-tier servers

    e. SAS clients

11. Log on to the machine as the SAS Installer user.

    This is the user with which your SAS deployment was installed. For more information, see "Required External User Accounts for SAS".

12. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system:

Table A3.3 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	**`setup.exe -record -deploy`**
UNIX	**`setup.sh -record -deploy`**
z/OS	**`setup.rexx -record -deploy`** To use a temporary directory other than **`/tmp`**, specify **`-templocation`** *new-temp-dir*.

For more information, see "Creating SAS Software Depots".

You should see a welcome page similar to the following:

13. Select the language that you want the SAS Deployment Wizard to use when it displays text.
14. Select **Install SAS Software**.
15. If you have more than one SAS software order in your depot, the wizard prompts you to select the order that you want to install.
16. If the wizard detects that there are SAS software products in your order that are more recent than what you have deployed on your machine, then the wizard automatically goes into Update mode.

    For more information, see "Adding, Updating, and Upgrading SAS Software".

    If you need to install product updates, then follow these steps:

    a. Install the updates using the SAS Deployment Wizard.

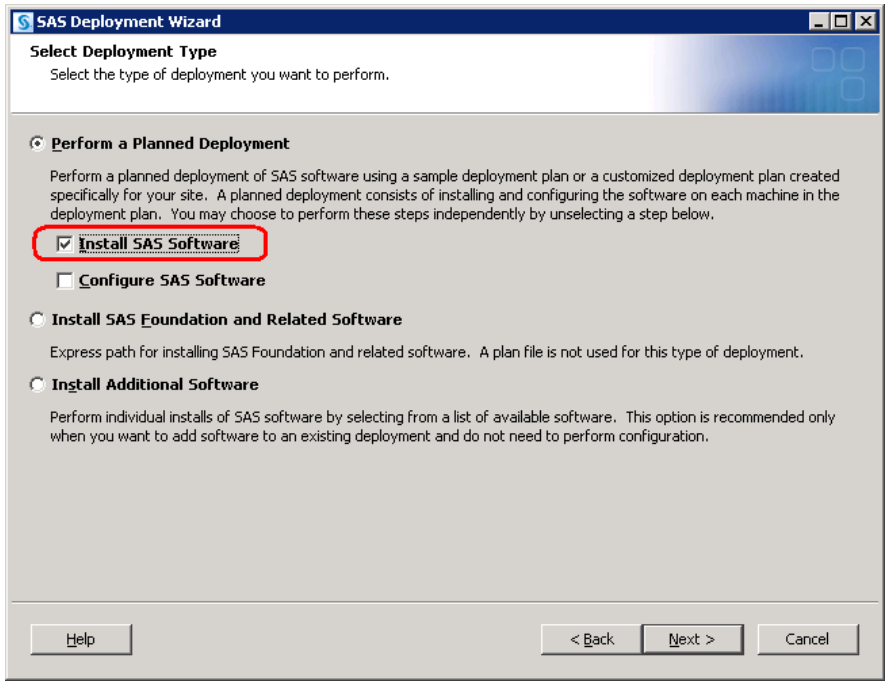
       CAUTION:
       Consult *SAS Guide to Software Updates and Product Changes* before performing *any* SAS updates.

    b. Perform any required manual configuration steps.

    Note: If you performed an update on a machine, you should update all of the machines in your SAS deployment first. After you have updated all of the machines in your SAS deployment, deploy your additional SAS products.
17. If you are adding a product to the SAS middle tier, make sure that the SAS Web Infrastructure Platform Data Server is not running.

    For more information, see "Use Individual Scripts to Operate Servers" in *SAS Intelligence Platform: System Administration Guide*.
18. Restart the SAS Deployment Wizard, following the directions in Step 12.
19. On the Select Deployment Type page, choose **Perform a Planned Deployment** and **Install SAS Software**.

    Note: Make sure that **Configure SAS Software** is deselected.



20. (UNIX and z/OS only) Specify the location (SASHome) where you want to install SAS.
21. Specify the type of deployment plan that you are using.
    - non-customized or customized deployment plan

      Choose **Specify the full path to a non-customized or customized deployment plan**, and then click **Browse** to navigate to the plan file.
    - standard deployment plan

      Choose **Select a standard deployment plan**, and then choose the appropriate deployment plan in the drop-down list.
22. Select the machine on which you are installing, and select the SAS products that you want to install by doing the following:
    a. Select the machine on which you are installing software from the **Machine** drop-down list.

       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".

    b. By default, all products displayed are installed. If there are no product changes, then the deployment wizard will not re-install any pre-existing products.

       Important: **Uncheck** SAS Environment Manager. If you do not uncheck SAS Environment Manager, before you run any subsequent configuration steps, you must re-install any SAS Environment Manager hot fixes that were previously applied and you must re-install the quarterly SAS Security Update.
23. If you are installing SAS on a Windows 64-bit operating system, you will see a wizard page that asks you which mode you want to install SAS Foundation in (32-bit or 64-bit mode). The advantage to installing SAS in 64-bit mode is that you can access memory beyond the four GB limit imposed by the 32-bit Windows operating system. For more information, consult the deployment wizard online Help.

24. Specify the location of the SAS installation data file that contains information about the software that you have licensed for the current machine.

    CAUTION:
    Be careful to use the correct 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.

25. (z/OS only) Provide input for the following prompts:

    Note: For more information, see the Configuration Guide for SAS 9.4 Foundation for z/OS.

    - **FTP Batch Generation**

      Specify the fully qualified host name or IP address of the z/OS mainframe machine on which you are deploying SAS. Also supply a valid user ID and password with which the SAS Deployment Wizard will FTP deployment information to the mainframe machine.

    - **Specify Jobcard Information**

      Specify the job account, programmer name, message class, message level, time, and region values. For more information, consult your z/OS documentation.

    - **Select Installation Action**

      Choose **B - Add products to existing SAS libraries**.

    - **Specify New Installation Qualifier**

      Specify the path where you want to install SAS. You can also choose to require Storage Management Subsystem (SMS) parameters. For more information, consult your z/OS documentation.

    - **Specify IBM's SMS Parameters**

      If you chose to require Storage Management Subsystem (SMS) parameters on the previous page, enter them here. For more information, consult your z/OS documentation.

    - **Specify Parameters**

      These are all parameters that are used in various DD statements throughout the installation. For more information, consult your IBM JCL documentation.

    - **Specify Entry Point**

      Specify the parameters for various ways that SAS can be run with different performance implications. Choose **SAS** (default ENTRY point) to run the unbundled configuration. Choose **SASB** to run the bundled configuration. Choose **SASLPA** to run the bundled configuration with some modules installed in the Link Pack Area (LPA).

    - **Specify Parameters**

      Specify additional parameters for DD statements. VOLDISK designates the VOLSER that the installed data sets go to. For more information, consult your IBM JCL documentation.

    - **Specify Parameters**

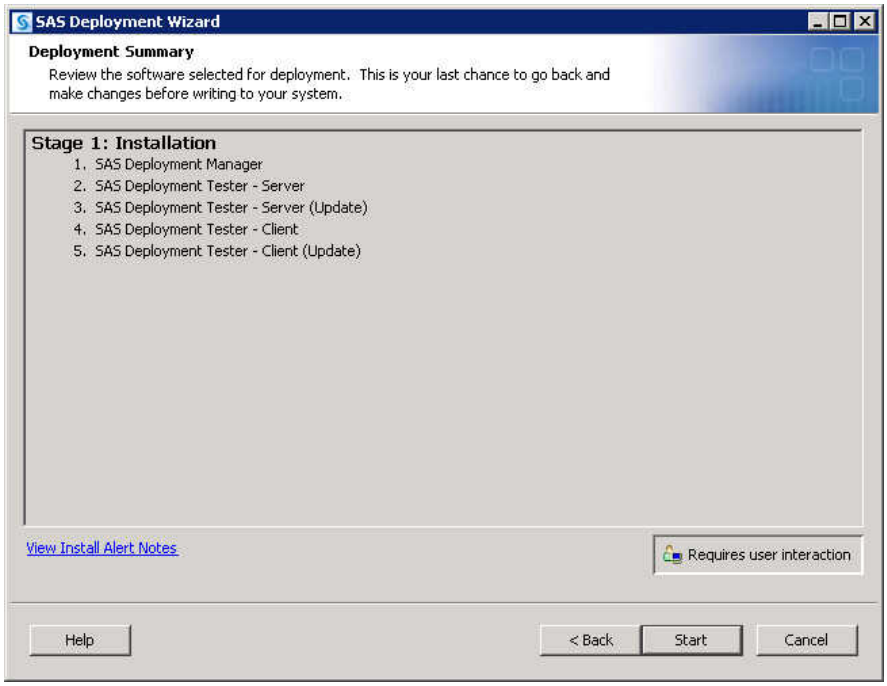
      Specify parameters used for reblocking the SAS load modules to a library with an optimum block size.

26. Deselect any languages that you do not want SAS to support. By default, SAS attempts to support all languages that your machine's operating system is configured for.
27. Review the list of required third-party software that is required for the SAS software that you are installing on the current machine. (The list of third-party software depends on the SAS software that you are installing on the current machine.)
28. In the pages that immediately follow, be prepared to provide paths to these third-party applications. (The number of wizard pages varies depending on the SAS software that you are deploying on the current machine.)

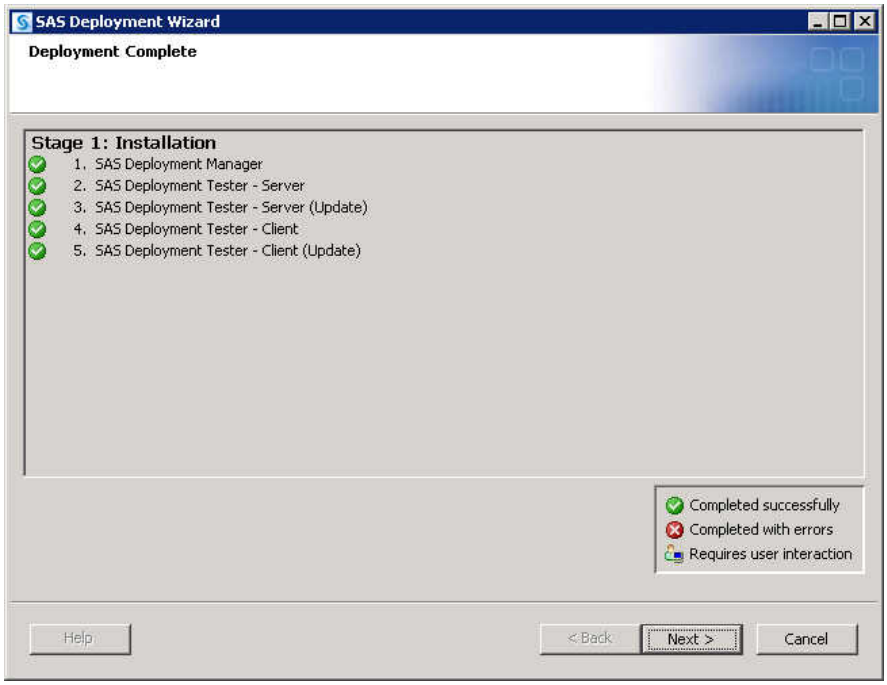
    Note: You must provide valid paths to the requested third-party software, or the SAS Deployment Wizard does *not* let you continue with the installation.
29. The SAS Deployment Wizard has finished collecting installation input. This is the last opportunity to go back and change any information that you have provided in previous pages before the wizard begins writing to your system.

    Make one of the following choices:

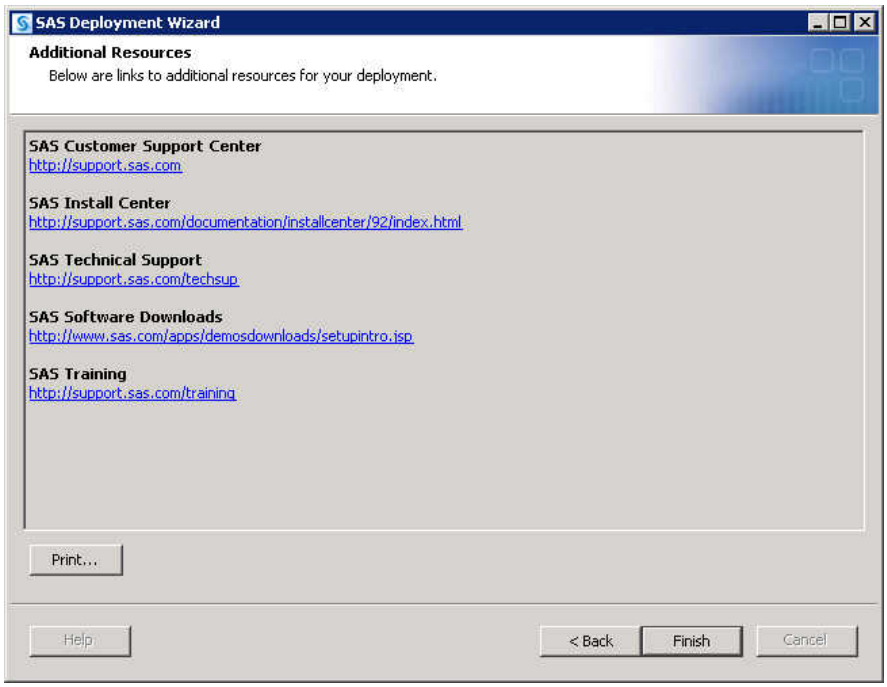
    - Select **Start** to begin installing SAS files to the current machine.
    - Select **Back** to navigate to earlier wizard pages to change installation information previously entered.
    - Select **Cancel** to terminate the wizard session. Note that you will lose installation information previously entered.



When you see a page similar to the following, the SAS Deployment Wizard is finished:



30. Click **Next** to go to the Additional Resources page.



31. Click **Finish** to close the deployment wizard.
32. To configure the SAS products that you just installed, proceed to "Configure SAS Products".

Note: If you are upgrading SAS Studio Basic, you must rerun the SAS Deployment Wizard to configure SAS Studio Basic. For more information about configuring a SAS product, see "Configure SAS Products".

Add SAS Products to a SAS Middle-Tier Horizontal Cluster

A SAS horizontal middle-tier cluster consists of a primary machine and additional machines referred to as cluster nodes. Anytime that you add SAS software to a primary middle-tier machine, you must also update the configuration for each cluster node using the SAS Deployment Wizard.

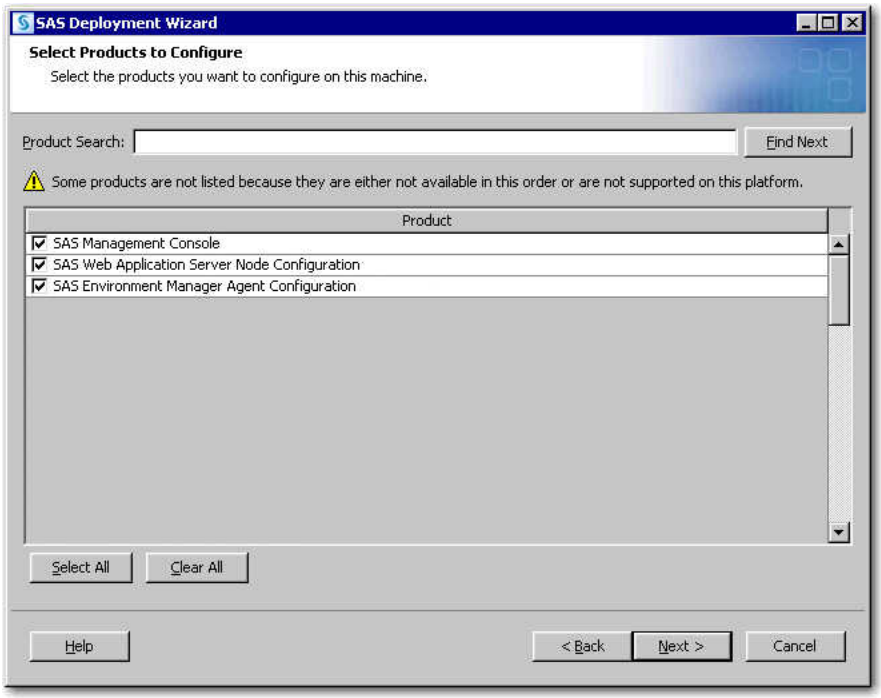
To update SAS software on a horizontal middle-tier cluster node, you must perform the following tasks:

1. Add the software to the primary horizontal middle-tier cluster machine first.

   For more information, see "Add SAS Products That Require Configuration".

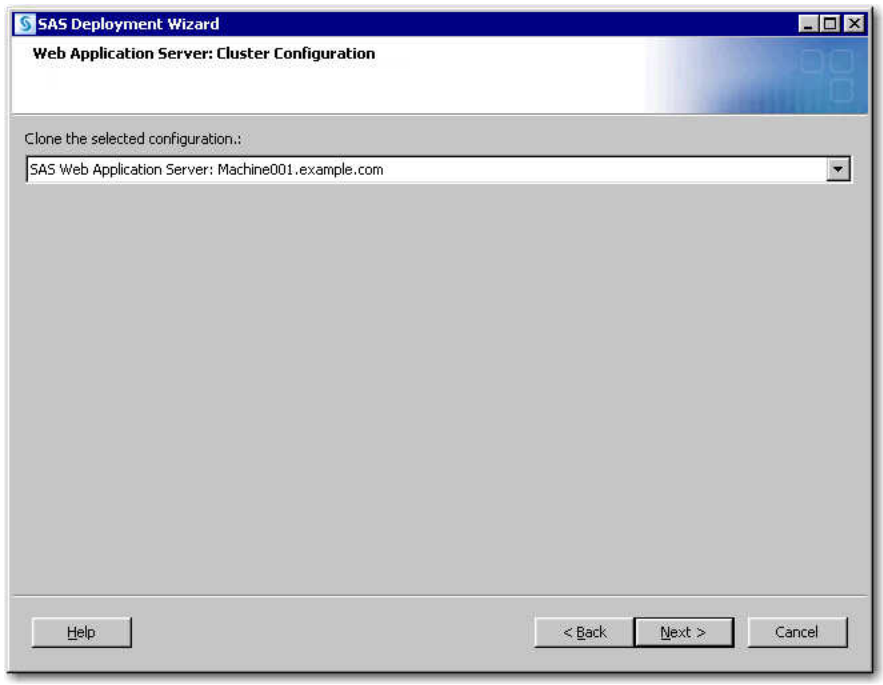
2. Reconfigure the primary horizontal middle-tier cluster machine.

   When you reconfigure the machine, the Select Product to Reconfigure page should resemble the following:



   For more information, see "Add SAS Products That Require Configuration".

   If you are distributing SAS web applications across multiple machines and you have two or more different configurations of web applications on your machines, you can cluster each of the different configurations using the deployment wizard, Web Application Server: Cluster Configuration page.



Use the drop-down list to select the machine that you are clustering. For example, your middle tier might resemble the following:

- Machine 1: SAS Web App Servers: WRS, Portal - cluster A
- Machine 2: SAS Web App Servers: WRS, Portal - cluster A
- Machine 3: SAS Web App Servers: VA Hub and other VA web apps - cluster B
- Machine 4: SAS Web App Servers: VA Hub and other VA web apps - cluster B

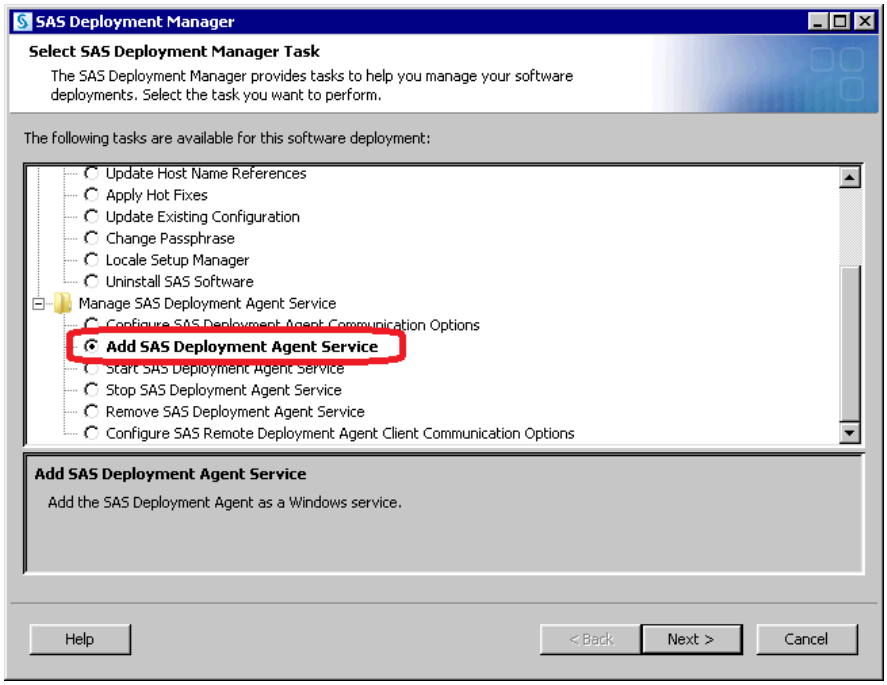
3. Add the software to each middle-tier cluster node machine, using the same process as in Step 1.
4. Reconfigure each middle-tier cluster node machine, using the same process as in Step 2.

