# Contents

Using This Book ........................................................................................................ v  
What's New in Installation and Configuration for the SAS 9.4 Intelligence Platform . vii

Chapter 1 • Introduction to Installing the SAS Intelligence Platform ............................... 1  
What Is the SAS Intelligence Platform? ........................................................................ 1  
What Is Covered in This Document? ................................................................. 2  
Deploying the SAS Intelligence Platform ................................................................ 2

Chapter 2 • Setting Up Users, Groups, and Ports ....................................................... 5  
Deployment Process Overview: Step Two .......................................................... 5  
Defining User Accounts ....................................................................................... 6  
Defining Groups ................................................................................................... 15  
Additional z/OS Pre-Installation Tasks ............................................................. 18  
Designating Ports and Multicast Addresses ....................................................... 21

Chapter 3 • Creating a SAS Software Depot ............................................................. 27  
Deployment Process Overview: Step Three ......................................................... 27  
About SAS Software Depots .............................................................................. 28  
Benefits of a SAS Software Depot ....................................................................... 29  
Best Practices for SAS Software Depots ........................................................... 31  
Creating SAS Software Depots ......................................................................... 32  
Subsetting SAS Software Orders ....................................................................... 46  
Managing SAS Orders ...................................................................................... 52  
Checking Your SAS Software Depot ................................................................... 61

Chapter 4 • Installing Third-Party Products ............................................................ 67  
Deployment Process Overview: Step Four ........................................................... 67  
About Installing Third-Party Products ............................................................... 67  
Obtaining Third-Party Software ......................................................................... 68  
About the Java Runtime Environment ................................................................ 69  
Pre-installation Checklists for Third-Party Products ........................................ 69

Chapter 5 • Setting Up Certificates for SAS Deployment ........................................... 73  
Deployment Process Overview: Step Five ........................................................... 74  
Changes to TLS and HTTPS Security .................................................................. 74  
What Are Certificates? ....................................................................................... 75  
How SAS Uses Certificates ............................................................................... 77  
Obtaining Certificates ....................................................................................... 82  
Adding CA Root and Intermediate Certificates ................................................ 88  
Implementing Certificates .................................................................................. 100  
Post-Deployment Tasks for Certificates ............................................................. 112

Chapter 6 • Installing and Configuring Your SAS Software ....................................... 131  
Deployment Process Overview: Step Six ............................................................. 132  
Preparing to Install and to Configure ................................................................ 132  
Install and Configure SAS Interactively ............................................................ 151  
Validate the SAS 9.4 Servers ............................................................................. 188  
About SAS Deployment Tester ........................................................................... 191  
Automating the SAS Installation on Multiple Machines .................................... 191
Chapter 7 • What to Do Next: Administration Tasks ................................................................. 199
  Overview of Administration Tasks ......................................................................................... 199
  First-Priority Setup Tasks ....................................................................................................... 200
  Standard Setup Tasks ............................................................................................................. 205
  Optional Setup Tasks .............................................................................................................. 206
  Ongoing System Administration Tasks ................................................................................... 207
  Best Practices for Ensuring the Integrity of Your System ....................................................... 208

Appendix 1 • Configuration Options by Prompt Level ................................................................. 211
  Overview of Configuration Options by Prompt Level ............................................................ 211
  Configuration Options by Prompt Level ................................................................................ 212

Appendix 2 • Deploying SAS Web Parts for Microsoft SharePoint ........................................... 221
  Overview of Deploying SAS Web Parts for Microsoft SharePoint ...................................... 221
  Automatically Deploy SAS Web Parts for Microsoft SharePoint ........................................ 224
  Configure HTTPS Connections for SAS Web Parts for Microsoft SharePoint .................. 229

Appendix 3 • Troubleshooting Your Initial SAS 9.4 Deployment ............................................... 231
  Overview of Troubleshooting Your Initial SAS 9.4 Deployment ......................................... 231
  Review SAS Deployment Tool Documents, Reports, and Logs ............................................ 232
  Troubleshooting the SAS Server Tier .................................................................................... 234
  Troubleshooting SAS Web Applications ............................................................................... 236

Appendix 4 • Managing Your SAS Deployment ........................................................................ 239
  Overview of Managing Your SAS Deployment ...................................................................... 239
  Adding, Updating, and Upgrading SAS Software .................................................................. 240
  Adding SAS Products ............................................................................................................. 244
  What Is Configuring and Unconfiguring? .............................................................................. 260
  Configuring SAS Products ..................................................................................................... 261
  Removing a SAS Configuration .............................................................................................. 274
  Change Locale for SAS ........................................................................................................... 284