Add a SAS Deployment Agent Service (Windows Only)

The SAS Deployment Agent is required for deployments that run remote processes. SAS uses the 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.

To add a SAS Deployment Agent service on Windows using the SAS Deployment Manager, follow these steps:

1. On the machine on which you want to add an agent, navigate to ***`SAS-installation-directory`*** from the Windows **Start** menu **All Programs** ⇨ **SAS** ⇨ **SAS Deployment Manager 9.4**.
2. In the Choose Language window, select a language, and click **OK**.
3. On the Select SAS Deployment Manager Task page, under **Manage SAS Deployment Agent Service**, click **Add SAS Deployment Agent Service**, and click **Next**.



4. Select agent start-up options, and click **Next**.
   - Select **Start SAS Deployment Agent After Configuration** to restart the SAS Deployment Agent when this configuration is completed.
   - Select **Start SAS Deployment Agent Automatically when Windows Starts** to restart the agent whenever Windows restarts.
5. 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 deployment manager begins writing to your system.

   Make one of the following choices:
   - Select **Start** to begin adding the service to the current machine.
   - Select **Back** to navigate to earlier deployment manager pages to change input previously entered.
   - Select **Cancel** to terminate the deployment manager session. Note that you will lose information previously entered.
6. When the SAS Deployment Manager has added the service, the Deployment Complete page opens. Click **Finish** to close the SAS Deployment Manager.

Add 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*/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

What Is Configuring and Unconfiguring?

This document uses the terms *configuring* and *removing a configuration* (unconfiguring) in the following ways.

- configuring

  In addition to installing products, the SAS automated deployment tools configure products. In most deployment scenarios, you install and configure in one SAS Deployment Wizard session. But, because the deployment wizard enables you to separate installation and configuration into separate tasks, it is possible that you can install a SAS product and then configure it later by rerunning the wizard. Therefore, you *configure* SAS products that have been installed on your system but have not yet been configured.

  For more information, see "Configure SAS Products".

  Your SAS configuration is affected when you add SAS products to a deployment that requires configuration.

  For more information, see "Adding SAS Products".

- removing a configuration

  Deleting one or more product configurations is referred to as removing a configuration. The following scenarios for removing SAS product configurations are common:

  - uninstalling a SAS product
  - adding new SAS products that require you to remove the current configuration before configuring it again
  - correcting configuration errors

  For more information, see "Removing a SAS Configuration".

Configuring SAS Products

About Configuring SAS Products

You can configure SAS products that are new to your deployment, or you can configure SAS products that you are updating or upgrading:

- "Configure SAS Products"
- "Configure Updated or Upgraded SAS Products"

Note: Because the SAS Metadata Server manages the repository that contains SAS configured objects, this server cannot be reconfigured by the SAS Deployment Manager. For more information, see *SAS Intelligence Platform: System Administration Guide*.

Configure SAS Products

Follow these steps to use the SAS Deployment Wizard to configure SAS products that you have already installed.

Note: If you are reconfiguring SAS products, when the deployment wizard prompts you for a configuration directory, you should reuse the former configuration directory instead of creating a new directory.

Important: Before you begin a product's configuration and after each successful configuration using the SAS Deployment Wizard, you should perform a backup. For more information, see "About the Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide* and SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.

1. Make sure that the machine where you want to add the new SAS 9.4 software contains the necessary user accounts, groups, and ports.

   For more information, see Chapter 3, "Creating Users and Groups and Designating Ports".

2. If you are reconfiguring SAS Web Parts for Microsoft SharePoint that was deployed manually, read the following topic before proceeding: "Reconfiguring SAS Web Parts for Microsoft SharePoint" in *SAS Intelligence Platform: Web Application Administration Guide*.

3. Make sure that the SAS servers on your SAS server tier are running.

   For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*.

4. If you are adding a product to the SAS middle tier, make sure that the SAS Web Infrastructure Platform Data Server is running.

   For more information, see "Use Individual Scripts to Operate Servers" in *SAS Intelligence Platform: System Administration Guide*.

5. Start the SAS Web Server on the middle tier. Make sure that the SAS Deployment Agent is running. Your SAS Web Application Server should *not* be running.

   Note: If you are adding a stand-alone middle-tier node, there are no SAS programs to start.

6. Make sure that you use a deployment plan that contains any add-on products as well as all original products for the machine that you are configuring.

Table A3.4 *Where Is My Deployment Plan?*

SAS 9.4 Products Being Added	Location of My Deployment Plan
Are part of my original SAS 9.4 order	In the **`Plan_Files`** directory in the original SAS Software Depot (or in a location to which you are pointing the SAS Deployment Wizard)
Are on a machine where a SAS 9.4 server, middle tier, or data tier already resides	In the SAS configuration directory in the **`Utilities`** directory
Are part of my new SAS 9.4 order	In the **`Plan_Files`** directory in the SAS Software Depot (or in a location to which you are pointing the SAS Deployment Wizard)

7. Log on to the primary horizontal middle-tier cluster machine as the SAS Installer user. This is the user with which your SAS deployment was installed. For more information, see "Required External User Accounts for SAS".

   Then, if the product requires configuration, follow the order specified in "Installation Order Rules for Multiple Machine Deployments".

8. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.

Table A3.5 *Start-Up Commands for the SAS Deployment Wizard*

Operating System	Command
Windows	**`setup.exe -record -deploy`**
UNIX	**`setup.sh -record -deploy`**
z/OS	**`setup.rexx -record -deploy`** To use a temporary directory other than **`/tmp`**, specify **`-templocation`** *new-temp-dir*.

For more information, see "Creating SAS Software Depots".

You should see a welcome page similar to the following:

9. Select the language that you want the SAS Deployment Wizard to use when it displays text.
10. Select **Install SAS Software**.
11. If you have more than one SAS software order in your depot, the wizard prompts you to select the order that you want to configure.
12. If the wizard detects that there are SAS software products in your order that are more recent than what you have deployed on your machine, then the wizard automatically goes into Update mode.

    For more information, see "Adding, Updating, and Upgrading SAS Software".

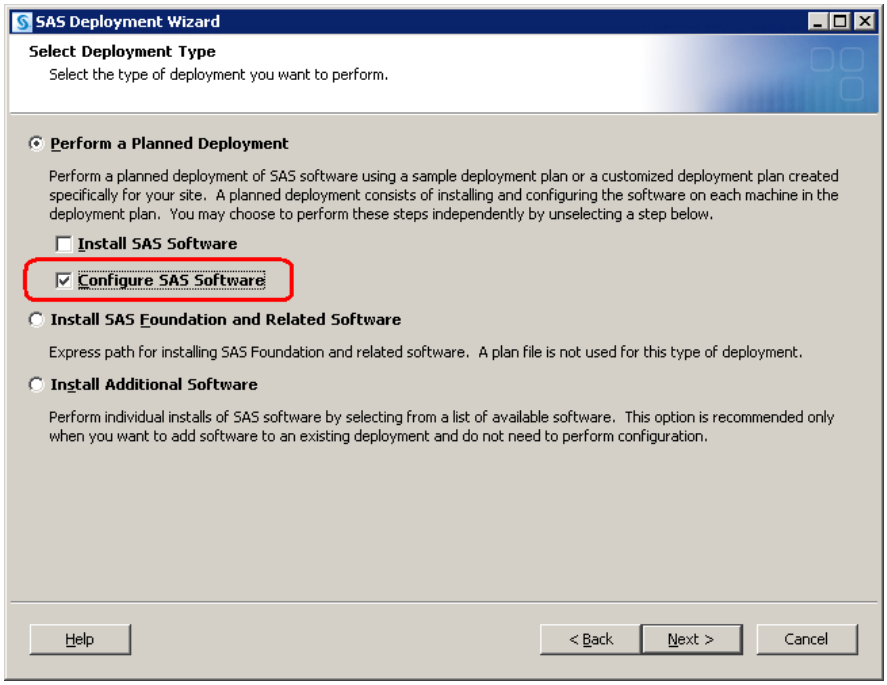
    If you need to install product updates, then follow these steps:

    a. Install the updates using the SAS Deployment Wizard.

       CAUTION:
       Consult *SAS Guide to Software Updates and Product Changes* before performing *any* SAS updates.

    b. When you are finished performing any required manual configuration steps, rerun the SAS Deployment Wizard.
13. Select **Perform a Planned Deployment** and **Configure SAS Software**.

    Note: Make sure that **Install SAS Software** is deselected.



14. Specify the type of deployment plan that you are using.

    - non-customized or customized deployment plan

      Choose **Specify the full path to a non-customized or customized deployment plan**, and then click **Browse** to navigate to the plan file.

    - standard deployment plan

      Choose **Select a standard deployment plan**, and then choose the appropriate plan in the drop-down list.

15. If there are multiple machines in your SAS deployment, select the machine on which you are configuring.

    The deployment wizard lists the SAS products in your order that should be installed on the machine.

16. Choose either the **Typical** or the **Custom** configuration prompting level. You want to be able to access the configuration page where you can set the SAS Metadata Server. The Express prompt level does not allow you to access this SAS server configuration setting.

    Note: When adding SAS 9.4 products that require configuring, make sure that you specify the metadata repository name if the one that you are using has a name other than the default (Foundation). To access the deployment wizard page to specify a custom repository name, choose the Custom configuration prompting level.

17. On the Specify Configuration Information page, specify the configuration directory and level for your current SAS deployment to which you are adding the new configuration.

18. If you are adding the products that you are configuring to an existing SAS deployment, you are asked to confirm your selection.

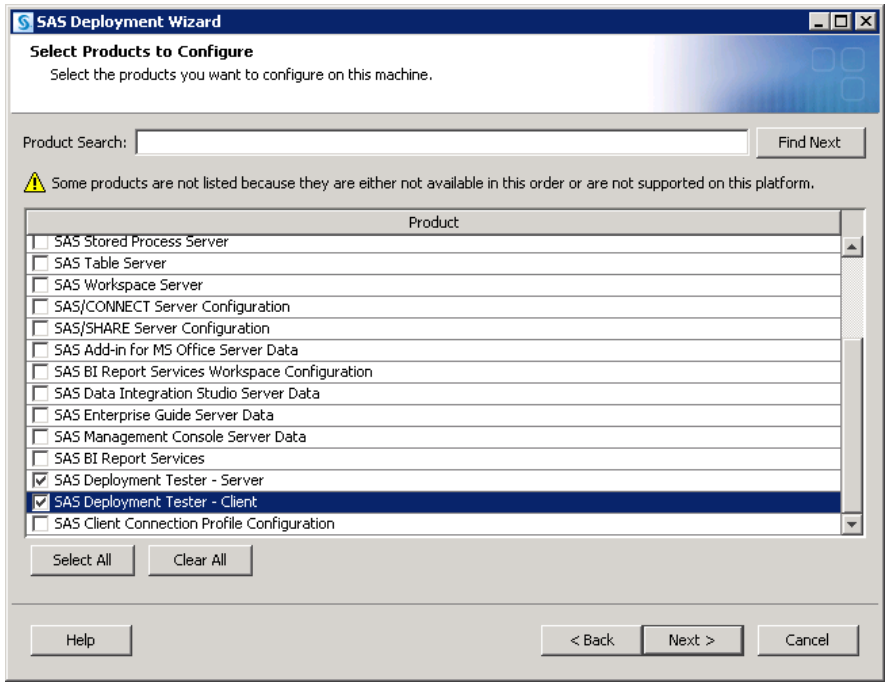
19. In the Select Products to Configure page, choose only those products that you want to configure on the machine.

The SAS Deployment Wizard has queried the metadata about your current configuration and checked the appropriate products to be configured.

We recommend that you accept the product selections displayed on this page.

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

Note: In the SAS Deployment Wizard, configure your web application server again by choosing the automatic configuration option. Note that manual configuration is no longer supported.



20. Provide the remaining configuration information as the wizard prompts you for it. (The actual number of configuration pages that you must provide input for depends on the prompt level that you chose.) For more information, see Step 9 in the topic, "Install and Configure SAS Interactively."

    Important: If you intend to configure an add-on product, you must configure it on the same machine on which the current configuration was originally created. During configuration, the SAS Deployment Wizard reviews whether the current machine's host name matches the host name used in the original configuration. These values are presented in the Validate configuration host names window. If the values do not match, configuration pauses, and the SAS Deployment Wizard asks you to address the discrepancy before continuing. The **Originally Configured Host Name** value is the host name that was used when the system was originally configured and cannot be changed in the SAS Deployment Wizard. The **Fully-Qualified Local Host Name** defaults to the current machine host name and can be changed in the previous Local Machine Name window. There are several causes of and solutions to a mismatch:

    - SAS Deployment Wizard is running on a different machine than the machine that created the configuration directory. Cancel SAS Deployment Wizard and run it on the correct machine.
    - SAS Deployment Wizard is running on the correct machine, but the name from the Local Machine Name window does not match the originally configured host name. This might occur if an alias was used during

configuration. Click **Back** to return to the Local Machine Name window, enter the originally configured host name, and continue. Or, cancel SAS Deployment Wizard, and specify the host name when you start SAS Deployment Wizard by issuing the following commands:

```
cd sas-software-depot-location
setup -confighostname correct-host-name
```

Or, you can find the correct value in the topology report from the SAS Content Assessment system evaluation application. Cancel and run the SAS Deployment Wizard with this correct value.

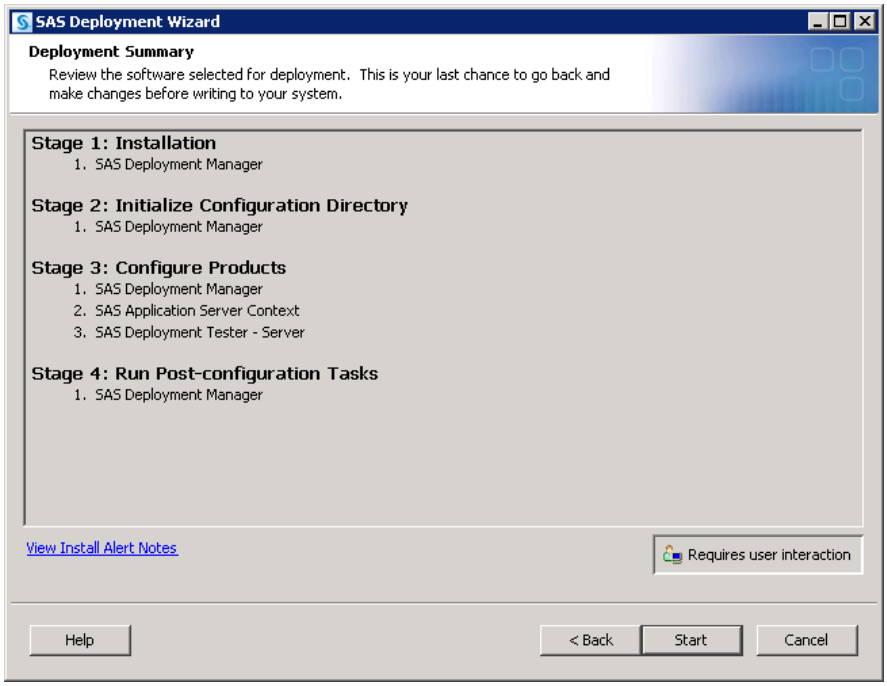
- SAS Deployment Wizard was used to install a product from a machine other than the machine that performed the original configuration. In this case, please contact SAS Technical Support for guidance.

Note: If you want to change the persisted local host name for this configuration directory, see "Using the SAS Deployment Manager to Update Host Name References" in *SAS Intelligence Platform: System Administration Guide*.

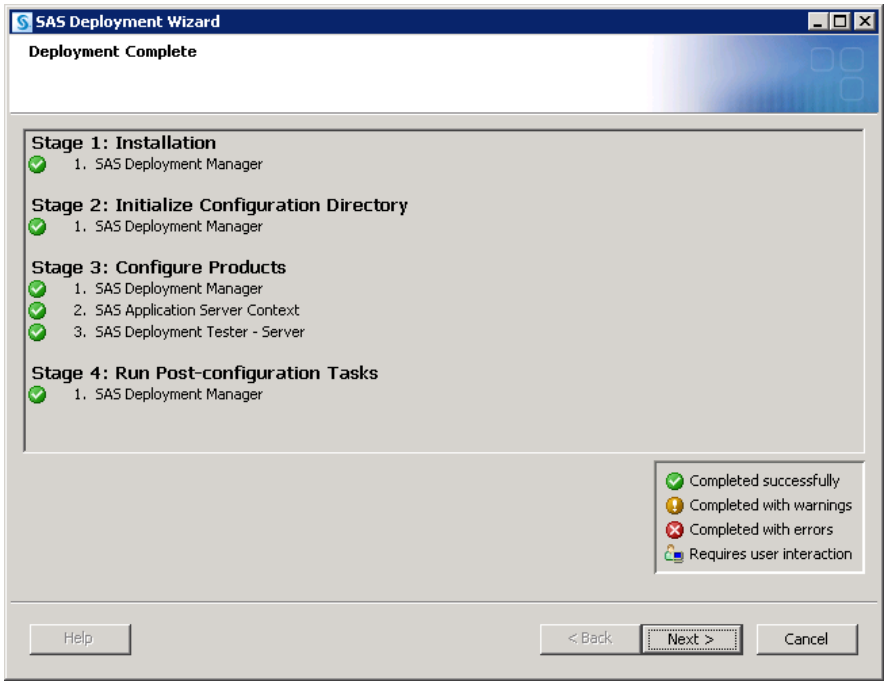
21. When you see the Deployment Summary page, the deployment wizard has finished collecting configuration input. This is the last opportunity to go back and change any information that you have provided in previous pages before the wizard begins writing to your system.

    Make one of the following choices:

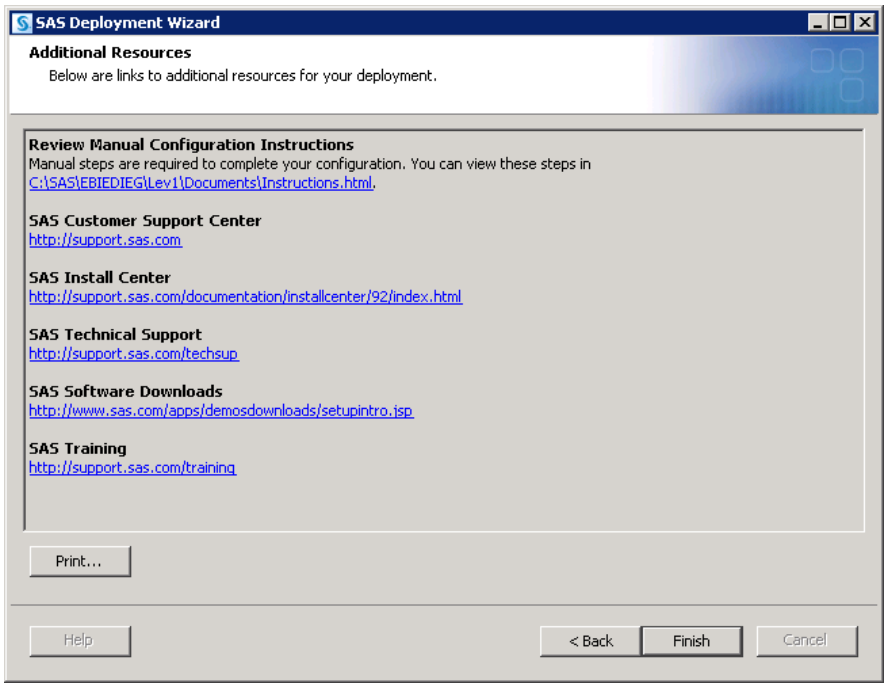
    - Select **Start** to begin writing the configuration to the current machine.
    - Select **Back** to navigate to earlier wizard pages to change configuration information previously entered.
    - Select **Cancel** to terminate the wizard session. Note that you will lose configuration information previously entered.



When you see a page similar to the following, the SAS Deployment Wizard is finished:



22. Click **Next** to go to the Additional Resources page.



23. Click **Review Manual Configuration Instructions** and complete any necessary manual configuration steps.

    The SAS Deployment Wizard writes the Instructions.html file to the Documents directory on the SAS configuration path. For example:

    - UNIX and z/OS:

      `/opt/SAS/Lev1/Documents/Instructions.html`

    - Windows:

      `C:\SAS\Config\Lev1\Documents\Instructions.html`

Note: The wizard backs up your previous Instructions.html file to the **Backup** subdirectory under the **Documents** directory on the SAS configuration path (for example, **C:\SAS\Config\Lev1\Documents\Backup\Instructions.html**_*YYYY-MM-DD-HH.MM*.**bak**).

24. If you encounter error messages about your SAS license expiring, you might need to perform another procedure to correct this.

    Note: You might also encounter SAS license expiration errors when you are adding on SAS products.