Appendix 5 • Configuring an Alternate Database for SAS Web Infrastructure Platform Services ................................................................. 287
  Overview of Configuring an Alternate Database .................................................................. 287
  Tested Databases .................................................................................................................... 288
  Preparing to Configure an Alternative Database ................................................................. 288
  Configure an Alternative Database ....................................................................................... 292

Appendix 6 • Provisioning SAS on Windows ............................................................................. 295
  Provisioning Overview .......................................................................................................... 295
  Step One: Provision System Requirements ........................................................................ 296
  Step Two: Provision SAS ...................................................................................................... 302
  Updating an Expired SAS License Used with Provisioning Software .................................. 306

Appendix 7 • Uninstalling the SAS Intelligence Platform ............................................................ 309
  Overview of Uninstalling the SAS Intelligence Platform ...................................................... 309
  Stopping SAS Servers That Are Running ............................................................................ 310
  Uninstalling Your SAS Software .......................................................................................... 310
  Uninstalling Third-Party Software ....................................................................................... 314

Recommended Reading ........................................................................................................ 315
Glossary ................................................................................................................................. 317
Index ................................................................................................................................... 325
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 SAS Home.) For example, *C:\Program Files \SASHome*.

**SAS Configuration Directory**

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

For more information, see 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. This document contains new material on enhancements and changes to the SAS 9.4 Intelligence Platform deployment tools.

Changes in the third maintenance release for SAS 9.4 regarding deployment include the following:

• password prompt reductions during SAS deployment
• re-entry into the deployment wizard during SAS installation
• support for optimizing SAS Software Depots
• improvements to depot subsetting

Change in the October 2014 release for SAS 9.4 (SAS 9.4, Rev. 940_14w41) regarding deployment includes the following:

• SAS Visual Analytics Administration and Reporting

Changes in the second maintenance release for SAS 9.4 regarding deployment include the following:

• the ability to update your SAS documentation only
• tuning support for SAS web application servers
• metadata server clustering support on z/OS

Changes in SAS 9.4 regarding deployment include the following:

• support for SAS Studio
• MSI-based packages for SAS Enterprise Guide and SAS Add-In for Microsoft Office
• SAS Deployment Agent
• depot subset recipes
• Locale Setup Manager task
• Uninstall SAS Software task
Password Prompt Reductions During SAS Deployment

In the third maintenance release for SAS 9.4, the SAS Deployment Wizard enables you to reduce the number of password prompts. For more information, see “Reducing the Number of Password Prompts” on page 134.

Re-entry into the Deployment Wizard During SAS Installation and Configuration

In the third maintenance release for SAS 9.4, a re-entry feature has been added to the SAS Deployment Wizard. For more information, see “Re-entry Feature of the Deployment Wizard” on page 135.

Support for Optimizing SAS Software Depots

In the third maintenance release for SAS 9.4, support has been added for optimizing SAS Software Depots. For more information, see Remove duplicate files and save space on page 36.

Improvements to Depot Subsetting

In the third maintenance release for SAS 9.4, improvements have been made to how you can subset SAS Software Depots. For more information, see Subsetting SAS Software Orders on page 46.

SAS Visual Analytics Administration and Reporting

Starting in October 2014 (SAS 9.4, Rev. 940_14w41) SAS ships SAS Visual Analytics Administration and Reporting with most SAS solution software orders. For more information, see “SAS Visual Analytics Administration and Reporting” on page 135.
The Ability Update Your SAS Documentation Only

In the second maintenance release for SAS 9.4, the SAS Deployment Wizard enables you to install only the newly released documentation. For more information, see “Update Your SAS Documentation Only” on page 136.

Tuning Support for SAS Web Application Servers

In the second maintenance release for SAS 9.4, the SAS Deployment Wizard enables you to specify the size of your web application based on number of users and workload. For more information, see “Estimated System Size” on page 170.

Metadata Server Clustering Supported on z/OS

In the second maintenance release for SAS 9.4, metadata server clustering is also supported on z/OS. For more information, see “Metadata Server Clustering” on page 138.

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. For more information, see “SAS Studio: Context Root” on page 184.

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 consists of packages based on 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.

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 “SAS Deployment Agents” on page 136.

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” on page 46.

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” on page 284.

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” on page 310.
Chapter 1
Introduction to Installing the SAS Intelligence Platform

What Is the SAS Intelligence Platform?  ............................................. 1
What Is Covered in This Document? .................................................. 2
Deploying the SAS Intelligence Platform ........................................... 2
   Deployment Process Overview: Step One ...................................... 2
   Step 1: Review Additional Documentation ................................... 2
   Step 2: Create Operating System Users and Groups and Designate Ports . 3
   Step 3: Create a SAS Software Depot ........................................... 4
   Step 4: Install Required Third-Party Software ................................ 4
   Step 5: (Optional) Set Up Certificates ......................................... 4
   Step 6: Install and Configure SAS .............................................. 4

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

The SAS Data Integration Server offering has been revised, and the SAS Enterprise Data Integration Server offering is available only through renewals.