    For more information about how to fix SAS license expiration errors, refer to the following documents:

    - The Software License Renewal Instructions--SAS for Microsoft Windows for x64 Planned Deployment.
    - The Software License Renewal Instructions--SAS for UNIX Environments Planned Deployment.

25. Click **Finish** to close the deployment wizard.
26. When you have completed manual configuration tasks, and you have made the necessary backups, repeat these steps listed in this topic on each machine defined in your deployment plan. Remember, it is important to create a restore point for your deployment by backing up your SAS 9.4 deployment. For more information, see "About the Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide* .
27. For multi-machine deployments, back up your metadata repository and your SAS configuration directory before you run the SAS Deployment Wizard on the next machine called for by your deployment plan. For more information, see SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.
28. If you are using SAS Deployment Tester to verify your deployment, then be sure to restart SAS Deployment Tester Server before running your deployment tests.
29. When you are finished installing and configuring SAS on each machine called for in your deployment plan, proceed to the section, "Validate the SAS 9.4 Servers".

Configure Updated or Upgraded SAS Products

Follow these steps to use the SAS Deployment Manager to configure SAS products for which you have already installed updates or upgrades.

Note: The SAS Deployment Wizard and the SAS Download Manager can be run on operating systems that do not have windowing systems. For more information, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide.

Important: Before you begin a product's configuration and after each successful configuration using the SAS Deployment Wizard, you should perform a backup. For more information, see "About the Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide* and SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.

1. If you are using your own Transport Layer Security (TLS) certificates, then you must reconfigure your certificate settings.

   For more information, see *SAS Intelligence Platform: Middle-Tier Administration Guide*.

2. On the SAS compute server tier, stop all SAS servers except the metadata server. On the SAS middle tier, stop all servers except the SAS Web Infrastructure Platform Data Server.

   (Your SAS Web Application Server and your SAS Environment Manager server should not be running.)

   For more information, see "Operating Your Servers" in *SAS Intelligence Platform: System Administration Guide*.

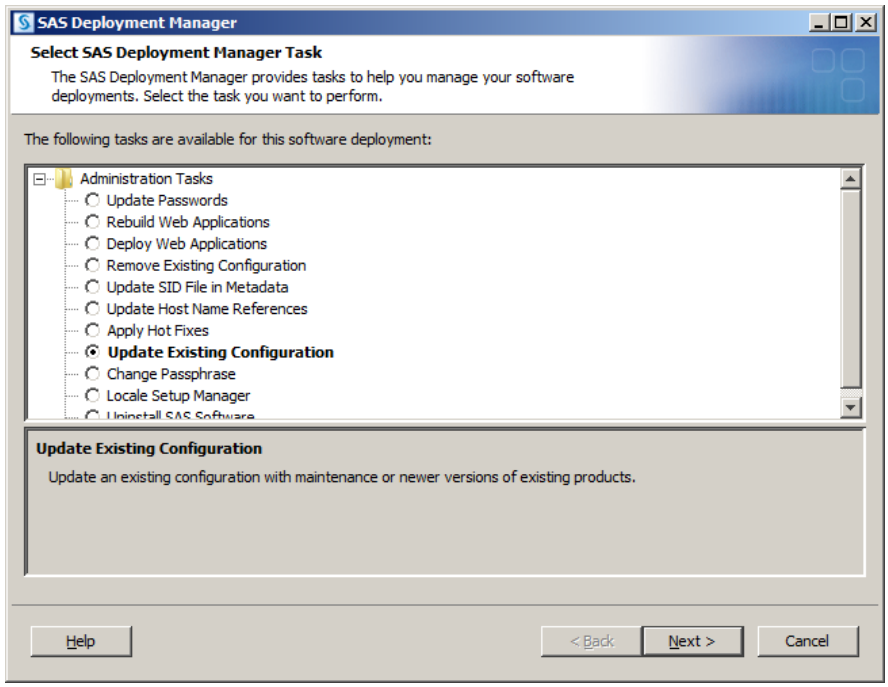
3. If you are reconfiguring SAS Web Parts for Microsoft SharePoint that was deployed manually, read the following topic before proceeding: "Reconfigure a Manual Deployment of SAS Web Parts for Microsoft SharePoint" in *SAS Intelligence Platform: Web Application Administration Guide*.

4. Log on to the machine on which you want to update the SAS product configuration as the SAS Installer user. This is the user with which your SAS deployment was installed and updated. For more information, see "Required External User Accounts for SAS".

5. On the host machine for the products whose configurations you are updating, 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.

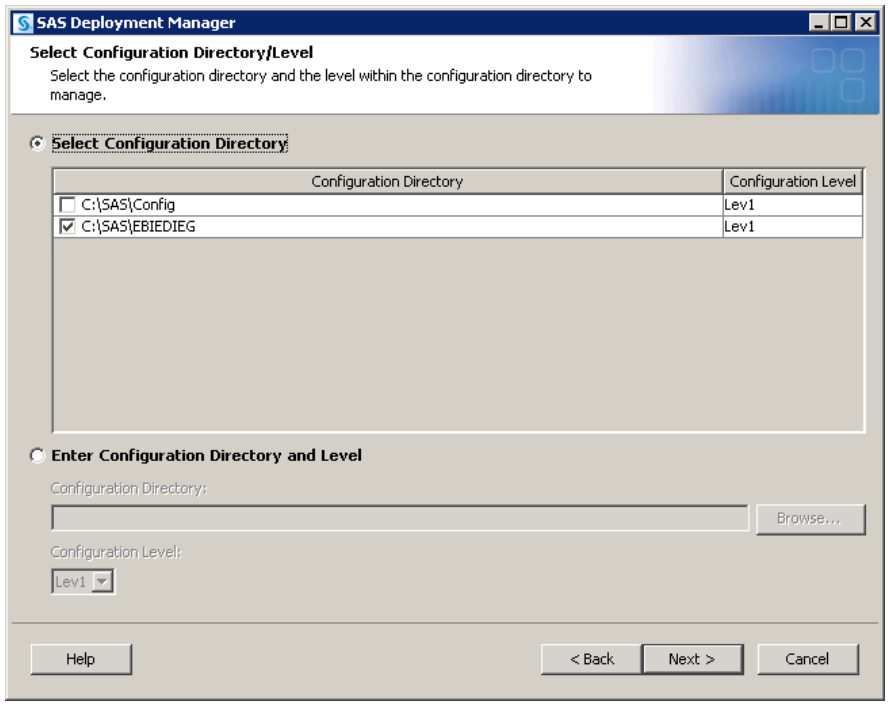
6. In the Choose Language window, select a language, and click **OK**.

7. In the SAS Deployment Manager, select **Update Existing Configuration**.



8. In the next page, specify the configuration directory and the level (for example, **Lev1**) that you want to update.

   Note: Anytime you configure your deployment, you must also configure your web application server, even if your configuration does not involve your SAS middle tier. If you manually configured the web application server when you deployed SAS 9.4, then configure it again manually. If the deployment wizard automatically configured your web application server, then choose the automatic configuration option.

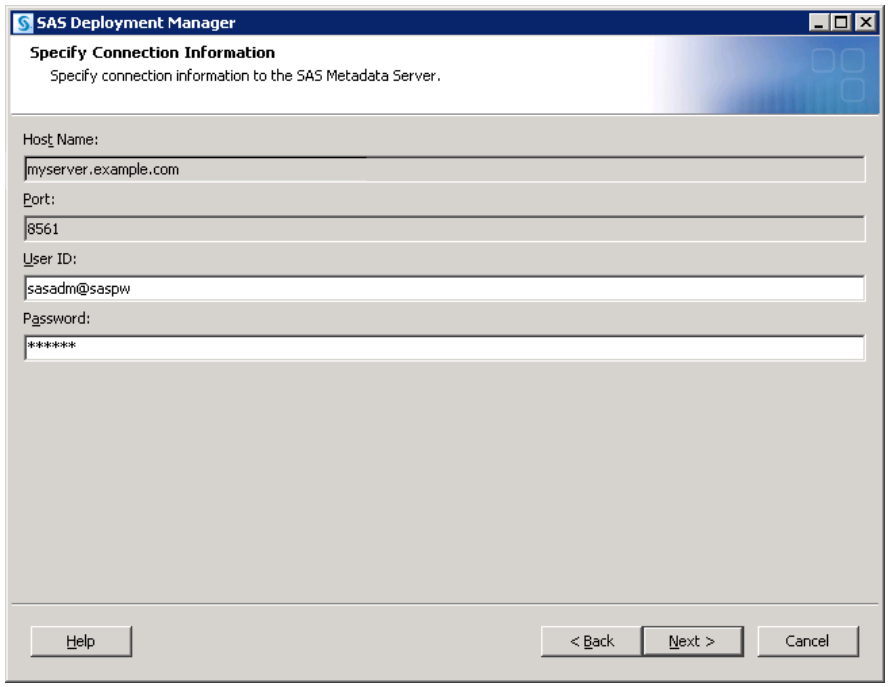


9. If you are running in a UNIX environment, restart the SAS Metadata Server:

   a. At a UNIX prompt, navigate to the directory where the SAS Metadata Server is configured.

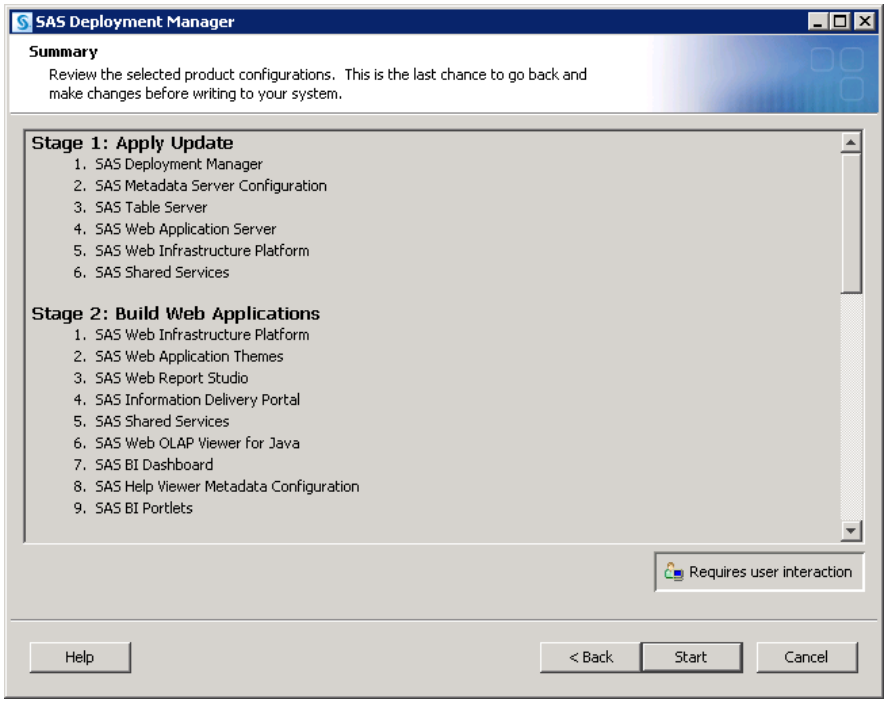
   b. Enter **`./MetadataServer.sh start`**

10. In the next page, enter the user ID and password for an unrestricted administrative user.



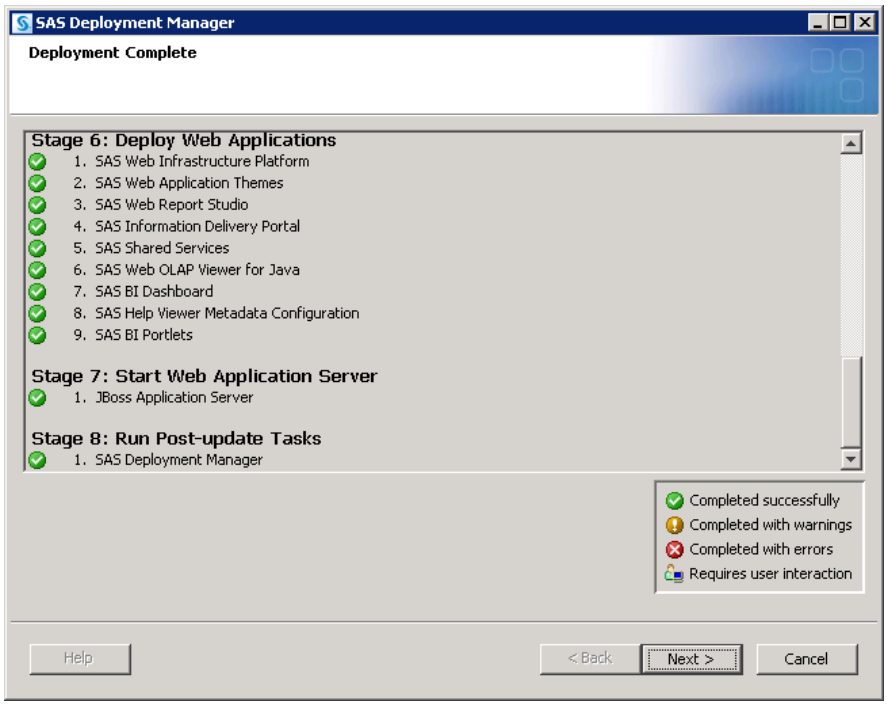
11. When you see the Summary page, the deployment manager has finished collecting configuration input. This is the last opportunity to go back and change any information that you have provided in previous pages before the manager begins writing to your system.

- Select **Start** to begin writing the configuration to the current machine.
- Select **Back** to navigate to earlier manager pages to change configuration information previously entered.
- Select **Cancel** to terminate the manager session. Note that you will lose configuration information previously entered.

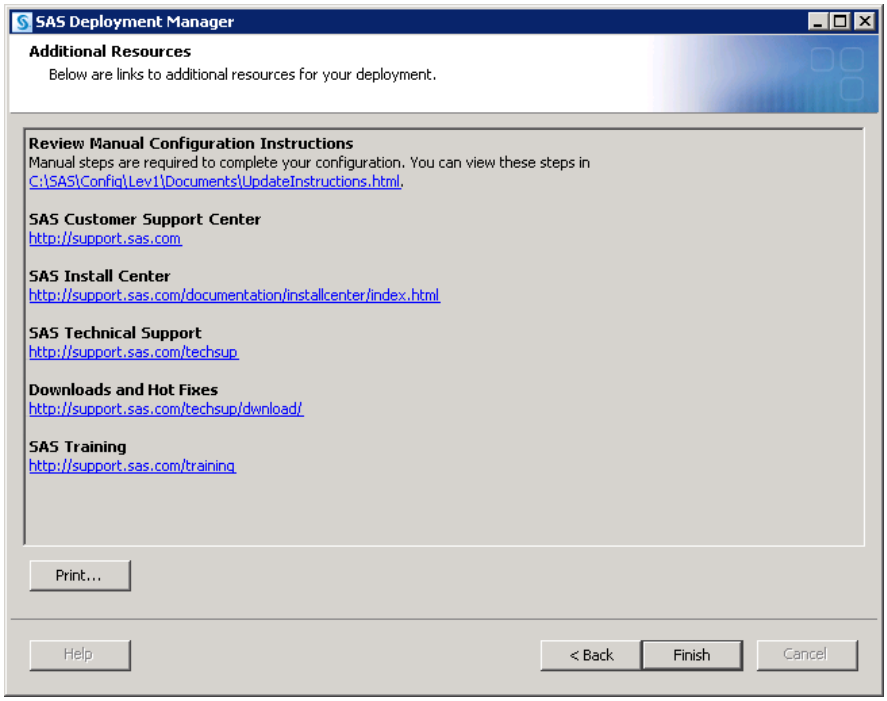


During the configuration process, SAS automatically restarts your SAS servers, configures your web application servers, and rebuilds and redeploys your SAS web applications.

When you see a page similar to the following, the SAS Deployment Manager is finished:



12. Click **Next** to go to the Additional Resources page.



13. If your configuration:

- encountered errors

  The first link on the Additional Resources page goes to the ConfigurationErrors.html file. Click this link and follow the instructions to debug your configuration.

- encountered no errors

The first link on the Additional Resources page goes to the UpdateInstructions.html file. Click this link and follow the instructions to complete any manual steps necessary to complete your configuration.

The SAS Deployment Manager writes its HTML pages to the Documents directory on the SAS configuration path. For example:

- UNIX and z/OS:

  /opt/SAS/Lev1/Documents/UpdateInstructions.html

- Windows:

  C:\SAS\Config\Lev1\Documents\UpdateInstructions.html

  Note: The manager backs up your previous HTML files to the Backup subdirectory under the Documents directory on the SAS configuration path (for example, C:**SAS\Config\Lev1\Documents\Backup\UpdateInstructions.html**_*YYYYMM-DD–HH.MM*.**bak**).

14. Click **Finish** to close the deployment manager.

    Detailed log messages are written to a file called *product-name*_**updateConfigure_date-and-time.log**, where *product-name* identifies the product that was configured. The deployment manager writes this file to ***SAS-configuration-directory*\Logs\Configure**.

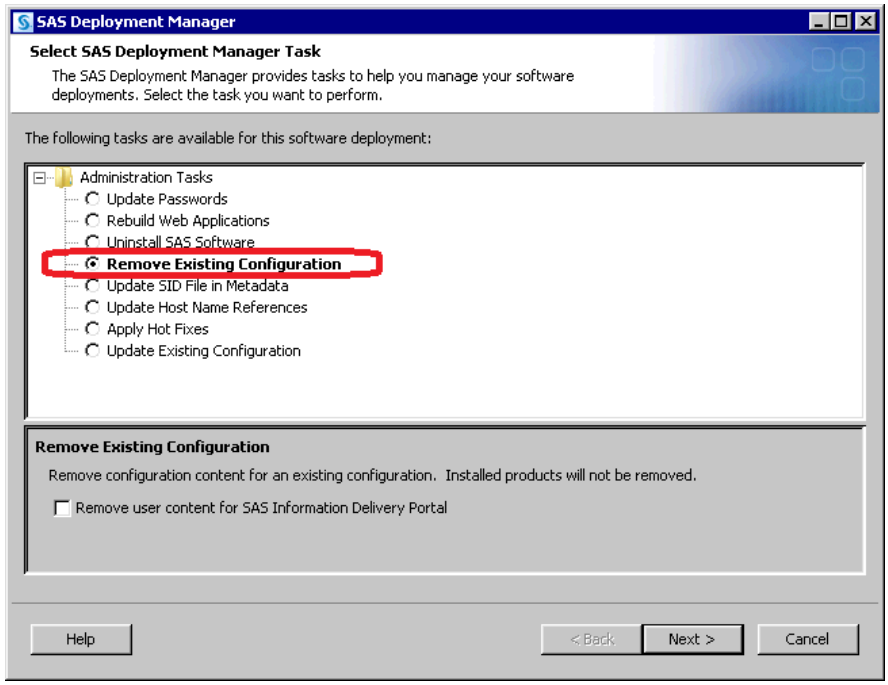
15. If you are running the February 15, 2022, release of SAS 9.4M7, you must rebuild the Windows service definition to apply any changes made to its configuration. For information, see "Rebuild Windows Service for Each SAS Web Application Server Instance" in *SAS Intelligence Platform: System Administration Guide*. If you are running a release prior to the February 15, 2022, release of SAS 9.4M7, configuration is complete and no further changes are necessary.

Removing a SAS Configuration

Overview of Removing a SAS Configuration

The Remove Existing Configuration feature of the SAS Deployment Manager provides an automated way to remove one or more products of a SAS Intelligence Platform configuration from your environment. With this feature, you can remove the configurations of all SAS products or just selected products from a machine. You can remove configuration information only, or you can also remove associated user-created content. (For more information about the other SAS Deployment Manager features, see "Overview of SAS Deployment Manager" in *SAS Intelligence Platform: System Administration Guide*.)

Note: You can automate running the deployment manager when you need to perform the same configuration action on many machines in your deployment. The deployment manager uses the same record and playback mechanism as the SAS Deployment Wizard to perform a non-interactive, silent configuration. For more information, see "Overview of Automating the SAS Installation on Multiple Machines".



Note: The SAS Deployment Manager does not uninstall or otherwise affect the SAS software that is located in the SAS installation directory. To uninstall SAS software, see "Overview of Uninstalling the SAS Intelligence Platform".

The Remove Existing Configuration feature of the SAS Deployment Manager is useful for the following purposes:

- to remove a product that you will no longer be using.
- to move a product (for example, a SAS Application Server) from one machine to another. In this situation, you would do the following:
  1. Use the SAS Deployment Manager to remove the product's (and any dependent product's) configuration from the first machine.
  2. Use the SAS Deployment Wizard to install and configure the product on the second machine.
- to recover from errors in the initial configuration of a product or to implement different configuration options for a product. In these situations, you would do the following:
  1. Use the SAS Deployment Manager to remove the product's configuration.
  2. Use the SAS Deployment Wizard to configure the product on the same machine, and select different configuration options than you selected previously.