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 the platform offerings, which include products and components such as the SAS Metadata Server, SAS Integration Technologies, and the SAS OLAP Server. See http://support.sas.com/94administration for more information about these software offerings and their components.
What Is Covered in This Document?

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

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, mixed operating system 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 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 also 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: Step One

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. 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. (Optional) Set up certificates.
6. Install and configure SAS.

The sections below provide a brief description of each of these tasks. Subsequent chapters in this document provide the step-by-step instructions that you will need to perform them.

Step 1: Review Additional Documentation

It is very important to review all the different documents associated with deploying your SAS software. There can be late-breaking information, or instructions specific to a
Your review should include these documents:

- **QuickStart Guide**
  
  This document is shipped with your SAS software. Follow its instructions.

  The QuickStart Guides are also available online:
  

- **software order e-mail (SOE)**
  
  This e-mail is sent to your site to announce the software and detail the order. It also enumerates the initial installation steps and, for SAS 9.4, contains instructions for using Electronic Software Delivery (ESD), if applicable. The SID file also contains your site's SAS license (SETINIT).

- **SAS order information (SOI)**
  
  After you download your order to an existing SAS Software Depot, you can use the SAS order information (SOI) file to determine what products were in your order and when the order was placed. The SOI is in your SAS Software Depot in `install_doc/order-number/soi.html`.

- **SAS software summary**
  
  In the same depot location as the SOI, the SAS software summary is a more detailed list of the software included in your order. Unlike the SAS order information sheet, which only lists the software that you have specifically ordered, this document also describes the included software that supports your order. The software summary is in your SAS Software Depot in `install_doc/order-number/ordersummary.html`.

  *Note:* The SAS Deployment Wizard installs only what is listed in the deployment plan. The order summary might list more products than the deployment plan. For more information, see “About Deployment Plans” on page 133.

- **system requirements**
  
  Available at: [http://support.sas.com/resources/sysreq/index.html](http://support.sas.com/resources/sysreq/index.html)

- **SAS Notes**
  
  Outstanding SAS Notes for alert status installation problems are available at:


---

**Step 2: Create Operating System Users and Groups and Designate Ports**

Create a set of operating system users and groups that will be required during the installation and configuration of your system, and designate a set of ports to use.

For more information, see Chapter 2, “Setting Up Users, Groups, and Ports,” on page 5.
Step 3: Create a SAS Software Depot

Create a SAS Software Depot, which enables you to install the SAS software over your site's network, rather than from the installation media.

Note: If you have elected to receive SAS through Electronic Software Delivery, a SAS Software Depot is automatically created for you.

For more information, see Chapter 3, “Creating a SAS Software Depot,” on page 27.

Step 4: Install Required Third-Party Software

Install any third-party products, that are necessary for your installation. These products are identified in your deployment plan.

For more information, see Chapter 4, “Installing Third-Party Products,” on page 67.

Step 5: (Optional) Set Up Certificates

A decision that you must make when deploying SAS 9.4 is whether to use certificates to authenticate user and machine identities to secure communication between SAS web applications.

For more information, see Chapter 5, “Setting Up Certificates for SAS Deployment,” on page 73.

Step 6: Install and Configure SAS

Having identified the proper deployment plan for your order, Install and configure your SAS software using the SAS Deployment Wizard, an installation and configuration tool that is supplied by SAS.

For more information, see Chapter 6, “Installing and Configuring Your SAS Software,” on page 131.
Chapter 2
Setting Up Users, Groups, and Ports

Deployment Process Overview: Step Two

Defining User Accounts
- Overview of Defining User Accounts
- Internal User Accounts
- Required External User Accounts for SAS
- Rights Required by External User Accounts for SAS
- Required External User Accounts for Third-Party Software
- Rights Required by External User Accounts for Third-Party Software
- Local or Directory Service Accounts?
- Password Policies
- Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX
- Pre-installation Checklist for External User Accounts for Third-Party Software
- Pre-installation Checklist for External User Accounts for SAS on z/OS

Defining Groups
- Overview of Defining Groups
- The SAS Server Users Group (Windows)
- The sas Group (UNIX)
- The SASGRP Group (z/OS)
- Pre-installation Checklist for Groups for SAS on Windows and UNIX
- Pre-installation Checklist for Groups for Third-Party Software
- Pre-installation Checklist for Groups for SAS on z/OS

Additional z/OS Pre-Installation Tasks
- About Additional z/OS Pre-Installation Tasks
- Create a Configuration Directory and Define the SAS Library on z/OS
- Install the SAS 9.4 SVC Routine
- Install the SASCP Module

Designating Ports and Multicast Addresses
- About Ports and Multicast Addresses
- Multicast Address Considerations
- Pre-installation Checklist for Ports for SAS

Deployment Process Overview: Step Two

Before you begin installing and configuring your software, you must create a set of required users and groups at the operating system level, and you must designate a set of...
TCP/IP ports for the servers to use. This is the second of six tasks required to install and configure the SAS Intelligence Platform.

1. 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. (Optional) Set up certificates.

6. Install and configure SAS.

---

Defining User Accounts

Overview of Defining User Accounts

There are two types of user accounts to understand when deploying SAS:

- **Internal user accounts** are accounts known only to SAS and 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 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. They help you answer these 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?

This section contains the following topics:

- “Internal User Accounts” on page 7

- “Required External User Accounts for SAS” on page 8

- “Rights Required by External User Accounts for SAS” on page 10

- “Required External User Accounts for Third-Party Software” on page 11

- “Rights Required by External User Accounts for Third-Party Software” on page 11

- “Local or Directory Service Accounts?” on page 12

- “Password Policies” on page 12

- “Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX” on page 13

- “Pre-installation Checklist for External User Accounts for Third-Party Software” on page 14

- “Pre-installation Checklist for External User Accounts for SAS on z/OS” on page 14
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 2.1  SAS Internal User Accounts

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

In the following table are additional internal user accounts:

Table 2.2  Additional SAS Internal User Accounts

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

User ID and password for the Environment Manager Enablement Kit Database.

User ID and password for accessing the EVManager database used by the SAS Environment Manager.

User ID and password for accessing the database used with SAS Visual Analytics Services.

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 only provide access to SAS—not to operating system resources.

**Required External User Accounts for SAS**

*External user accounts* are user accounts defined outside of SAS metadata. These accounts are local to a machine or are defined in a network directory service of which the machine is a member, such as LDAP. SAS requires certain *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 stored process server and the 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 the *SAS Intelligence Platform: System Administration Guide*.

As you set up external accounts, remember to use different external accounts for the SAS First User and the SAS Spawned Servers user. Otherwise, your configuration will end in errors and the SAS pooled workspace server will not be 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” on page 13 or in “Pre-installation Checklist for External User Accounts for SAS on z/OS” on page 14. You will need this information when you run the SAS Deployment Wizard later.

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

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

**Table 2.3 Required External User Accounts for SAS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Recommended User ID</th>
<th>Machine Where Authenticated</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Installer—</td>
<td>sas</td>
<td>Every machine</td>
</tr>
<tr>
<td>The account used to install SAS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Spawned Servers account—</td>
<td>sassrv</td>
<td>Stored process server</td>
</tr>
<tr>
<td>The process owner for stored process servers and pooled workspace servers.</td>
<td></td>
<td>Pooled workspace server</td>
</tr>
</tbody>
</table>

**Note:**

- For information about the user rights that each external account requires, see “Rights Required by External User Accounts for SAS” on page 10.
- UNIX: the SAS 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 SAS Installer user ID must be available in the long term for future SAS maintenance.
- UNIX: Do not use root for the SAS Installer user ID.
- AIX: For both user IDs, make sure that the *User can LOGIN?* setting is set to true.
- z/OS: The SAS Installer and the SAS Spawned Servers account must have a TSO segment defined.
- z/OS: By default, the SAS Installer:
is the started task owner for the servers.
• is the owner of the configuration directory structure.
• must have a writable home directory in the UNIX file system.
• 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 to deploy and run SAS.

Table 2.4 Rights Required by External User Accounts for SAS

<table>
<thead>
<tr>
<th>External User Account</th>
<th>Operating System</th>
<th>User Rights Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Installer</td>
<td>Windows</td>
<td>Administrator rights</td>
</tr>
<tr>
<td></td>
<td>UNIX</td>
<td>The group that you designate as the primary group for the SAS Installer must contain the SAS Spawned Servers account.</td>
</tr>
<tr>
<td></td>
<td>z/OS</td>
<td>The group that you designate as the primary group for the SAS Installer must contain the SAS Spawned Servers account.</td>
</tr>
<tr>
<td>SAS Spawned Servers account</td>
<td>Windows</td>
<td>Log on as a batch job</td>
</tr>
</tbody>
</table>
|                       | UNIX             | Member of a group that is the primary group for the SAS Installer.  
|                       | z/OS             | Member of a group that is the primary group for the SAS Installer.  

* 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 how 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:

• be the administrator or a member of the Windows Administrator's group
• 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—either as local accounts or in a network directory service that the machine can access.