When you remove a product's configuration, the SAS Deployment Manager performs the following tasks:

- stops the product (or the associated service) if it is running, as well as any dependent products (or associated services). For example:
  - If you are removing the configuration of a running OLAP server, then it stops the server. If the server is installed as a Windows service, then it stops the service.
  - If you are removing the configuration of a running metadata server, then it stops the server (or the associated Windows service). It also stops any running servers and services that depend on the metadata server, OLAP servers, stored process

servers, workspace servers, pooled workspace servers, batch servers, SAS/SHARE servers, and SAS/CONNECT servers.

Note: The SAS Deployment Manager does not stop the object spawner. You must do this manually.

- deletes metadata objects that contain the product's configuration information. For example, if you remove a server configuration, then the server's metadata definition is removed and the server no longer appears in the Server Manager tree in SAS Management Console.
- on Windows systems, deletes shortcuts that are associated with the product. For example, if you remove a server configuration, then any shortcuts for starting, stopping, pausing, or resuming the server are deleted.
- on Windows systems, deletes the service (if applicable) that is associated with the product. For example, if you remove a server configuration, and if the server runs as a Windows service, then the service is removed.
- deletes configuration files and directories that are associated with the product. For example, if you remove the configuration for a SAS OLAP Server, then the server's configuration directory, files, scripts, **`sasusers`** directory, and logs directory are deleted. The only exception is sasv9_usermods.cfg, which is retained if its contents have changed since the initial installation.
- deletes site-specific portal content if you are removing the configuration for the SAS Information Delivery Portal and if you select the option to **Remove user content for SAS Information Delivery Portal**. The content that is removed includes portal pages; portlets; changes to page navigation, page layout, and package sort order; and other similar customizations.
- determines whether other products in your deployment depend on the removed products. If dependent products exist, and if you have not selected those products for removal, then the SAS Deployment Manager prompts you to remove them. For example, the SAS BI Dashboard depends on the SAS Information Delivery Portal. If you choose to remove the configuration for the SAS Information Delivery Portal, but you do not also choose to remove the configuration for the SAS BI Dashboard, then the SAS Deployment Manager prompts you to include it for removal. For more information about dependencies, see "Identify Dependent SAS Products".
- creates an HTML page that lists the items that were removed and describes any additional manual tasks that you need to perform. The page is created in a temporary location. You should save it to a permanent location on your network or file system.
- writes detailed log messages to a file called *product-name*`_unconfigure_`*date-and-time*, where *product-name* identifies the product that was removed. The deployment manager writes this file to *SAS-configuration-directory*`\Logs\Configure`.

Summary of Steps for Removing a SAS Configuration

Here is a summary of the steps that you should take when removing a configuration:

Important: Before you perform any of the following steps, you should create a restore point for your deployment by completely backing up your SAS 9.4 deployment in case there are issues during removal. This should include a backup of the SAS Metadata Server following the instructions in "Backing Up and Recovering the SAS Metadata Server" in *SAS Intelligence Platform: System Administration Guide*. For more information about backing up your SAS 9.4 deployment, see SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice and "About the

Deployment Backup and Recovery Tool" in *SAS Intelligence Platform: System Administration Guide*. Backing up is critical because it is not possible to undo the removal of a configuration.

1. Most SAS services and processes on all servers *must be stopped* before you proceed with the following steps. Some specific programs, servers, services, and products *must be running* to proceed. You might have addressed this requirement in SAS 9.4 Upgrade in Place: System-Level Backup and Recovery Best Practice.

   If you have not addressed this requirement, here are the details:

   - You must temporarily disable all anti-virus, anti-spyware, and firewall software. This software can interfere with the removal process and block files.
   - You must stop the SAS Object Spawner if you are removing a server that it runs.
   - For each server that you are removing, you might want to stop it and its associated services.
   - The SAS Metadata Server must be running until the end of the removal process, and then it can be stopped and removed.
   - The SAS Web Infrastructure Platform Data Server must be running if you are removing a SAS configuration on the middle tier.

2. Determine which product configurations to remove.
3. Determine which products depend on the products that you are removing. You need to remove the configuration for each of these products. For more information, see "Identify Dependent SAS Products".
4. Remove SAS product configurations in the reverse order in which they were installed.

   a. Remove SAS client configurations first.
   b. Remove the middle tier with other web applications (such as SAS BI Dashboard, SAS Web Report Studio, and so on).
   c. Remove the middle tier with SAS Web Infrastructure Platform.
   d. Remove the SAS application servers (such as SAS Workspace Server or SAS Stored Process Server) on machines other than the SAS Metadata Server machine.
   e. Remove the SAS Metadata Server last.

5. For each product that you plan to remove, identify the machine where it is installed.

   Note: On Windows, in order to run the SAS Deployment Manager, you must be a member of the machine's Windows Administrator group.

   In a single-machine installation, you can remove the configurations of multiple products as well as their dependent products in a single execution of SAS Deployment Manager.

   In a multiple-machine installation, you should remove middle-tier products first. Then, remove products on the SAS server tier. If you are removing the SAS Metadata Server, you should remove it last.

6. When all of these steps are complete, follow the steps that are described in "Remove a Configuration".

Identify Dependent SAS Products

If you remove the configuration of a product that another product depends on, then the dependent product would not be 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.

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. For example:

- If you remove the SAS BI Dashboard configuration, then you do not need to remove any other products. No products depend on the SAS BI Dashboard.
- If you remove the SAS BI Report Services Workspace Configuration, then you must also remove the following dependent products: BI Report Services, SAS BI Dashboard, SAS Web Report Studio, and SAS Web Report Viewer.
- If you remove the SAS Metadata Server configuration, then you must remove all other products.

Note: For information about the order for removing SAS products, see "Overview of Uninstalling the SAS Intelligence Platform".

Table A3.6 *Dependencies in the SAS Intelligence Platform*

Product	Dependent Products*
SAS BI Report Services	None
SAS BI Dashboard Configuration Data	None
SAS BI Lineage Scheduling Server	None
SAS BI Portlets	None
MySQL Database Server	None
Platform Process Manager	SAS Web Report Studio
SAS Application Server Context	All SAS products
SAS BI Dashboard	SAS Strategy Management Extensions for SAS BI Dashboard
SAS Foundation Services	SAS Web Infrastructure Platform
SAS Web Server	SAS Web Application Server
SAS Web Application Server	All SAS web-based products
SAS Web Infrastructure Platform Data Server	All SAS web-based products
SAS Stored Process Server	SAS Strategy Management

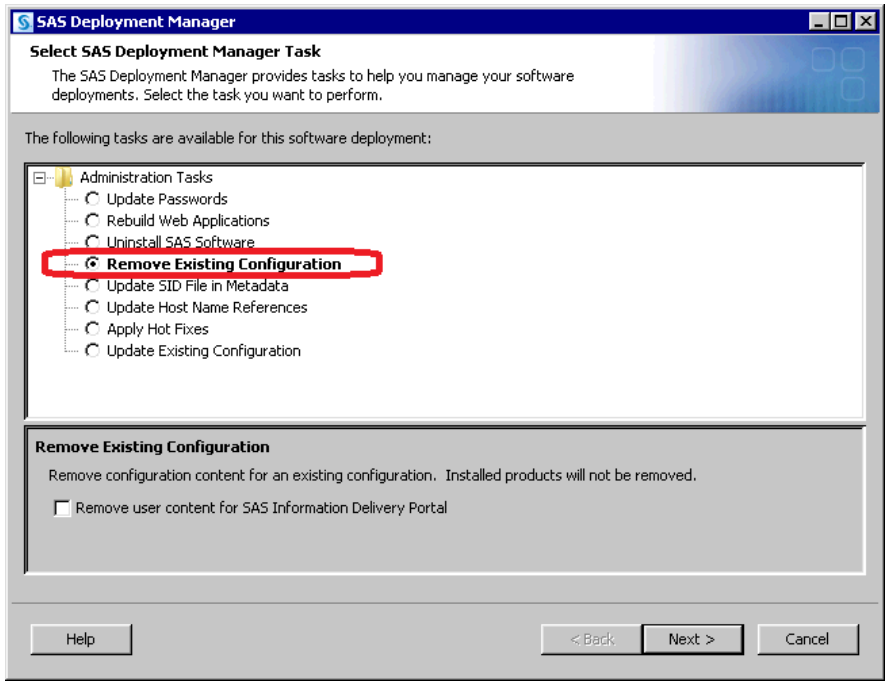
Product	Dependent Products*
SAS Web Infrastructure Platform	Most SAS web-based products
SAS Enterprise Miner	None
SAS Flex Application Themes	SAS BI Dashboard
SAS BI Report Services Workspace	SAS Web Report Studio SAS Web Report Viewer SAS BI Report Services
SAS Grid Manager Control Server	SAS Grid Manager Client Utility Configuration SAS Grid Manager Node Configuration
SAS Information Delivery Portal	SAS BI Portlets SAS BI Dashboard SAS Strategy Management SAS Strategy Management Portlets
SAS object spawner	SAS Workspace Server SAS Pooled Workspace Server SAS Stored Process Server Operating System Services Scheduling Server
SAS Pooled Workspace Server	SAS BI Report Services Workspace Configuration SAS BI Dashboard SAS Decision Services Server Configuration
SAS Web Report Studio	SAS BI Portlets SAS BI Dashboard SAS Information Delivery Portal
SAS Workspace Server	SAS Forecast Server SAS Model Manager SAS BI Lineage Scheduling Server SAS High-Performance Risk Server SAS Visual Analytics Administrator SAS Time Series Studio SAS Visual Data Builder SAS Visual Analytics Administration SAS BI Dashboard

* 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.

Remove a Configuration

In a single-machine installation, you can remove the configurations of multiple products as well their dependent products in a single execution of the SAS Deployment Manager.



In a multiple-machine installations, you should remove middle-tier product configurations first. Then remove product configurations on the SAS server tier. If you are removing the metadata server configuration, then you should remove it last.

Note: When removing a configuration, the SAS Deployment Manager does not delete any configuration log files associated with the configuration. However, server log files are removed.

Follow these steps to run the SAS Deployment Manager to remove the configurations from each machine:

1. Make sure that you have completed the preparatory steps that are described in "Summary of Steps for Removing a SAS Configuration".

   Note: On Windows, in order to run the SAS Deployment Manager, you must be a member of the machine's Windows Administrator group.

2. Make sure that you have are removing the SAS configurations in the sequence specified in Step 4.

3. On the host machine for the products whose configurations you are removing, 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.

4. In the SAS Deployment Manager, select **Remove Existing Configuration**.

If you are removing the SAS Information Delivery Portal, then you can also select the option to remove user content that is associated with the portal. If you select this option, the SAS Deployment Manager removes portal pages; portlets; changes to page navigation, page layout, and package sort order; and other similar customizations.

CAUTION:
Use caution when choosing the option to remove user content for the SAS Information Delivery Portal. The content cannot be recovered unless you have a complete backup of your system.

5. If you have more than one SAS configuration, the wizard prompts you to specify the configuration directory and the level (for example, **Lev1**) from which the configuration is to be removed.
6. In the next page, enter the user ID and password for an unrestricted administrative user.
7. On the next page, select the check boxes for the products that you want to remove. For each product that you select, be sure to also include the other products on the machine that depend on that product. (See "Identify Dependent SAS Products".)
8. Detailed log messages are written to a file called *product-name*`_unconfigure_`*date-and-time*`.log`, where *product-name* identifies the product that was removed. The deployment manager writes this file to *SAS-configuration-directory*`\Logs\Configure`.
9. When the configuration removal is complete, the Additional Resources page is displayed. In this page, click on the following document name:

   configuration-name-and-level`_ConfigurationRemoval.html_`*YYYY-MM-DD.HH.MM.SS*`.html`

   The document contains details about the products that were removed and additional manual steps that you might need to perform. The document is created in a temporary location. You should save it on your network or your file system so that you can refer to it later.

For details about what occurs when you remove a configuration, see "Overview of Removing a SAS Configuration".

After removing the configuration, you might need to take one of the following additional steps, depending on the reason for the removal:

- run the SAS Deployment Wizard to create a new configuration. For details, see "Configuring SAS Products".
- uninstall the associated software (if you will no longer be using the product on the current machine, or if you will be re-installing the software on the current machine). For details, see "Overview of Uninstalling the SAS Intelligence Platform" .

Remove a SAS Deployment Agent Service (Windows Only)

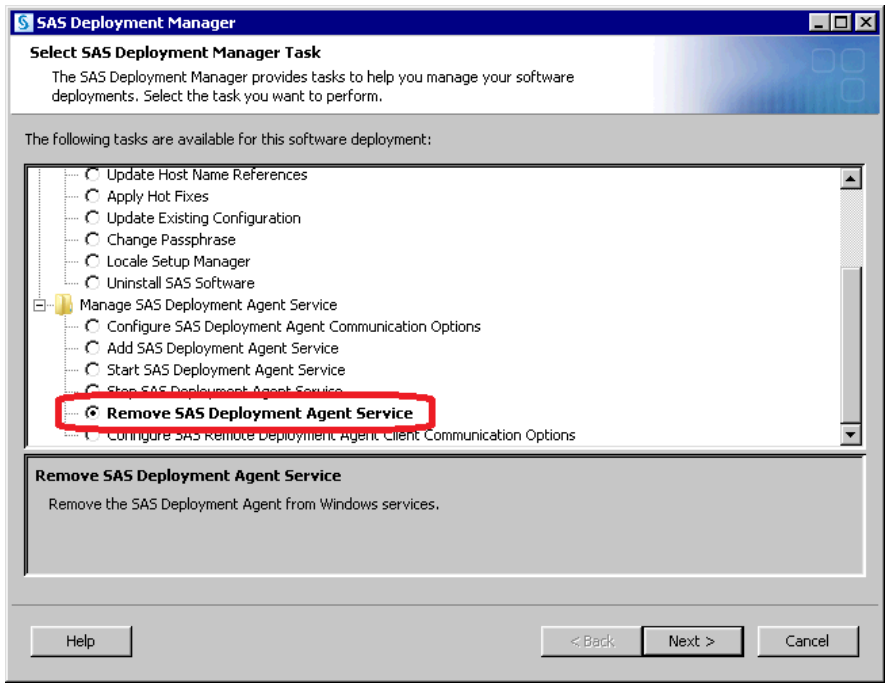
The SAS Deployment Agent is required for deployments that run remote processes. SAS uses the agent to copy content and to perform configuration management operations associated with creating new servers and clustering. It is also used for server administration tasks such as deployment backups.

Note: Do not remove the SAS Deployment Agent when reconfiguring your SAS deployment. The SAS Deployment Agent runs outside the context of the SAS

configuration and should not be removed unless you are intending to uninstall all of your SAS deployment.

To remove a SAS Deployment Agent service on Windows using the SAS Deployment Manager, follow these steps:

1. On the machine on which you want to add an agent, navigate to ***`SAS-installation-directory`*** from the Windows **Start** menu **All Programs** ⇨ **SAS** ⇨ **SAS Deployment Manager 9.4**.
2. In the Choose Language window, select a language, and click **OK**.
3. On the Select SAS Deployment Manager Task page, under **Manage SAS Deployment Agent Service**, click **Remove SAS Deployment Agent Service**, and click **Next**.



4. The SAS Deployment Manager has finished collecting input. This is the last opportunity to go back and change any information that you have provided in previous pages before the deployment manager begins changing your system.

   Make one of the following choices:

   - Select **Start** to begin removing the service from the current machine.
   - Select **Back** to navigate to earlier deployment manager pages to change input previously entered.
   - Select **Cancel** to terminate the deployment manager session.

5. When the SAS Deployment Manager has added the service, the Deployment Complete page opens. Click **Finish** to close the SAS Deployment Manager.

Remove a SAS Configuration on a Horizontal Middle-Tier Cluster

A SAS horizontal middle-tier cluster consists of a primary machine and additional machines referred to as cluster nodes. You remove the SAS Web Application Server

configuration on the primary machine first, and then remove the configuration on each node.

To remove a SAS configuration on a horizontal middle-tier cluster, follow these steps:

1. Shut down all servers on the primary middle-tier machine and on all of its middle-tier nodes. Also, shut down the SAS Web Server.
2. Unconfigure the products that you want to remove on the primary middle-tier machine first.

   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. Select the language that you want the SAS Deployment Wizard to use when it displays text.
4. In the SAS Deployment Manager, select **Remove Existing Configuration**.
5. If you have more than one SAS configuration, the wizard prompts you to specify the configuration directory and the level (for example, **Lev1**) from which the configuration is to be removed.
6. In the next page, enter the user ID and password for an unrestricted administrative user.
7. On the next page, select the check boxes for the products that you want to remove. For each product that you select, be sure to also include the other products on the machine that depend on that product. (See "Identify Dependent SAS Products").

   Detailed log messages are written to a file called *product-name*`_unconfigure_`*date-and-time*`.log`, where *product-name* identifies the product that was removed. The deployment manager writes this file to *SAS-configuration-directory*`\Logs\Configure`.
8. When the configuration removal is complete, the Additional Resources page is displayed. In this page, click the following document name:

   configuration-name-and-level`_ConfigurationRemoval.html_`*YYYY-MM-DD.HH.MM.SS*`.html`

   The document contains details about the products that were removed and additional manual steps that you might need to perform. The document is created in a temporary location. You should save it on your network or your file system so that you can refer to it later.

   Note: When removing a configuration, the SAS Deployment Manager does not delete any configuration log files associated with the configuration. However, server log files are removed.
9. Restart these servers that you shut down earlier:
   - SAS Deployment Agent (on each machine in the cluster)
   - JMS server (primary middle tier machine only)
10. On each middle-tier cluster node machine, run the SAS Deployment Manager and select the **Update Existing Configuration** task. For more information, see "Configure Updated or Upgraded SAS Products".

For details about what occurs when you remove a configuration, see "Overview of Removing a SAS Configuration".

After removing the configuration, you might need to take one of the following additional steps, depending on the reason for the removal:

- run the SAS Deployment Wizard to create a new configuration. For details, see "Configuring SAS Products".
- uninstall the associated software (if you will no longer be using the product on the current machine, or if you will be re-installing the software on the current machine). For details, see "Overview of Uninstalling the SAS Intelligence Platform".

Change Locale for SAS

On Windows and UNIX machines, you can use the Locale Setup Manager task in the SAS Deployment Manager to configure the language and region for SAS Foundation and certain SAS applications, such as the following:

- SAS BI Report Services 4.4
- SAS ODS Graphics Editor 9.4
- SAS Information Map Studio 4.4

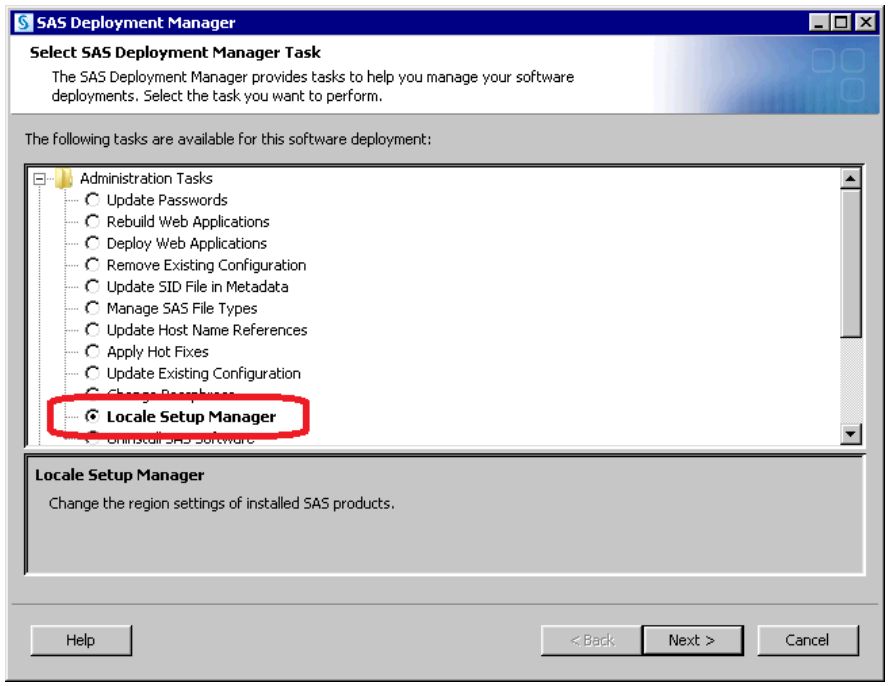
Using this task, you can do the following:

- change the user interface language for selected clients
- correct the locale for SAS Foundation and clients if the wrong locale was selected during deployment

You run the Locale Setup Manager task from the SAS Deployment Manager. The deployment manager is accessible through the Windows Start menu (**Start ⇨ All Programs ⇨ SAS ⇨ SAS Deployment Manager 9.4**).

Note: If the SAS Foundation locale is changed and the new locale requires a different encoding, the deployment manager displays a window prompting you to confirm the locale change. If you choose to continue with the change, you must create a new SAS server context to use the new encoding.

Figure A3.3 *Locale Setup Manager Task in the SAS Deployment Manager*



For more information about the Locale Setup Manager task, see "Change Locale and Region Settings (Windows and UNIX only)" in the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

For more information about how SAS supports languages and locales in general, see *SAS National Language Support (NLS): Reference Guide*.