**Table 2.5 Required External User Accounts for Third-Party Software**

<table>
<thead>
<tr>
<th>Description</th>
<th>Recommended User ID</th>
<th>Machine Where Authenticated</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSF Administrator—</td>
<td>lsfadmin</td>
<td>Every Platform Process Manager and Platform LSF machine</td>
</tr>
<tr>
<td>Process owner for Platform LSF services and daemons. Required if you install Platform Suite for SAS to support scheduling or grid computing. Also owns the LSF configuration and log files and has permission to perform cluster-wide operations, edit configuration files, and reconfigure a cluster.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSF User—</td>
<td>lsfuser</td>
<td>Platform Process Manager</td>
</tr>
<tr>
<td>Sometimes referred to as the scheduling user. Required by SAS Web Report Studio to run the Output Generation Tool, which creates scheduled reports in batch mode.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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” on page 13. You will need this information when you run the SAS Deployment Wizard (in Chapter 6).

*Note:* For information about the user rights that each account requires, see “Rights Required by External User Accounts for Third-Party Software” on page 11.

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

The following table describes the user rights needed by the required external user accounts to deploy and run third-party software:
Table 2.6 Rights Required by External User Accounts for Third-Party Software

<table>
<thead>
<tr>
<th>External User Account</th>
<th>Operating System</th>
<th>User Rights Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSF Administrator</td>
<td>Windows</td>
<td>Administrator rights</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adjust memory quotas for a process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Debug programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log on as a service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace a process level token</td>
</tr>
<tr>
<td>LSF User</td>
<td>Windows</td>
<td>Log on as a batch job or Log on locally</td>
</tr>
</tbody>
</table>

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 through a computer 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 2.3 on page 9 can be authenticated by the machine's authentication provider—be that an authentication provider that is local to the machine, or an authentication provider that is 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 only to log on to the machine or machines that can authenticate the credentials. A secondary benefit 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 this for you.

For example, setting up the SAS Spawned Server user account is usually straightforward. The spawned server account must be able to be authenticated by the pooled workspace server and 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: This section addresses the passwords for the external user accounts that SAS requires, not the passwords for regular users of the system.

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

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

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

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

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

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at http://support.sas.com/installcenter/plans. This website also contains a corresponding deployment plan and an architectural diagram.

Table 2.7 Pre-installation Checklist for External User Accounts for SAS on Windows and UNIX

<table>
<thead>
<tr>
<th>Account</th>
<th>Recommended User ID</th>
<th>Actual User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Installer</td>
<td>Windows: <em>my-domain/installer-ID</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNIX: <strong>sas</strong>*</td>
<td></td>
</tr>
<tr>
<td>SAS Spawned Servers</td>
<td>Windows: <em>my-domain/sassrv</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNIX: <strong>sassrv</strong></td>
<td></td>
</tr>
</tbody>
</table>

* 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 SAS Installer user must have Write permission to /etc/opt/vmware in order to configure VMware license files on all SAS middle tier machines.

Note these important items:

- For information about the user rights that each external account requires, see “Rights Required by External User Accounts for SAS” on page 10.
- The SAS Deployment Wizard prompts you for the Installer account and the SAS Spawned Servers account information, and 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 with which to set these permissions. This script, setuid.sh, must be run as root in order to complete successfully. You have three options for running setuid.sh:
• set up sudo for the SAS Installer prior to running the deployment wizard, and not be prompted for the sudo password. The wizard running under the installer account will have sudo privileges to run setuid.sh.

• provide the sudo password when prompted by the deployment wizard, and allow the wizard to run setuid.sh as sudo.

• when the wizard is paused, run setuid.sh yourself. When the script is complete, you 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 9.4 will not function properly. For more information, see the Configuration Guide for SAS 9.4 Foundation for UNIX Environments available at: http://support.sas.com/documentation/installcenter/en/ikfdtmuxncg/66380/PDF/default/config.pdf.

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

Use the following 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, and you cannot complete the installation without it.

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at http://support.sas.com/installcenter/plans. This website also contains a corresponding deployment plan and an architectural diagram.

Table 2.8  Pre-installation Checklist for External User Accounts (Third Party)

<table>
<thead>
<tr>
<th>Account</th>
<th>Recommended User ID</th>
<th>Actual User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSF Administrator</td>
<td>Windows: my-domain\lsfadmin</td>
<td>UNIX: lsfadmin</td>
</tr>
<tr>
<td>LSF User</td>
<td>Windows: my-domain\lsfuser</td>
<td>UNIX: lsfuser</td>
</tr>
</tbody>
</table>

Note: For information about the user rights that each account requires, see “Rights Required by External User Accounts for Third-Party Software” on page 11.

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

Use the following pre-installation checklist to create the necessary external user accounts to deploy and run SAS on z/OS.