Appendix 4

Configuring an Alternate Database for SAS Web Infrastructure Platform Data Server

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Configure an Alternative Database **210**

Overview of Configuring an Alternate Database

By default, SAS Web Infrastructure Platform Services is configured to use SAS Web Infrastructure Platform Data Server to store transactions for the SAS 9.4 middle tier and certain SAS solutions software. The SAS Web Infrastructure Platform Data Server is a customized version of PostgreSQL supplied by SAS, that is configured specifically to support SAS 9.4 software, and is integrated with the Deployment Recovery and Backup tool that is new for SAS 9.4.

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

However, some SAS sites might want to use another data server because the site has experience with a particular database.

Be aware that you can choose an alternative DBMS for the SharedServices database that is used for SAS Web Infrastructure Platform Services, but you must still install, configure, and run the SAS Web Infrastructure Platform Data Server in order to support SAS Environment Manager. Also, the SAS Deployment Backup and Recovery tool does not operate with an alternative DBMS.

Provided that your site has the necessary expertise, you can use an alternate database to the SAS Web Infrastructure Platform Data Server. The process for using an alternate data server for SAS Web Infrastructure Platform Services consists of the following steps:

1. Determine whether your database has been tested.

2. Prepare your database.
3. Choose the alternative database during SAS deployment.

Depending on your choice of database, SAS Deployment Wizard prompts you for some or all of the following information:

- Host name of the database server
- Port number of the database server or listener
- Database name or SID
- User ID and password
- Location of JDBC drivers for the database

Supported Databases

SAS supports many third-party database versions with SAS 9.4 Web Infrastructure Platform. SAS recommends that you follow the upgrade recommendations from your database provider to get the latest fixes and security updates. You should also review **System Requirements** for SAS 9.4 Foundation, solutions, and databases at SAS Documentation.

SAS Content Server Storage

The SAS Content Server uses a database for storage. SAS Content Server uses the same database that is used by the SAS Web Infrastructure Platform. The default configuration for the SAS Web Infrastructure Platform is to use the SharedServices database instance on the SAS Web Infrastructure Platform Data Server. However, the SAS Web Infrastructure Platform can be configured to use a third-party vendor database such as Oracle, MySQL, DB2, or SQL Server.

When a third-party vendor database is used, make sure that the database is configured to accept large binary objects such as documents and images. For example, on MySQL, the max_allowed_packet variable must be set at least as large as the largest binary object in the SAS Content Server repository.

Preparing to Configure an Alternative Database

DB2

Before deploying SAS 9.4, you must have an IBM DB2 database instance and a user ID (with database administration authority) to access and create tables.

TIP DB2 uses operating-system user IDs by default. Make sure that you identify a user ID that has an account on the operating system. For more information about how to create a user ID and assign permissions, see your DB2 documentation.

When you create the database, the SAS table structure requires the following specifications:

- create a database with a 32KB page size.

  For example, using the DB2 Command Line Processor on Windows, you would enter a command similar to the following:

  ```
  create database shareddb on /db2 alias shared pagesize 32 k
  ```

- create a bufferpool and tablespaces with these parameters:
  - size: 8192K
  - page size: 32KB
  - autoresize: yes

  For example, on Windows, you would enter commands similar to the following:

  ```
  connect to shared

  create bufferpool shared_bp size 8192 pagesize 32 k

  create temporary tablespace sys_temp_shared pagesize 32 k managed by
  database using (file '/db2/shared/ts/shareddb/sys_temp.ts' 500m)
  autoresize yes bufferpool shared_bp

  create large tablespace shared1 pagesize 32 k managed by database
  using (file '/db2/shared/ts/shareddb/shared1.ts' 50m) autoresize yes
  bufferpool shared_bp

  create user temporary tablespace user_temp_shared pagesize 32 k
  managed by database using (file
  '/db2/shared/ts/shareddb/user_temp.ts' 500m) autoresize yes
  bufferpool shared_bp
  ```

- grant database administration authority.

  For example, on Windows, you would enter commands similar to the following:

  ```
  grant dbadm on database to user sharedservices
  ```

- configure the DB2 database to support MYS SQL grammar.

  ```
  db2set DB2_COMPATIBILITY_VECTOR=MYS

  db2stop

  db2start
  ```

  Supporting MYS SQL grammar enables you to query pages of records using the LIMIT/OFFSET feature.

Note: The earlier examples in this document were tested on a Microsoft Windows environment. There might be variations for your operating system. Please consult your DB2 documentation for more information.

You must also install the latest compatible version of the JDBC drivers located in DB2_HOME**/java** on the machine that is hosting the SAS Web Application Server. The SAS Deployment Wizard configures the SAS Web Application Server with a JDBC data source that uses a URL that is similar to the following example:

```
jdbc:db2://host:50002/shared
```

If you want the SAS Deployment Wizard to automatically configure and load tables, then confirm that the user account can perform the query **`select 1`** from **`sysibm.sysdummy1`** successfully before you start the SAS Deployment Wizard.

MySQL

Note: Do not create the database. The SAS Deployment Wizard issues the **CREATE DATABASE** statement when it runs.

Before deploying SAS 9.4 when using MySQL, do the following:

- Set the default transaction isolation level to READ-COMMITTED by adding the following line to your MySQL INI file:

  ```
  transaction-isolation=READ-COMMITTED
  ```

- Make sure that you have a MySQL user ID with permission to access and create tables.

  For example, after logging on to MySQL as the root user, you would enter commands similar to the following:

  ```
  create user sharedservices@'%' identified by 'password';
  grant all on sharedservices.* to sharedservices@'%';
  ```

  TIP For more information about how to create a user ID and assign permissions, see your MySQL documentation.

- You must also install the latest compatible version of the JDBC drivers from **MySQL Connector/J** on the machine that is hosting the SAS Web Application Server. The SAS Deployment Wizard configures the SAS Web Application Server with a JDBC data source that uses a URL similar to the following example:

  ```
  jdbc:mysql://host:3306/SharedServices
  ```

- On Linux, the value of the **lower_case_table_names** option must be changed from its default of zero to one. For more information, see Identifier Case Sensitivity.

- If you want the SAS Deployment Wizard to automatically configure and load tables, then confirm that the user account can perform the query **select 1** successfully before you start the SAS Deployment Wizard.

Oracle

Before deploying SAS 9.4, you must have an Oracle database instance and user ID with permission to access and create tables.

Note: SAS strongly recommends that you use UTF-8 as the character encoding for the database.

Using the Database Configuration Assistant for Oracle, create an Oracle instance specifying **sharedservices** for the SID.

Next, the commands that you would enter would be similar to the following:

```
sqlplus sys@sharedservices as sysdba

create user sharedservices identified by password default tablespace
user temporary tablespace temp;

grant connect,resource to sharedservices;
```

TIP For more information about how to create a user ID and assign permissions, see your Oracle documentation.

Important: For Oracle 12c, you must specify **STANDARD** for the Oracle parameter **max_string_size**. To confirm this value, execute the following query using SQL*Plus: **show parameter max_string_size;**.

Important: Sites that use Oracle 12 must specify an unlimited quota. Refer to your Oracle documentation for more information.

You must download and install the latest compatible version of the JDBC drivers located in **ORACLE_HOME/product/version/install/jdbc/lib** and place them in a separate directory that does not contain any other files on all middle-tier servers. You can download Oracle JDBC drivers. The JDBC driver version must match the database version.

The SAS Deployment Wizard configures your SAS Web Application Server with a JDBC data source that uses a URL that is similar to the following example:

```
jdbc:oracle:thin:@host:1521:SharedServices
```

If you want the SAS Deployment Wizard to automatically configure and load tables, then confirm that the user account can perform the query **select 1 from dual** successfully before you start the SAS Deployment Wizard.

PostgreSQL

By default, the SAS Web Infrastructure Platform Data Server is a PostgreSQL database customized for use with SAS. If you choose to use an alternate PostgreSQL database, then it needs to be configured as described below. The alternate PostgreSQL database must be located on a different host than the PostgreSQL database provided by SAS.

Before deploying SAS 9.4, you must have a database instance and user ID with permission to access and create tables.

Log on to the system as the PostgreSQL user ID. Next, the commands that you would issue would be similar to the following:

```
create role sharedservices LOGIN PASSWORD 'password';

createdb SharedServices owner sharedservices encoding 'UTF8'
```

Confirm that the **listen_addresses** parameter in the postgresql.conf file permits connections from hosts other than localhost, and that the pg_hba.conf file is configured to permit access from the machine that is hosting the SAS Web Application Server.

Install the extension, which provides support for managing Large Objects: **create extension lo;**

TIP For more information about how to create a user ID and assign permissions, see your PostgreSQL documentation.

You must install the latest compatible version of the JDBC driver for PostgreSQL on the machine that is hosting the SAS Web Application Server. SAS requires the 9.1 or later version of the PostgreSQL JDBC driver. The SAS Deployment Wizard configures the SAS Web Application Server with a JDBC data source that uses a URL that is similar to the following example: **jdbc:postgresql://host:5432/SharedServices**.

If you want the SAS Deployment Wizard to automatically configure and load tables, then confirm that the user account can perform the query **select 1** successfully before you start the SAS Deployment Wizard.

SQL Server

Before deploying SAS 9.4, you must have a database instance and user ID with permission to access and create tables.

Note: Do not create the database. The SAS Deployment Wizard issues the **CREATE DATABASE** statement when it runs.

Use the SQL Server Installation Center to create a database instance. Configure it to use mixed mode authentication.

Next, use **sqlcmd** to log on to the instance with the **sa** account and create the **sharedservices** user. The commands that you would enter would be similar to the following:

```
use controller
go
create login sharedservices with password = 'password'
go
create user sharedservices for login sharedservices
go
```

TIP For more information about how to create a user ID and assign permissions, see your SQL Server documentation.

If your DBA is going to manage the Sharedservices database, the **sharedservices** user must be added to the **db_datawriter** role:

```
alter role db_datawriter add member sharedservices
```

If the sharedservices user is going to manage the Sharedservices database, the **sharedservices** user must be added to the **db_owner** role:

```
alter role db_owner add member sharedservices
```

You must install the latest compatible version of the JDBC drivers from Microsoft on the machine that is hosting the SAS Web Application Server. The SAS Deployment Wizard configures the SAS Web Application Server with a JDBC data source that uses a URL that is similar to the following example: **jdbc:sqlserver://host:1433;databaseName=SharedServices**.

If you want the SAS Deployment Wizard to automatically configure and load tables, then before you start the SAS Deployment Wizard, confirm that the user account can do the following:

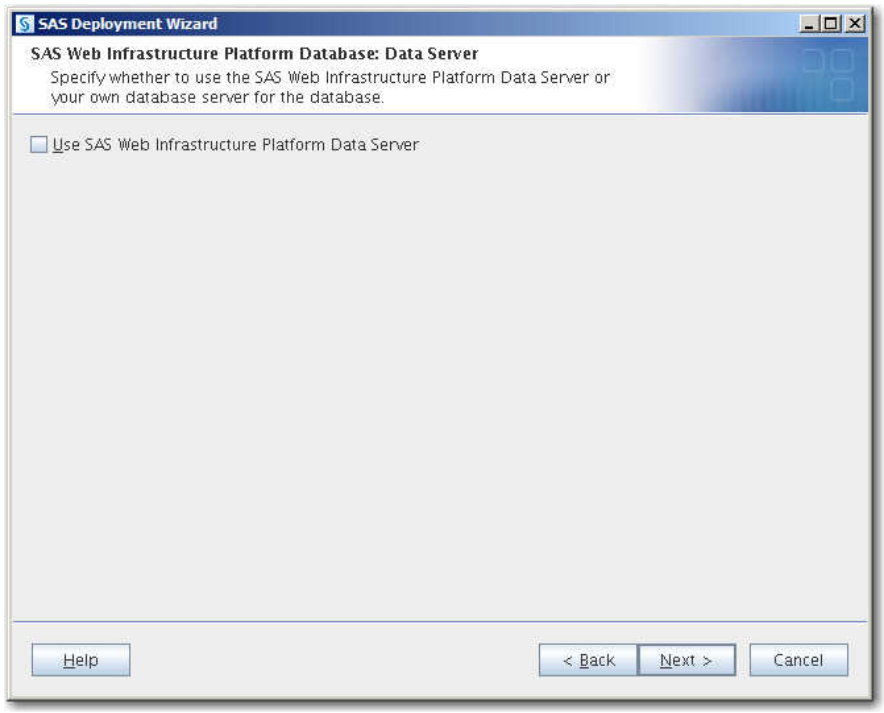
- use the controller database
- issue a CREATE DATABASE statement
- perform the query **select 1**

Configure an Alternative Database

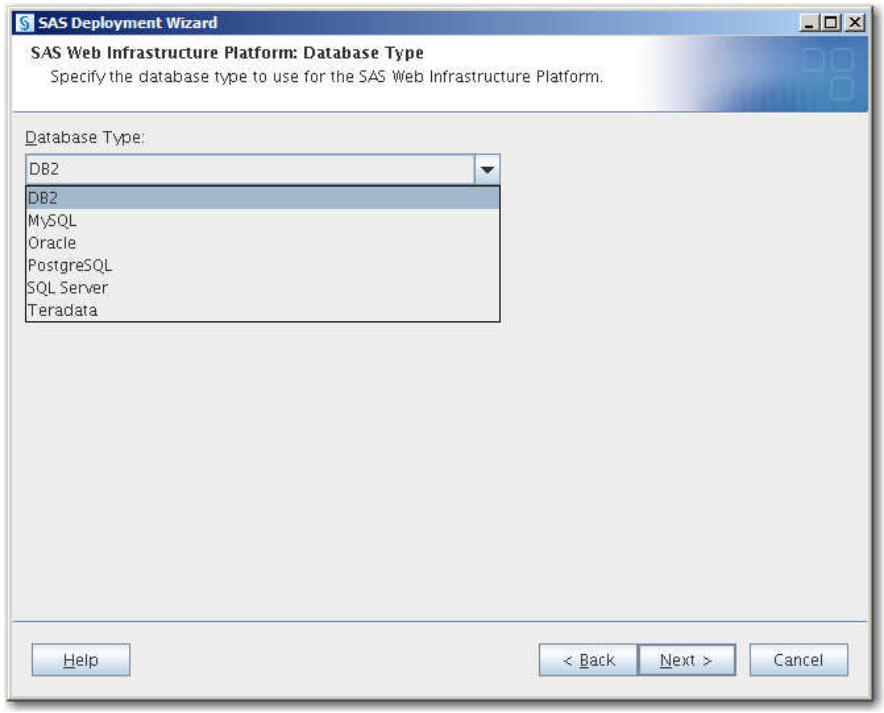
During SAS 9.4 deployment, to configure the SAS Web Infrastructure Platform to use an alternative database, follow these steps:

Note: The instructions in this topic should be used in conjunction with "Install and Configure SAS Interactively".

1. Make sure that the alternative database that you are intending to use has been tested. For more information, see "Supported Databases".
2. Make sure that you have prepared your database. For more information, see "Preparing to Configure an Alternative Database".
3. Make sure that you have adequately prepared your system for deploying SAS 9.4, and that you have started the SAS Deployment Wizard using the instructions found in "Install and Configure SAS Interactively".
4. On the Select Configuration Prompting Level page, select **Custom** for the prompting level.
5. On the SAS Web Infrastructure Platform Database: Data Server page, deselect **Use SAS Web Infrastructure Platform Data Server**.



6. On the SAS Web Infrastructure Platform: Database Type page, choose the alternative database that you want to use from the **Database Type** drop-down list.



7. Follow the instructions for the remaining deployment wizard configuration prompts found in "Install and Configure SAS Interactively".

   Later, the SAS Deployment Wizard prompts you for additional information about your database, including a database user ID and password. The user ID that you specify must have the ability insert, update, and delete database records. For more information, see "SAS Web Infrastructure Platform Data Server".

Appendix 5

Provisioning SAS on Windows

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Updating an Expired SAS License Used with Provisioning Software **224**

Provisioning Overview

Automation can be helpful when applying software updates to administrator desktops and rolling out new software to end users on their Windows desktop machines. This document describes how you can quietly deploy SAS 9.4 throughout your enterprise by using the SAS Deployment Wizard in conjunction with a third-party provisioning system such as LANDesk, Wise, Microsoft SCCM, Symantec Altiris, IBM Tivoli, BMC, and so on.

The methodology described in this document is the same regardless of which third-party provisioning system you decide to use.

TIP Before you start, inventory your site and develop a list all of the SAS products that you need to provision.

Automating the process of adding and updating SAS software across your Windows enterprise consists of the following steps:

1. (Optional) Provision system requirements
2. Provision SAS

Step One: (Optional) Provision System Requirements

After you have a list of all the SAS products that you plan to roll out across your Windows enterprise, provision the necessary system requirements on which they depend.

Determine System Requirements

Review the SAS 9.4 system requirements.

However, if you already have the SAS 9.4 software that you plan to provision on-site, you can run the SAS Deployment Wizard to analyze your system and identify which system requirements you must install. When you run the deployment wizard with the **`-srwonly`** option, the wizard creates a batch file that contains a list of the commands required to install the necessary system requirements. You then add these commands to your provisioning system in order to roll out the system requirements for SAS across your Windows enterprise.

For more information about the **`-srwonly`** option, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide.

TIP Remember that you might need to create multiple system requirements batch files when there are target groups that have different needs for specific deployments. For example, you might have three groups with different product needs: Group A needs SAS Enterprise Guide only. Group B requires SAS Enterprise Guide and SAS Add-In for Microsoft Office. Group C requires only SAS Foundation. Depending on the SAS products involved, different groups can have different system requirements.

To run the deployment wizard to create a batch file of system requirements commands, follow these steps:

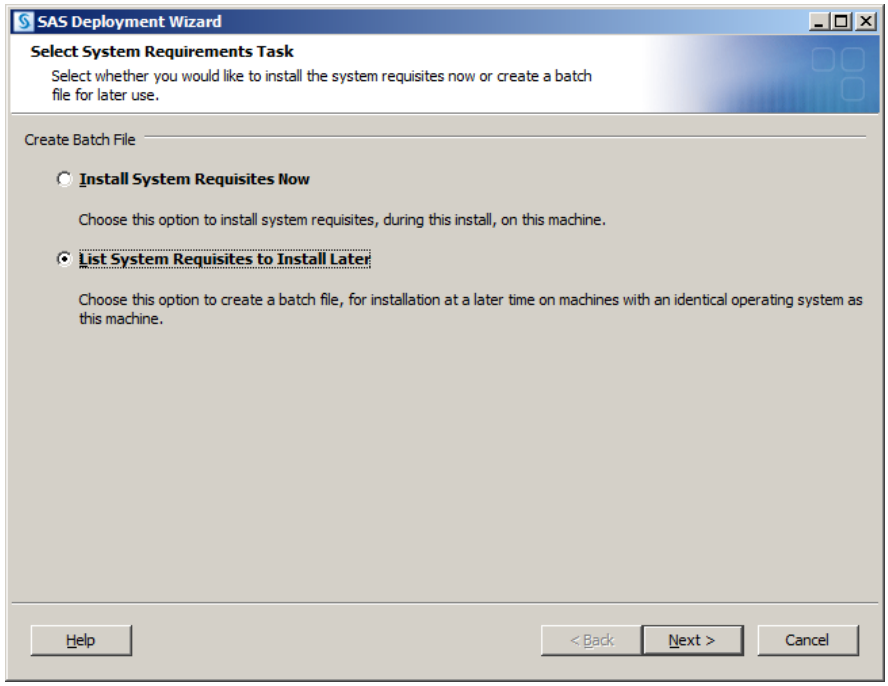
1. Make sure that the Windows operating systems that you are using support SAS 9.4. For more information, see Supported Operating Systems.
2. Make sure that the machine that you choose for analyzing system requirements meets the following criteria:
   - It is a clean machine on which no SAS products have been installed.

     If a version of SAS is already installed on the machine on which you are recording, you might see different results in your response file than you would see on a clean machine. Consequently, your results are different when you attempt the installation.
   - It is a machine that is typical of machines that your end users use (for example, in its operating system, bitness, third-party software, drives, group policy, and so on.)
3. Log on to the machine with the SAS Installer account (or with an account that is a member of the Windows Administrators group).
4. Open a Windows command prompt and start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the following command:
   ```
   setup.exe -srwonly
   ```

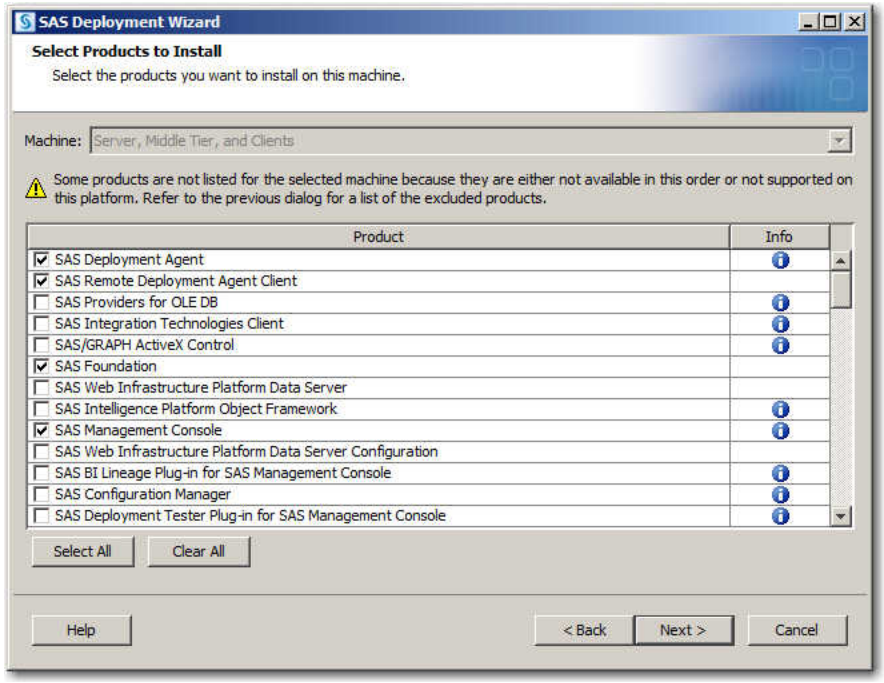
   You should see a welcome page similar to the following:

5. On the Select System Requirements Task page, select **List System Requirements to Install Later** and click **Next**.

   The wizard does *not* install any of the system requirements when run with **`-srwonly`** and **List System Requirements to Install Later**. The wizard generates only a batch file that contains a list of commands to install system requirements.



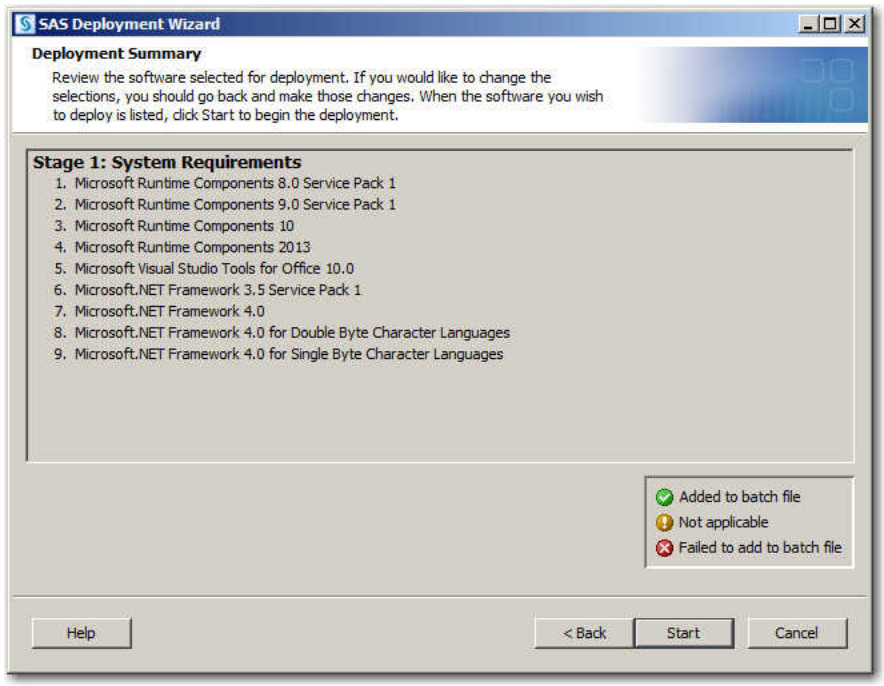
6. Provide the information that the deployment wizard prompts you for.
7. On the Select Products to Install page, select the SAS products that you plan to roll out across your Windows enterprise.



8. On the pages that follow, make selections for such prompts as language and regional settings support. Provide any additional information that the deployment wizard prompts you for.

   Note: Language and region settings can affect whether certain system requirements are needed on a particular machine.

9. At the Deployment Summary page, click **Start**.

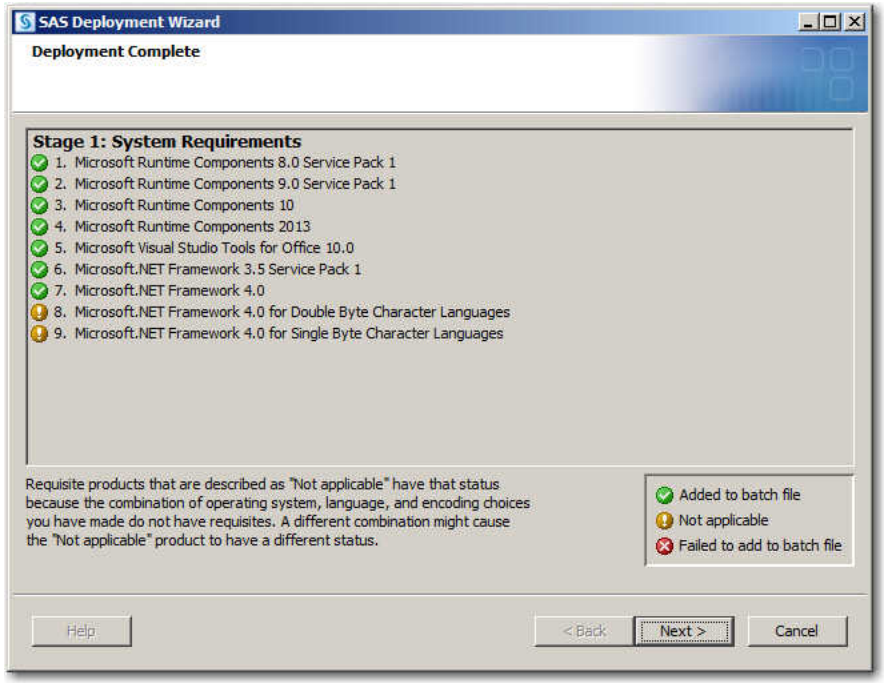


   When the deployment wizard is finished, the Deployment Complete page appears.

10. Review the Deployment Complete page.

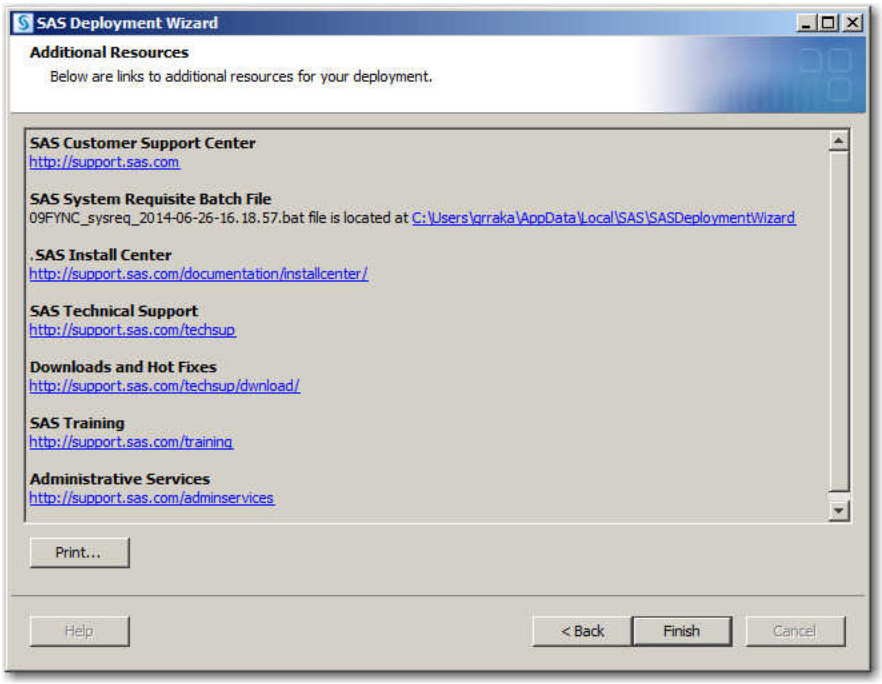
    The icons on this page indicate the following:

- A green icon indicates that the particular system requirement was added to the batch file successfully.
- A yellow icon indicates that the particular system requirement was not needed on this machine, based on the Windows version and the language and encoding selections made.
- A red icon indicates that an error occurred when adding the particular system requirement to the batch file.



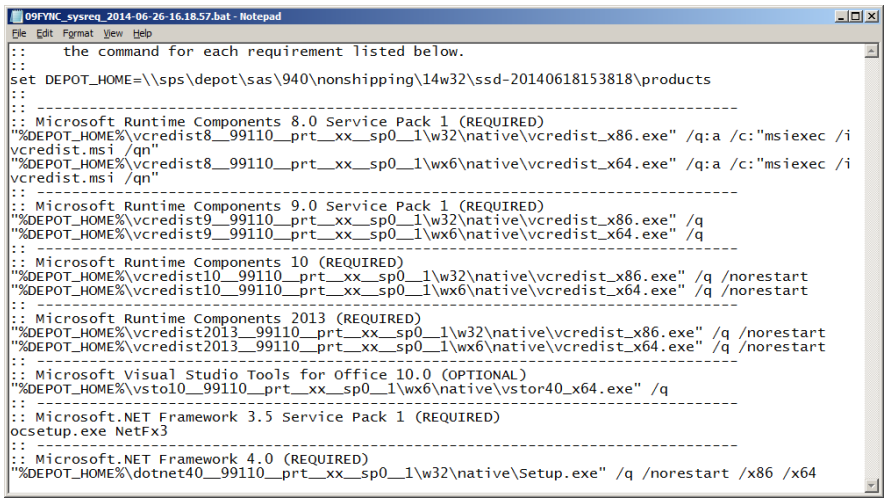
11. When you are finished, click **Next**.

    The Additional Resources page appears and lists the location of the generated batch file under **SAS System Requisite Batch File**.



The wizard-generated batch file contains the following information:

- order number for which the system requirements check was performed
- Windows operating system for the machine
- list of SAS products on which the requirements check was performed



12. Click **Finish** to close the SAS Deployment Wizard.
13. Proceed to the next section.

Add the System Requirements Commands to Your Provisioning System

To add the system requirements commands to your provisioning system, follow these steps:

1. Using a text editor, open the batch file that the deployment wizard generated in "Determine System Requirements".

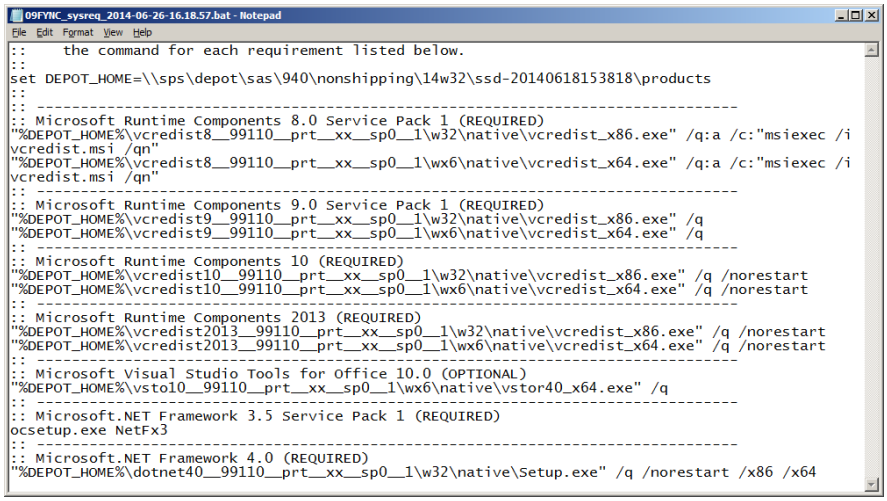
   The batch file is named *SAS-order-number_sysreq_YYYY-MM-DD-HH-MM-SS*.bat, and resides in **`[drive]:\Users\SAS Installer\AppData\Local\SAS\SASDeploymentWizard`**.

2. Verify that the SAS Software Depot paths are accurate for each installation command, and that all machines on which you are provisioning SAS have access to these paths.

   Note: The commands contained in the batch file can be used on other machines than the one where the check was performed, but they should be used only with the same SAS software order, the same selected products, and on the same Windows operating system.

   Figure A5.1 illustrates a sample batch file to install system requirements generated by the deployment wizard.

Figure A5.1 *Sample System Requirements Batch File*



```
09FYNC_sysreq_2014-06-26-16.18.57.bat - Notepad
File  Edit  Format  View  Help
::     the command for each requirement listed below.
::
set DEPOT_HOME=\\sps\depot\sas\940\nonshipping\14w32\ssd-20140618153818\products
::
:: ------------------------------------------------------------------------------
:: Microsoft Runtime Components 8.0 Service Pack 1 (REQUIRED)
"%DEPOT_HOME%\vcredist8__99110__prt__xx__sp0__1\w32\native\vcredist_x86.exe" /q:a /c:"msiexec /i
vcredist.msi /qn"
"%DEPOT_HOME%\vcredist8__99110__prt__xx__sp0__1\wx6\native\vcredist_x64.exe" /q:a /c:"msiexec /i
vcredist.msi /qn"
:: ------------------------------------------------------------------------------
:: Microsoft Runtime Components 9.0 Service Pack 1 (REQUIRED)
"%DEPOT_HOME%\vcredist9__99110__prt__xx__sp0__1\w32\native\vcredist_x86.exe" /q
"%DEPOT_HOME%\vcredist9__99110__prt__xx__sp0__1\wx6\native\vcredist_x64.exe" /q
:: ------------------------------------------------------------------------------
:: Microsoft Runtime Components 10 (REQUIRED)
"%DEPOT_HOME%\vcredist10__99110__prt__xx__sp0__1\w32\native\vcredist_x86.exe" /q /norestart
"%DEPOT_HOME%\vcredist10__99110__prt__xx__sp0__1\wx6\native\vcredist_x64.exe" /q /norestart
:: ------------------------------------------------------------------------------
:: Microsoft Runtime Components 2013 (REQUIRED)
"%DEPOT_HOME%\vcredist2013__99110__prt__xx__sp0__1\w32\native\vcredist_x86.exe" /q /norestart
"%DEPOT_HOME%\vcredist2013__99110__prt__xx__sp0__1\wx6\native\vcredist_x64.exe" /q /norestart
:: ------------------------------------------------------------------------------
:: Microsoft Visual Studio Tools for Office 10.0 (OPTIONAL)
"%DEPOT_HOME%\vsto10__99110__prt__xx__sp0__1\wx6\native\vstor40_x64.exe" /q
:: ------------------------------------------------------------------------------
:: Microsoft.NET Framework 3.5 Service Pack 1 (REQUIRED)
ocsetup.exe NetFx3
:: ------------------------------------------------------------------------------
:: Microsoft.NET Framework 4.0 (REQUIRED)
"%DEPOT_HOME%\dotnet40__99110__prt__xx__sp0__1\w32\native\Setup.exe" /q /norestart /x86 /x64
```

3. Make sure the systems requirements commands work on your Windows machines in your enterprise environment.
4. Add these system requirements commands to your provisioning system.

   For more information, consult your provisioning system documentation.
5. Proceed to the next section.

Provision the System Requirements

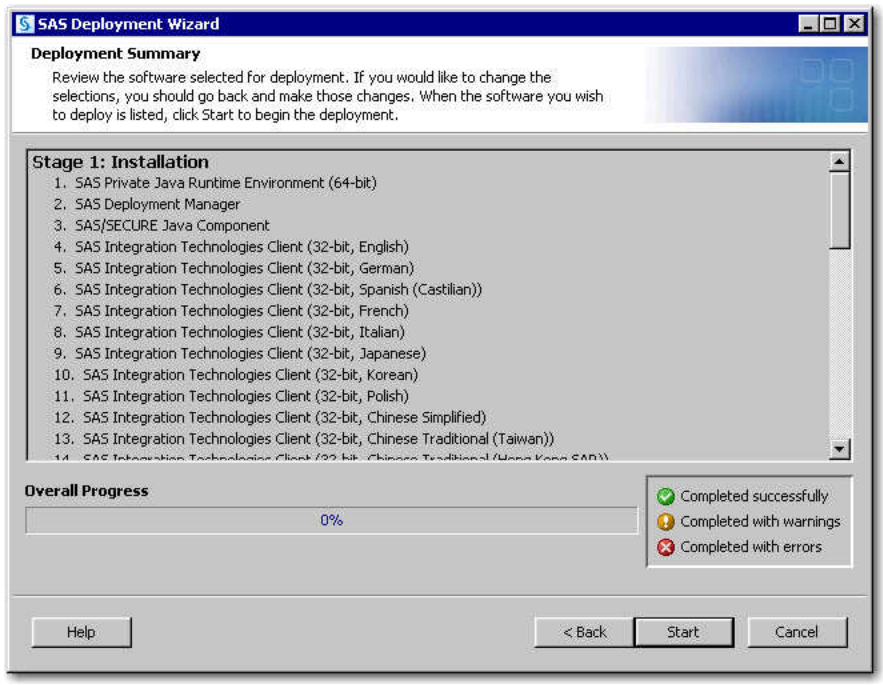
To provision the system requirements throughout your Windows enterprise, follow these steps:

1. Run your provisioning system and deploy the SAS system requirements.

   Operating system reboots are not always required. However, reboots might be pending either from previous installations of products other than SAS or because one of the system requirements that you just installed requires a reboot.

   If you want to suppress a reboot, remove the Windows registry entries that cause reboots, such as **`FileRenameOperations`** or **`PendingFileRenameOperations`**. These entries are located here: **`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\SessionManager`**.
2. After you provision the system requirements, rerun the deployment wizard without the **`-srwonly`** option. (For more information, revisit "Determine System Requirements".)

   The Deployment Summary page should no longer list a systems requirements stage. Stage 1 should now read **Installation**. This verifies that your systems requirements commands worked properly and that no more system requirements are needed.



3. Proceed to the next section.

Step Two: Provision SAS

After you provision the system requirements, provision SAS.

Record a Deployment Wizard Response File

You run the SAS Deployment Wizard to record a response file that captures all of the necessary installation and configuration responses to prompts from the wizard. Later, your provisioning system runs the deployment wizard in quiet mode. The deployment wizard uses this response file to roll out SAS across your Windows enterprise.

Multiple response files might be necessary when there are target groups that have different needs for specific deployments.

For example, you might have three groups with different product needs: Group A needs SAS Enterprise Guide only. Group B requires SAS Enterprise Guide and SAS Add-In for Microsoft Office. Group C requires only SAS Foundation. It can be helpful to name the response files after the products being provisioned (for example, EG_response.properties) or name them to reflect the group (for example, Group-A_response.properties).

To record a deployment wizard response file, follow these steps:

1. Make sure that the machine that you choose to record the response file meets the following requirements:
   - It is a machine on which you have installed the necessary SAS system requirements.
   - It is a clean machine on which no SAS products have been installed.

If a version of SAS is already installed on the machine on which you are recording, you might see different results in your response file than you would see on a clean machine. Consequently, your results are different when you attempt the installation.

- It is a machine that is typical of machines that your end users use (for example, in its operating system, bitness, third-party software, drives, group policy, and so on.)

2. Log on to a machine that meets the requirements listed in step 1 with the SAS Installer account (or with an account that is a member of the Windows Administrators group).

   You deploy SAS on this machine and in the process, record your responses to the deployment wizard to be reused later when you roll out SAS using the wizard in conjunction with your provisioning system.

3. Open a Windows command prompt and start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the following command:
   `setup.exe -record -responsefile "`*`response-file-path`*`\`*`response-file`*`"`

   In this command, *response-file* is the name given to the response file, and *response-file-path* is the absolute path to the directory where the deployment wizard writes the response file. (You can name your response file whatever you like.)

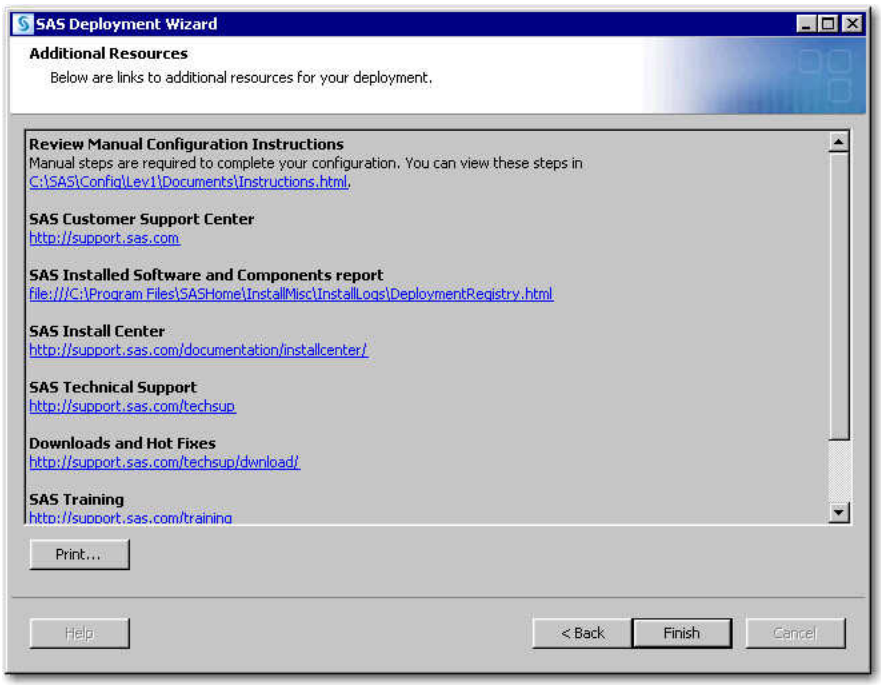
   For example, you might enter a command similar to this:

   ```
   setup.exe -record -responsefile "C:\deploy\response.txt"
   ```

   TIP If you copied a command from a PDF file, be sure to delete the hyphen (-) that was copied and then manually retype the hyphen. For more information, see Usage Note 37418: You must use a hyphen with command-line options in the SAS Deployment Wizard.