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

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at http://support.sas.com/installcenter/plans. This website also contains a corresponding deployment plan and an architectural diagram.
### Table 2.9  Pre-installation Checklist for External UserAccounts for SAS on z/OS

<table>
<thead>
<tr>
<th>Account</th>
<th>Recommended User ID</th>
<th>Actual User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Installer</td>
<td>sas</td>
<td></td>
</tr>
<tr>
<td>SAS Spawned Servers account</td>
<td>sassrv</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- For information about the user rights that each external account requires, see “Rights Required by External User Accounts for SAS” on page 10.
- The SAS Installer and the SAS Spawned Servers account must have a TSO segment defined.
- By default, the SAS Installer:
  - is the started task owner for the servers.
  - is the owner of the configuration directory structure.
  - must have a writable home directory in the UNIX file system.
  - 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.

This section contains the following topics:

- “The SAS Server Users Group (Windows)” on page 16
- “The sas Group (UNIX)” on page 16
- “The SASGRP Group (z/OS)” on page 17
- “Pre-installation Checklist for Groups for SAS on Windows and UNIX” on page 17
- “Pre-installation Checklist for Groups for Third-Party Software” on page 18
- “Pre-installation Checklist for Groups for SAS on z/OS” on page 18
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 stored process server, a pooled workspace server, or a standard workspace server. One suggestion for giving a user 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—also must have this same right.)

Note: Not all of these user accounts will exist in every installation. You add only those that you have created. In addition, if you are working in a multi-machine environment and are using local groups, not all of the users that you have created need to be included in every local group. You need only include the users who will be authenticated by a stored process server, pooled workspace server, or standard 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
   - SAS First User (optional account)
   - LSF User
   - any other external users that need to access a standard 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 choose to have the wizard create the optional SAS 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 SAS First User and other regular SAS users who access standard workspace servers, such as SAS Data Integration Studio or SAS Enterprise Guide users.

3. Finally, 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 and make this the primary group for the UNIX SAS Installer user. The SAS Spawned Servers account should also be made a member of the sas group. (Members of this group will be 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 SAS 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 the following pre-installation checklist to make sure that you have created the necessary groups to deploy and run SAS on Windows and UNIX:

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at http://support.sas.com/installcenter/plans. This website also contains a corresponding deployment plan and an architectural diagram.

<table>
<thead>
<tr>
<th>Table 2.10  Pre-installation Checklist for Groups for SAS on Windows and UNIX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended Group Name</strong></td>
</tr>
<tr>
<td>SAS Server Users*</td>
</tr>
<tr>
<td>SAS First User</td>
</tr>
<tr>
<td>sas**</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

* Unless Integrated Windows authentication (IWA) is implemented, add any other any external users accessing standard 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 the following pre-installation checklist to create the necessary groups to deploy and run third-party software.

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at [http://support.sas.com/installcenter/plans](http://support.sas.com/installcenter/plans). This website also contains a corresponding deployment plan and an architectural diagram.

<table>
<thead>
<tr>
<th>Recommended Group Name</th>
<th>Group Members</th>
<th>Operating System and Purpose</th>
<th>Actual Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Server Users</td>
<td>Scheduling user (lsfuser)</td>
<td>Windows—</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suggested method for assigning the Log on as a batch job user right to scheduling users.</td>
<td></td>
</tr>
</tbody>
</table>

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

Use the following pre-installation checklist to create the necessary groups to deploy and run SAS on z/OS:

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at [http://support.sas.com/installcenter/plans](http://support.sas.com/installcenter/plans). This website also contains a corresponding deployment plan and an architectural diagram.

<table>
<thead>
<tr>
<th>Recommended Group Name</th>
<th>Group Members</th>
<th>Purpose(s)</th>
<th>Actual Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SASGRP</td>
<td>SAS Installer</td>
<td>Default group for the SAS Installer user.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SAS Spawned Servers account</td>
<td>Through group membership, grants Write permissions to the SAS Spawned Server account for modifying SAS log and configuration directories.</td>
<td></td>
</tr>
</tbody>
</table>

* 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 also do the following:
Create a Configuration Directory and Define the SAS Library on z/OS

In addition to creating the necessary users, groups, and ports, to deploy the SAS Intelligence Platform on z/OS, you must also do the following:

- 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 this information in the following checklist:

<table>
<thead>
<tr>
<th>Task</th>
<th>Actual Directory or Library Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a configuration directory* for the SAS server tier</td>
<td></td>
</tr>
<tr>
<td>Define the SAS executable library to be program-controlled</td>
<td></td>
</tr>
</tbody>
</table>

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

Install the SAS 9.4 SVC Routine

In addition to creating the necessary users, groups, and ports, to deploy the SAS Intelligence Platform on z/OS, you must also install the SAS 9.4 SVC routine. To install the SAS 9.4 SVC routine, follow these steps:

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. Use the following RECEIVE command to create a PDS that will contain the JCL members that are required to install the SVC routine, where sas94.instsvc.xmit is the name of the file to which you transferred the instsvc.xmit file, using FTP.
   ```bash
   receive indataset(sas94.instsvc.xmit)
   ```
Respond with the name of a data set that will contain the JCL members (that you will use to complete the installation) by issuing the following command:

da(sas94.instsvc.cntl)

4. Create the library that will contain the load modules by issuing the following command, where SAS94.INSTSVC.CNTL is the data set that you created in the previous step:

receive indataset(sas94.instsvc.cntl(svcmod))

5. Respond with the name of a data set that will contain the load modules by issuing the following command:

da(sas94.instsvc.library)

6. 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 available at: http://support.sas.com/documentation/installcenter/en/ikfdtnmvscg/66194/PDF/default/config.pdf, with the following exceptions:

- Anywhere that the documentation references 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 data set that you created in step 4.

Install the SASCP Module

In addition to creating the necessary users, groups, and ports, to deploy the SAS Intelligence Platform on z/OS, you must also install the SAS 9.4 SASCP module. To install the SAS 9.4 SASCP module, follow these steps:


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. Use the following RECEIVE command to create a PDS that will contain the SASCP load module, where sas94.insascp.xmit is the name of the file to which you transferred the instsascp.xmit file, using FTP.

   receive indataset(sas94.insascp.xmit)

   Respond with the name of the target data set to contain the SASCP load module by issuing the following command:

   da(sas94.insascp.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 9.4 Foundation for z/OS available at:
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 set of ports that the SAS servers, third-party servers, and spawners in your system will use by default. If any of these ports is unavailable, select an alternate port, and record the new port on the following ports pre-installation checklists:

• “Multicast Address Considerations” on page 21
• “Pre-installation Checklist for Ports for SAS” on page 22

For third-party software ports, see “Pre-installation Checklists for Third-Party Products” on page 69.

You also need to plan for designating Internet Protocol (IP) multicast addresses for the all the machines in your SAS deployment. Multicasting simplifies the on-going 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

The SAS Deployment Wizard prompts you to supply a multicast address for inter-machine 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 those used by other multicast applications at your site.

The IP multicast address must be valid for IP multicasting and 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 during configuration by the SAS Deployment Wizard 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. This is a UDP port and does 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 will automatically isolate 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 option 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. This 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 deployment wizard lets you set the TTL value during SAS 9.4 deployment. For information about how to change this option after deployment, see “Administering Multicast Options” in SAS Intelligence Platform: Middle-Tier Administration Guide.

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

The 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 also be appropriate in higher-security environments where the multicast group communication is isolated from the user community, either via a firewall or TTL option, 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 string 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 deployment wizard to enter an authentication token value that meets your organization's security guidelines. The authentication token can be any password-like string. 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 string 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, and gives you a place to enter the port numbers that you will actually use.

SAS servers and their clients dynamically allocate ports in the ephemeral ports range. These are temporary ports allocated by the operating system’s IP stack. The operating system assigns ephemeral ports from a designated 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. These ranges are generally tunable by a system administrator. Consult your
operating system administration guide for details on tuning your system. An ephemeral port becomes available for reuse when the connection terminates.

Note: The SAS Deployment Wizard prompts you for this information, and 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 this SAS installer ID job name as valid users of this port. You can use an asterisk (such as, sas*) in this definition. You can also use a TCP Service name instead of a hard-coded port. For more information about how to reserve the TCP port for a particular SAS server, please 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 metadata server is 8561. If you choose another level, such as Lev2, the wizard changes the default port to 8562.

Note: These checklists are superseded by more complete and up-to-date checklists that can be found at http://support.sas.com/installcenter/plans. This website also contains corresponding deployment plans and architectural diagrams. 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 2.14 Pre-installation Checklist for Ports (SAS)