4. Provide the information that the deployment wizard prompts you for.

5. When the Additional Resources page appears, your deployment is complete. Click **Finish** to close the deployment wizard.



6. Proceed to the next section.

Test the Deployment Wizard Response File

Before proceeding, it is important to test the SAS Deployment Wizard response file.

To test the deployment wizard response file, follow these steps:

1. Before proceeding, review Problem Note 41966: Using the SYSTEM account with automated installations might result in error messages. (Note the information about the missing **`Documents`** folder under Windows 7 for the SYSTEM account.)
2. Make sure that the machine that you choose to test the response file meets the following requirements:
   - It is a machine on which you have installed the necessary SAS system requirements.
   - It is a clean machine on which no SAS products have been installed.

     If a version of SAS is already installed on the machine on which you are recording, you might see different results in your response file than you would see on a clean machine. Consequently, your results are different when you attempt the installation.
   - It is a machine that is typical of machines that your end users use (for example, in its operating system, bitness, third-party software, drives, group policy, and so on.)

     TIP Failure to locate a typical machine can result in a response file that works on the original machine but fails on target machines.
3. Log on to a machine that meets the requirements listed in step 3 with the SAS Installer account (or with an account that is a member of the Windows Administrators group).
4. Run the deployment wizard using the response file that you created earlier.

   Open a Windows command prompt and start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the following command: **`setup.exe -nomsupdate -responsefile "`*`response-file-path`*`\`*`response-file`*`"`**

   In this command, *response-file-path**response-file* is the absolute path and the name of the response file that you recorded earlier.

   Important: Do not use the **`-nomsupdate`** parameter if you have not provisioned the SAS system requirements. The **`-nomsupdate`** option directs the wizard *not* to re-install the system requirements.
5. Provide the information that the deployment wizard prompts you for.

   Verify that the installation and configuration is successful. This run is interactive and enables you to see any potential issues that might arise.

   TIP If you encounter problems with your response file, it is quicker to record it again than it is to manually edit the response file. If the response file is not edited correctly, you will spend more time editing and adjusting it than you would recording it again.
6. Proceed to the next section.

Construct a Quiet Installation Command

Your third-party provisioning system requires a command to run the SAS Deployment Wizard in *quiet mode* (that is, without user interaction). You run the deployment wizard in quiet mode on one of your target Windows machines in order to construct this command and also to test the command.

To run the SAS Deployment Wizard in quiet mode, follow these steps:

1. Make sure that the machine that you choose to construct a quiet installation command meets the following requirements:

   - It is a machine on which you have installed the necessary SAS system requirements.
   - It is a clean machine on which no SAS products have been installed.

     If a version of SAS is already installed on the machine on which you are recording, you might see different results in your response file than you would see on a clean machine. Consequently, your results are different when you attempt the installation.
   - It is a machine that is typical of machines that your end users use (for example, in its operating system, bitness, third-party software, drives, group policy, and so on.)

     TIP Failure to locate a typical machine can result in a response file that works on the original machine but fails on target machines.

2. Log on to a machine that meets the requirements listed in step 1 with the SAS Installer account (or with an account that is a member of the Windows Administrators group).

   You deploy SAS on this machine and, in the process, document the command that you used to run the deployment wizard. Later, you add this command to your provisioning system, so that the system can automatically deploy SAS across your Windows environment.

3. Open a Windows command prompt and start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the following command:
   `setup.exe -quiet -nomsupdate -silentstatus -responsefile "`*`absolute-path-to-response-file\response-filename`*`"`

   Note the following deployment wizard options used in this command:

   - The **`-quiet`** option suppresses visual feedback from the wizard. (**`-quiet`** is required by **`-silentstatus`**.)
   - The **`-nomsupdate`** option directs the wizard *not* to re-install the system requirements.

     Important: Do not use the **`-nomsupdate`** parameter if you have not provisioned the SAS system requirements. The **`-nomsupdate`** option directs the wizard *not* to re-install the system requirements.
   - The **`-silentstatus`** option enables you to monitor the progress of the installation.

   TIP If your provisioning system monitors the setup.exe process or if the package is configured to run one program before another, add the **`-wait`** option to the installation command: **`setup.exe -quiet -wait -nomsupdate -silentstatus -responsefile "`***`absolute-path-to-response-`*

file\response-filename". The **-wait** parameter causes setup.exe to remain resident.

4. Remember the command that you just issued in step 3, as you must add it to your provisioning system later.
5. When the wizard has completed deploying SAS, proceed to the next section.

Provision SAS

In this final task, you add the command to launch the SAS Deployment Wizard in quiet mode (using the previously created response file) to your provisioning system. Run the provisioning system to roll out SAS across your Windows enterprise. For more information, consult your provisioning system documentation.

Updating an Expired SAS License Used with Provisioning Software

This topic discusses options for replacing an expired license in a known good SAS installation package deployed with provisioning software.

Option 1: Modify the SAS Deployment Wizard response file to reference the new license file.

- Benefit:

  You change only the response file. You do not have to alter the actual installation deployment package.

- Procedure:

  In your response file, update the value for SAS_INSTALLATION_DATA.

  For example:

  ```
  SAS_INSTALLATION_DATA=C:\Program Files\SASHome\licenses\
  SAS94_09HDSX_70068130_Win_X64_Wrkstn_Srv.txt
  ```

- Best Practices:

  - Make a backup of your response file before you modify it.
  - Test the new license file on one machine before you deploy it on every machine in your SAS environment.

Option 2: Rename the new SAS license file to the name of the expired license file.

- Benefit:

  No change is made to the response file or to the installation deployment package.

- Procedure:

  Delete your expired SAS license file.

  For example:

  ```
  del C:\Program Files\SASHome\licenses\
  SAS94_09HDSX_70068130_Win_X64_Wrkstn_Srv.txt
  ```

  Rename your new SAS license file to the name of the expired license file.

  For example:

```
move C:\Program Files\SASHome\licenses\
SAS94_09HDSX_35110889_Win_X64_Wrkstn_Srv.txt
C:\Program Files\SASHome\licenses\
SAS94_09HDSX_70068130_Win_X64_Wrkstn_Srv.txt
```

- Best Practices:
  - Make a backup of your new SAS license file before you rename it.
  - Test the new license file on one machine before you deploy it on every machine in your SAS environment.

Appendix 6

Uninstalling the SAS Intelligence Platform

Overview of Uninstalling the SAS Intelligence Platform **227**

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Overview of Uninstalling the SAS Intelligence Platform

Remove software from machines deploying SAS 9.4 in the following order:

1. client-tier machines
2. middle-tier node machines
3. middle-tier machine
4. server-tier machines (compute servers)
5. metadata node machines
6. metadata server machine

To uninstall the SAS 9.4 Intelligence Platform, you need to perform the following steps —where applicable—on each machine in your deployment:

1. Unconfigure your SAS software.

   See “Removing a SAS Configuration”.

2. Stop SAS servers that are running.

   See “Stopping SAS Servers That Are Running”.

3. Uninstall your SAS software.

   See “Uninstalling Your SAS Software”.

4. Uninstall third-party software.

   See "Uninstalling Third-Party Software".

Stopping SAS Servers That Are Running

Stop SAS Servers That Are Running on Windows

Before uninstalling any software on a machine, you must stop any SAS servers that are running there. To stop SAS servers running on Windows, follow steps:

- Log on to the machine as the SAS Installer user (the user account used to install the SAS Software) or as the Administrator (or as a user in the Administrators group).
- Run the Windows Services snap-in (**Start** ⇨ **Control Panel** ⇨ **Administrative Tools** ⇨ **Services**).
- Stop all of the SAS services that are running.

  For more information, refer to your Microsoft Windows documentation.

Stop SAS Servers That Are Running on UNIX

Before uninstalling any software on a machine, you must stop any SAS servers that are running there. To stop SAS servers running on UNIX, follow steps:

- Log on to the machine as the SAS user.
- From the **Lev***n* SAS configuration directory, run the following command:

  ```
  sas.servers stop
  ```

  For example:

  ```
  /opt/SAS/Config/Lev1/sas.servers stop
  ```

Uninstalling Your SAS Software

Overview of Uninstalling Your SAS Software

SAS provides two methods for uninstalling:

- interactively

  Use the **Uninstall SAS Software** task in the SAS Deployment Manager.
- non-interactively
  - Run the SAS Deployment Manager silently using a response file.
  - Run the SAS Deployment Manager silently without using a response file.

Note: The SAS Deployment Agent is removed through a different task in the SAS Deployment Manager. Therefore, the deployment agents must be stopped and

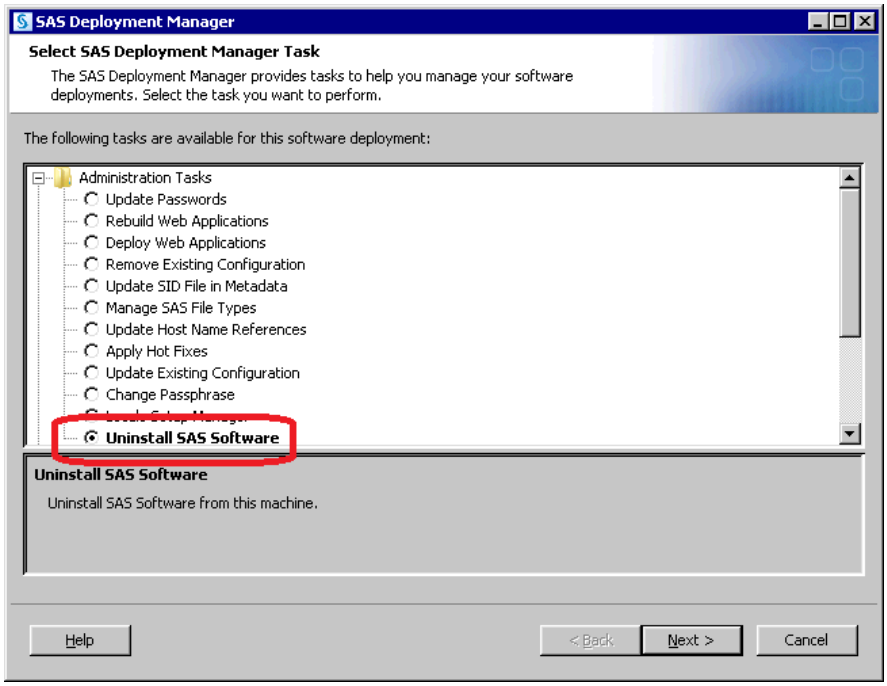
removed manually before uninstalling SAS. For more information, see the SAS Deployment Wizard and SAS Deployment Manager: User's Guide.

Uninstall SAS Interactively

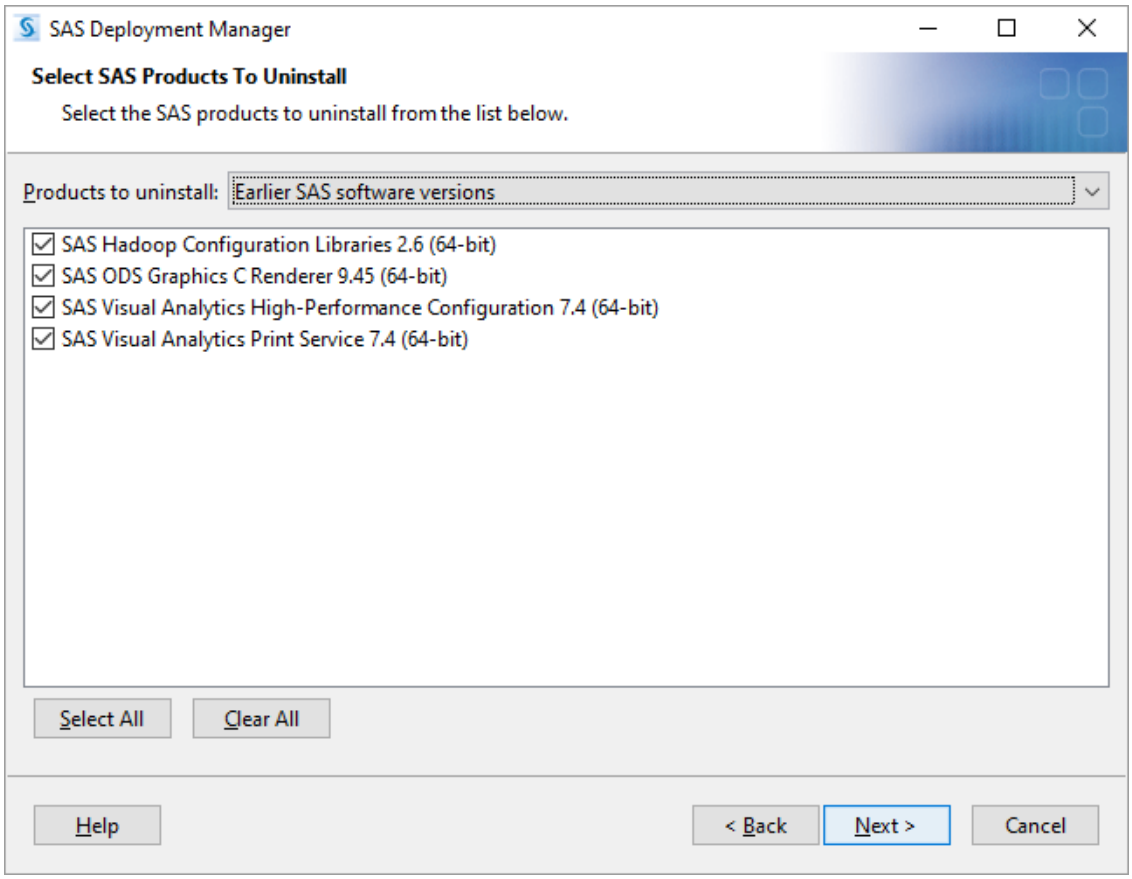
To uninstall SAS software interactively using the SAS Deployment Manager user interface, perform these steps:

1. Make sure that you have stopped your SAS servers by following the instructions described in "Stopping SAS Servers That Are Running".
2. Make sure that you are logged on as the SAS Installer user (the user account used to install the SAS Software) or as the Administrator (or a user in the Administrators group).
3. On the host machine for the products whose configurations you are removing, 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.
4. Select the language that you want the SAS Deployment Manager to use when it displays text.

   The SAS Deployment Manager splash screen appears.
5. On the Select Deployment Manager Task window, choose **Uninstall SAS Software** and click **Next**.



6. In the Select SAS Products to Uninstall window, all SAS products are selected to be uninstalled. If there are any products that you want to retain, uncheck them. Or, you can choose to uninstall earlier versions of your SAS products (to free up disk space, for example).



Click **Next**.

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**.

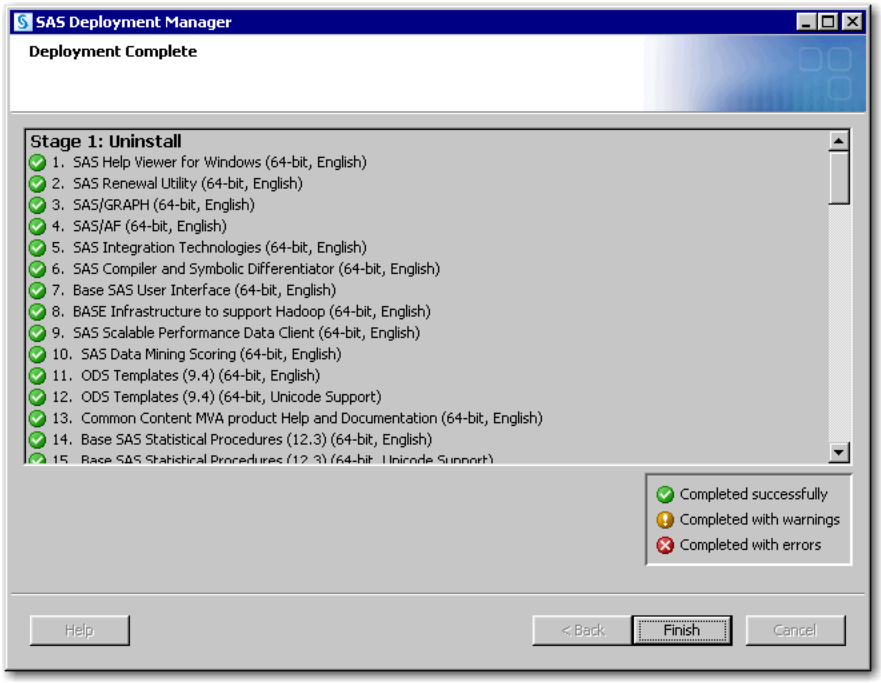
If the wizard lists any files in the text box, then while the wizard is still running, quit SAS, and add Write permission to each file listed. When you are finished, click **Next**.

A Summary page appears.

7. If there are any products that you want to keep, click **Back** until you see the Select SAS Products to Uninstall page and deselect the products. Otherwise, click **Start**.

   The deployment manager uninstalls the selected SAS products.

8. When you see the Deployment Complete page, click **Finish**.



The deployment manager closes.

9. Do the following, appropriate for your operating system:
   - On UNIX and z/OS:
     - For the SAS Installer account, delete the directory **`$HOME/.SASAppData`**.
     - Delete your SAS installation directory (SASHome).
   - On Windows:
     - Delete your SAS configuration directory (for example, **`C:\SAS\Config\Lev1`**).
     - Delete all SAS Windows Start menu shortcuts for the All Users user and the SAS Installer user (for example, delete the **`SAS`** directory under **`C:\Documents and Settings\All Users`**).
     - Delete the **`SAS`** directory under **`\Users\`*`SAS-Installer-ID`*`\AppData\Local\SAS`** for the SAS Installer user.
     - Delete the **`SAS`** directory under **`\Users\All Users\AppData\Local\SAS`** for the All Users user. This removes an additional copy of the sdwpreferences.txt file that might interfere with a subsequent deployment of SAS.
     - Delete the **`SAS`** directory under **`C:\ProgramData`**. This removes an additional copy of the sdwpreferences.txt file that might interfere with a subsequent deployment of SAS.
     - Delete all SAS services definitions. For more information, refer to your Windows documentation.
     - Delete the following Windows Registry keys:
       - **`HKEY_LOCAL_MACHINE\SOFTWARE\SAS Institute Inc.\Common Data`**
       - **`HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\SAS Institute Inc.\Common Data`**

Uninstall SAS Non-Interactively (Silently)

To uninstall SAS without interacting with a graphical user interface (silently), you have two options:

- Run the SAS Deployment Manager silently using a response file.

  For example:

  - On UNIX: **`./sasdm.sh -quiet -responsefile /myresponse_file`**
  - On z/OS: **`./sasdm.rexx -quiet -responsefile /myresponse_file`**
  - On Windows: **`sasdm.exe -quiet -responsefile c:\myresponse_file`**

    In order to create a response file, you must run the deployment manager and perform an uninstall using the **`-record`** option. This is similar to recording a response file for deploying SAS using the SAS Deployment Wizard. For more information, see "Automating the SAS Installation on Multiple Machines".

- Run the SAS Deployment Manager silently without a using a response file.

  For example:

  - On UNIX: **`./sasdm.sh -quiet -uninstallall`**
  - On z/OS: **`./sasdm.rexx -quiet -uninstallall`**
  - On Windows: **`./sasdm.exe -quiet -uninstallall`**

    The advantage of uninstalling without a response file is that you run the deployment manager one time. Although, all SAS software on the machine is uninstalled; you cannot choose to uninstall a subset of SAS products. A single uninstall command also facilitates using the command in script files.

Uninstalling Third-Party Software

The SAS Intelligence Platform often uses third-party products. You can determine whether third-party software was deployed on a particular machine by reviewing your deployment plan file (plan.xml). To uninstall these products, use the same procedures that you used to uninstall your SAS software.

Appendix 7

Subcapacity Licensing

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Overview of Subcapacity Licensing

You can run SAS using less than the full capacity of the machine and at potentially lowered pricing by requesting a subcapacity license. To do this, you need to gather some information and work with your SAS Account Representative. Your SAS Account Representative will determine whether you qualify for this pricing. SAS can then generate a correct SAS installation data file (SID file) for subcapacity pricing.

Note: The correct number of CPUs for subcapacity licensing must be limited at the physical level on the machine using virtual machines (VMs), LPARs, or containers.

See the topic appropriate for the operating system on which you intend to run a SAS deployment with a subcapacity license.

For subcapacity licensing in a cloud environment such as Amazon Web Services, contact your SAS Account Representative.

UNIX Subcapacity Licensing

To gather the information for a subcapacity license for a SAS deployment on UNIX, run the systeminfo command to get the host name and the number of CPUs.

Beginning with SAS 9.2 TS2M3, the systeminfo command is in the **`!SASROOT/utilities/bin`** directory of an existing SAS 9 deployment.

You can download the systeminfo utility from the SAS FTP site.

Table A7.1 *Operating System and Utility*

Operating System	Utility
AIX	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.r64.zip
HP-UX (PA-RISC)	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.H64.zip
HP-UX for Itanium	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.H6I.zip
Linux for Intel	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.lnx.zip
Linux for x64	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.lax.zip
Solaris (SPARC)	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.s64.zip
Solaris for x64	ftp://ftp.sas.com/techsup/download/unix/ZQJsysteminfo.sax.zip

Contact your SAS Account Representative and provide the host name and number of CPUs.

Windows Subcapacity Licensing

To gather the information for a subcapacity license for a SAS deployment on Windows, you need the computer name and the number of cores.

Computer Name

To determine the computer name, navigate to **Control Panel ⇨ System**, **Control Panel ⇨ System and Maintenance ⇨ System**, or **Control Panel ⇨ System and Security ⇨ System**. The information should look similar to the following:

```
Computer name: win76-xxxx
Full computer name: win76-xxxx.de.comp.com
Domain: de.comp.com
```

Only the computer name is included in the SID file.

Note: For a subcapacity license for Windows, the computer name can be up to 15 characters and can include hyphens. In the SID file, the computer name is in the MODEL field. If the computer name is too long for the MODEL field, the remainder is in the MODNUM field.

Number of Cores

Subcapacity licensing is based on the total number of cores, not the number of processors. To determine the number of cores on a Windows system, click **Start**, and enter **`CMD.EXE`** in the search box.

In the Command Prompt window, enter the following:

```
wmic cpu get numberofcores
```

Press Enter. The number of cores is displayed.

To determine the number of cores reported on VMs, do the following:

1. Open the Virtual Machine Properties window.
2. Click the **Hardware** tab.
3. Locate the number of CPUs. This is the number of cores on the machine.

Contact your SAS Account Representative and provide the computer name and number of cores.

z/OS Subcapacity Licensing

To gather the information for a subcapacity license for a SAS deployment on z/OS, you need the CPU and image capacity for the specific LPAR that you intend to use for the subcapacity deployment.

CPU

To find the CPU, from the LPAR on the subcapacity deployment, run the following z/OS command:

```
D M=CPU
```

The output is similar to the following:

```
IEEE174I 12.81.41 DISPLAY M 944
PROCESSOR STATUS
ID   CPU   CR            SERIAL
00   +       +            02345A2066
01   +       -            12345A2066
PC ND = --2-66.0A2.IBM.02.00000002345A
CPC SI = 2066.0A2.IBM.02.000000000002345A
CPC ID = 00
CPC NAME = P002345A
LP NAME = TST1
LP ID = 1
MIF ID = 1
```

Save the output of this command.

Run the Resource Management Facility CPU Report

Run the following job to display the LPAR capacity for the z/OS system on which the sub-capacity license will be installed.

The output should be similar to the following:

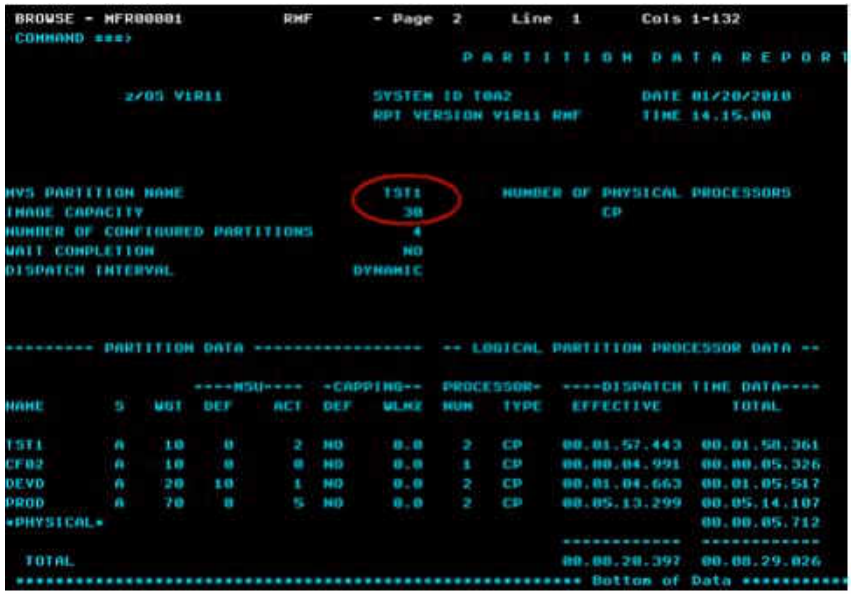
```
//JOBNAME JOB
//SMF EXEC PGM=IFASMFDP
//SMFIN DD DSN=SYS1.MAN1,DISP=SHR <== SET TO YOUR SMF DATASET
//RMF DD DSN=&&RMFIN,UNIT=SYSDA,SPACE=(CYL,(4,2)),DISP=(,PASS)
//SYSPRINT DD SYSOUT=*
 /* PICK RECORDS FOR ANY RMF INTERVAL. */
 /* THIS EXAMPLE PICKS UP THE 8:00 INTERVAL. */
START(0759)
```

```
END(0801)
INDD(SMFIN,OPTIONS(DUMP))
OUTDD(RMF,TYPE(70))
//*
//RMF EXEC PGM=ERBRMFPP,COND=(0,LT)
//MFPINPUT DD DSN=&&RMFIN,DISP=SHR
REPORTS(CPU)
```

Note: The SMFIN DD file must contain an SMF TYPE 70 record written during the time range that is specified in the START and END parameters. The SMF TYPE 70 records are written at the end of each RMF recording interval. This interval is defined by your organization, and there are usually several intervals recorded in a one-hour period.

In the output, locate the MFR00001 output data set.

Figure A7.1 *Output*



Save the report.

Send a copy of both the output of the D M=CPU command and the report to your SAS Account Representative.

Defining a Sub-Capacity LPAR

The sub-capacity license is based on the CPU and image capacity for the LPAR. Unless the image capacity value is adjusted, the reported image capacity for the LPAR is determined by the image capacity of all central processors (CPs) that are potentially available to this LPAR. The number of CPs that are potentially available is the lesser of either of the following:

- the sum of all active and reserved CPs defined to the image at activation time
- the total number of general CPs in the central electronic complex (CEC)

Note: When adjusting the image capacity, only general CPs count. Specialty processors such as zIIPs and zAAPs are not included.

There are three ways in which the LPAR image capacity, as reported by z/OS, can be less than the full capacity of all potentially available CPs:

1. Restrict the number of CPs. Define the LPAR with fewer CPs than actually exist on the machine. These CPs can be either dedicated or shared. The LPAR image capacity is the maximum capacity that the number of processors could achieve. This is calculated as the total image capacity of the assigned and reserved CPs.
2. Set a hard cap. Limit the image capacity of the LPAR in which SAS is running by setting the LPAR weight and turning on capping. This method is known as hard capping. The LPAR image capacity is calculated as follows:

   ```
   ((LPAR-weight)/(Sum-of-all-LPAR-weights)*( MSU-of-shared CPs))+(MSU-of-dedicated-CPs)
   ```

   Note: Because the LPAR MSU cap is affected by the LPAR weight of other LPARs, the MSU cap can be changed without changing the definition of the LPAR on which SAS is running. Use care to ensure that the changes do not increase the MSU value beyond the amount that SAS is licensed to use.

   Consider this example:

   - There are four active LPARs. Three have a weight of 50. The LPAR on which SAS is running has a weight of 30 and is capped.
   - The machine that is being used is a z/10 Model 706, and there are no dedicated CPs. The rated MSU capacity of this machine is 571 MSU.
   - The image capacity is calculated as follows:

     ```
     ((30/180)*571)+0=95.2 MSU
     ```

   - To use a sub-capacity SAS license in this LPAR, the setinit must specify an MSU value of 96 or larger. Fractional MSU specification is not allowed.
3. Set a soft cap. The LPAR has a defined image capacity that is managed by the z/OS Workload Manager (WLM). In this approach (soft capping), the Hardware Management Console (HMC) establishes a defined capacity for the LPAR. The z/OS WLM manages the capacity of the LPAR to this value by dynamically manipulating the hardware capping controls. The WLM manages to a soft cap that is based on the rolling 4-hour average MSU usage by the LPAR. In this case, the defined MSU value is specified in the machine's hardware console definition for the LPAR, and the image capacity of the LPAR is equal to the defined capacity. The SAS setinit MSU value must specify a value that is at least as large as the defined capacity. Unlike the hard-cap scenario, this value is not dependent on the weights that are assigned to the different LPARs.

The following summarizes how LPAR capacity is determined:

1. If capping is not used, LPAR capacity is:

   ```
   MSU of the number of CPs defined for the LPAR (whether dedicated or shared)
   ```

2. If the LPAR uses hard capping, LPAR capacity is:

   ```
   ((LPAR weight)/(Sum of all LPAR weights)*(MSU of shared CPs))+(MSU of dedicated CPs)
   ```

3. If the LPAR uses soft capping, LPAR capacity is:

   ```
   number of MSU specified for the defined capacity setting
   ```

   Note: If the LPAR image capacity that is defined in the soft cap exceeds the maximum possible MSU rating for that number of CPs, the reported LPAR capacity is the smaller value.

The simplest and least confusing way to specify a subcapacity value for an LPAR is to use the soft capping method to set a defined capacity. The other approaches are subject to many variations, including the total number of processors on the machine (CPs and all

specialty processors). Individual CP capacity declines as the total number of online processors that are on the machine increases. Also, changing the weight for any LPAR can affect the image capacity of the LPAR in which SAS is running. So, you could inadvertently cause the image capacity of an LPAR that is using hard capping to increase; and, thereby, cause the setinit check to fail.

Using the Hardware Management Console to Define LPAR Capacity

The HMC can set the subcapacity definition of an LPAR as follows:

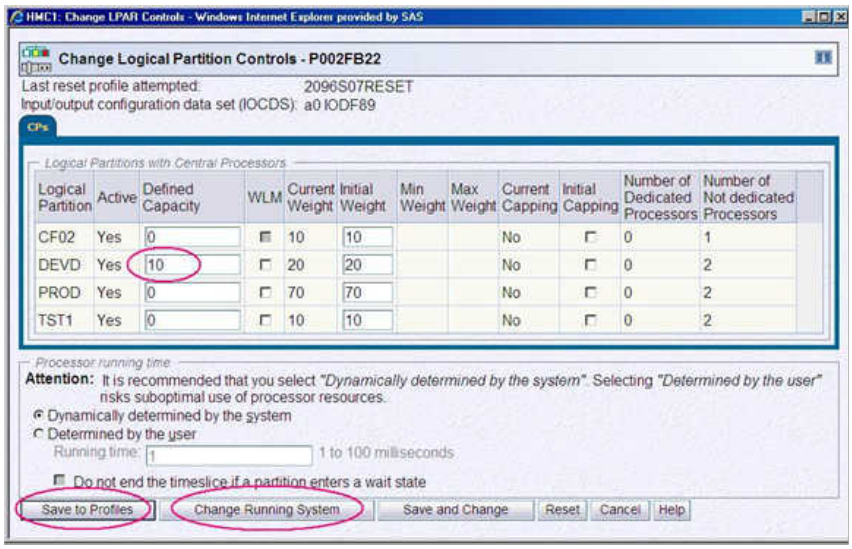
1. Log on to the HMC, and select the central processor complex (CPC) in which the LPAR capacity changes are to be made.
2. Navigate to the **Operational Customization** group, and invoke the **Change Logical Partition Controls** function.
3. Set a soft cap or hard cap MSU based on your current system configuration.

Soft Cap

To set a soft cap:

1. Enter MSU settings for the LPAR on the **CPs** tab.

Figure A7.2 *Set a Soft Cap*



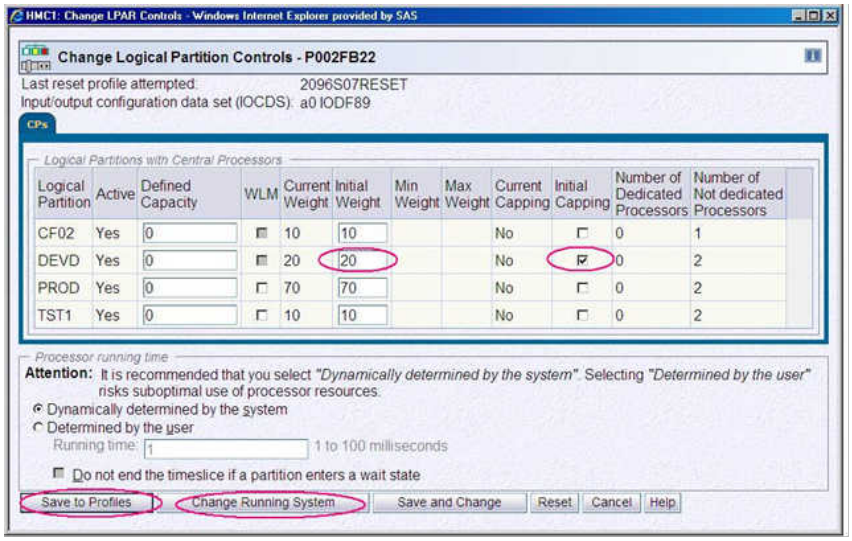
2. To make the change effective immediately, click **Change Running System**.
3. To make the change permanent for all subsequent image activations, click **Save to Profiles**.

Hard Cap

To set a hard cap:

1. Enter the appropriate weight relative to all other LPARs on the **CPs** tab.

Figure A7.3 Set a Hard Cap



2. Select **Initial Capping** to hard cap the LPAR.
3. To make the change effective immediately, click **Change Running System**.
4. To make the change permanent for all subsequent image activations, click **Save to Profiles**.

Glossary

authentication
See client authentication.

authentication domain
a SAS internal category that pairs logins with the servers for which they are valid. For example, an Oracle server and the SAS copies of Oracle credentials might all be classified as belonging to an OracleAuth authentication domain.

browser
See web browser.

client authentication (authentication)
the process of verifying the identity of a person or process for security purposes.

cluster
a group of computers that participate in load balancing. Each computer in the cluster runs an object spawner that handles client requests for connections.

component
a self-contained, reusable programming object that provides some type of service to other components in an object-oriented programming environment.

connection profile
a client-side definition of where a metadata server is located. The definition includes a computer name and a port number. In addition, the connection profile can also contain user connection information.

credentials
evidence that is submitted to support a claim of identity (for example, a user ID and password) or privilege (for example, a passphrase or encryption key).

daemon
a process that starts and waits either for a request to perform work or for an occurrence of a particular event. After the daemon receives the request or detects the occurrence, it performs the appropriate action. If nothing else is in its queue, the daemon then returns to its wait state.

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.

database management system (DBMS)
a software application that enables you to create and manipulate data that is stored in the form of databases.

database server
a server that provides relational database services to a client. Oracle, DB/2, and Teradata are examples of relational databases.

DBMS
See database management system.

deploy
to install an instance of operational SAS software and related components. The deployment process often includes configuration and testing as well.

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.

domain
a database of users that has been set up by an administrator by using a specific authentication provider such as LDAP or the host operating system. The domain name should be unique within your enterprise. For example, you should not have a Windows domain and a UNIX domain that are both named "SALES". *See also* authentication domain.

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 (XML)
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.

foundation services
See SAS Foundation Services.

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
See Internet Protocol Version 6.

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.

job
a collection of SAS tasks that can create output.

load balancing
for IOM bridge connections, a program that runs in the object spawner and that uses an algorithm to distribute work across object server processes on the same or separate machines in a cluster.

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.

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.

migrate
to populate a new deployment of SAS software with the content, data, or metadata (or a combination of these) from an existing deployment. Migrating might include upgrading to a new software release, converting data or metadata, or other changes to ensure compatibility.

object
an entity that can be manipulated by the commands of a programming language. In object-oriented programming, an object is a compilation of attributes (object elements) and behaviors (methods) that describe an entity. Unlike simple data types that are single pieces of information (for example, int=10), objects are complex and must be constructed.

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.

pre-installation checklist
a checklist that enumerates the tasks a customer must perform before installing the business intelligence platform. The primary task is to create a set of operating system user accounts on the metadata server host.

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. *See also* service.

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 Management Console
a Java application that provides a single user interface for performing SAS administrative tasks.

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 OLAP Server
a SAS server that provides access to multidimensional data. The data is queried using the multidimensional expressions (MDX) language.

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.

SAS/SHARE server
the result of an execution of the SERVER procedure, which is part of SAS/SHARE software. A server runs in a separate SAS session that services users' SAS sessions by controlling and executing input and output requests to one or more SAS libraries.

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).

service
one or more application components that an authorized user or application can call at any time to provide results that conform to a published specification. For example, network services transmit data or provide conversion of data in a network, database services provide for the storage and retrieval of data in a database, and web services interact with each other on the World Wide Web. *See also* SAS Foundation Services.

servlet
a Java program that runs on a web server. Servlets are a complementary technology to applets, which run in web browsers. Unlike applet code, servlet code does not have to be downloaded to a web browser. Instead, servlets send HTML or other

appropriate content back to a browser or to another type of web-based client application.

servlet container
the component of a web server that manages the life cycle of servlets, mapping a URL to a particular servlet and ensuring that the URL requester has the correct access rights. All servlet containers must support HTTP as a protocol for requests and responses, but they can also support additional protocols such as HTTPS.

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)
an email message, sent to a customer site, that announces arrival of the software and describes the order. It explains the initial installation steps and might also contain instructions for using Electronic Software Delivery (ESD), if 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.

upgrade
a type of software update that introduces new functionality. An upgrade generally involves a new release number.

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.

Web Distributed Authoring and Versioning (WebDAV)
a set of extensions to the HTTP protocol that enables users to collaboratively edit and manage files on remote web servers.

WebDAV
See Web Distributed Authoring and Versioning.

WebDAV server
an HTTP server that supports the collaborative authoring of documents that are located on the server. The server supports the locking of documents, so that multiple authors cannot make changes to a document at the same time. It also associates metadata with documents in order to facilitate searching. The SAS business intelligence applications use this type of server primarily as a report repository. Common WebDAV servers include the Apache HTTP Server (with its WebDAV modules enabled), Xythos Software's WebFile Server, and Microsoft Corporation's Internet Information Server (IIS).

workspace
See SAS IOM workspace.

XML
See Extensible Markup Language.

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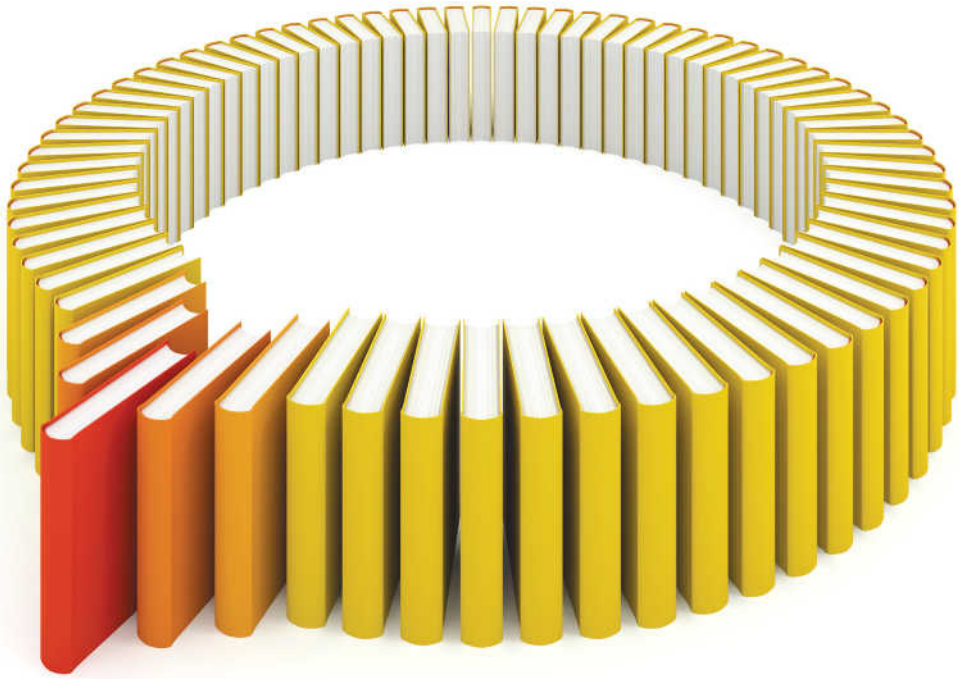

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