<table>
<thead>
<tr>
<th>Server or Spawner</th>
<th>Default Port</th>
<th>Data Direction</th>
<th>Actual Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail server</td>
<td>25</td>
<td>Outbound</td>
<td></td>
</tr>
<tr>
<td>HTTP server</td>
<td>80 (Windows)</td>
<td>Inbound and outbound</td>
<td>7980 (UNIX)</td>
</tr>
<tr>
<td>HTTP server (secure port)</td>
<td>443 (Windows)</td>
<td>Inbound and outbound</td>
<td>8343 (UNIX)</td>
</tr>
<tr>
<td>SAS Remote Services application</td>
<td>5091</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS OLAP Server</td>
<td>5451</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent</td>
<td>5660</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Event Broker administration</td>
<td>6051</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Server or Spawner</td>
<td>Default Port</td>
<td>Data Direction</td>
<td>Actual Port</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>SAS Web Application Server HTTP Port (Server 1)</td>
<td>8080 (Single)</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8080-8084 (Vertical Clustering)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server HTTP Port (Server 14)</td>
<td>9380 (Single)</td>
<td></td>
<td>9380-9384 (Vertical Clustering)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server HTTPS Port (Server 1)</td>
<td>8443 (Single)</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8443-8448 (Vertical Clustering)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server HTTPS Port (Server 14)</td>
<td>9743 (Single)</td>
<td></td>
<td>9743-9748 (Vertical Clustering)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server JMX Port (Server 1)</td>
<td>6969 (Single)</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6969-6973 (Vertical Clustering)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server JMX Port (Server 14)</td>
<td>8269 (Single)</td>
<td></td>
<td>8269-8273 (Vertical Clustering)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager</td>
<td>7080</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager (secured)</td>
<td>7443</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS/CONNECT spawner</td>
<td>7541</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS/CONNECT server</td>
<td>7551</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Web Report Studio In-Process Scheduling UDP Port 1</td>
<td>7570</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Server or Spawner</td>
<td>Default Port</td>
<td>Data Direction</td>
<td>Actual Port</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>--------------</td>
<td>------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Web Report Studio In-Process Scheduling UDP Port 2</td>
<td>7571</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Web Report Studio In-Process Scheduling UDP Port 3</td>
<td>7572</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Event Broker HTTP</td>
<td>8111</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Operating System Services scheduler</td>
<td>8451</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS/SHARE server</td>
<td>8551</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Multicast (UDP port)</td>
<td>8561</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Metadata Server</td>
<td>8561</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS object spawner: operator port</td>
<td>8581</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Workspace Server</td>
<td>8591</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: bridge connection</td>
<td>8601</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: load balancing connection 1 (MultiBridge)</td>
<td>8611</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: load balancing connection 2 (MultiBridge)</td>
<td>8621</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Stored Process Server: load balancing connection 3 (MultiBridge)</td>
<td>8631</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Pooled Workspace Server</td>
<td>8701</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS object spawner: pooled workspace server port bank 1</td>
<td>8801</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS object spawner: pooled workspace server port bank 2</td>
<td>8811</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS object spawner: pooled workspace server port bank 3</td>
<td>8821</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager Embedded tcServer JMX Port</td>
<td>9360</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Server or Spawner</td>
<td>Default Port</td>
<td>Data Direction</td>
<td>Actual Port</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SAS Environment Manager Embedded tcServer Base JMX Port</td>
<td>9360</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Web Infrastructure Platform Database Server</td>
<td>9432</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Job Monitor Database Server</td>
<td>9452</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Tester server</td>
<td>10021</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Information Retrieval Studio</td>
<td>10651</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>JMS Server JMX Port</td>
<td>11099</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>SAS Visual Process Orchestration Runtime Server</td>
<td>21050</td>
<td>Inbound</td>
<td></td>
</tr>
<tr>
<td>Cache Locator Port</td>
<td>41415</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>JMS Server Port</td>
<td>61616</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>Cache Locator membership port range</td>
<td>1024-65535</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
<tr>
<td>(TCP/UDP port range)†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TCP port for middle-tier cache communications‡</td>
<td>0–65535</td>
<td>Inbound and outbound</td>
<td></td>
</tr>
</tbody>
</table>

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

** 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 using restricted port numbers can cause runtime errors in GemFire start-up.
Chapter 3
Creating a SAS Software Depot

Deployment Process Overview: Step Three

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.

Creating a SAS Software Depot is the third of six steps required to install and configure the SAS Intelligence Platform:

1. 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. (Optional) Set up certificates.
6. Install and configure SAS.

About SAS Software Depots

A SAS Software Depot is a file system that consists of 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 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 3.1  SAS Software Depot File Structure

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

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

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

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

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

- **saves disk space**
  Storing multiple SAS orders in a single depot saves disk space because any content shared between SAS orders is not duplicated, but rather shared, in the depot.

  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.

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

- **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.)

- **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 the following 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 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).

- **Perform routine backups.**
  
  As with your SAS production system, it is important to routinely back up your SAS Software Depot and to verify the integrity of these backups.

  *Note: Another important reason for securing and backing up your SAS Software 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 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 other 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 SAS Software 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.

Before creating a depot, make sure that you have met the necessary requirements described in the following section.

Prerequisites for Creating a SAS Software Depot

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

- Choose a machine that has the following:
  - 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, go to [http://support.sas.com/resources/thirdpartysupport/v94/jdks.html](http://support.sas.com/resources/thirdpartysupport/v94/jdks.html).
  - Windowing environment
    If you want to run the SAS Download Manager and the SAS deployment Wizard using a traditional graphical user interface, then on a UNIX or a z/OS system, make sure that a windowing environment such as the Common Desktop Environment or X11 is installed.
    - certain Linux packages and libraries
• The SAS Download Manager on some 64-bit distributions of Linux might require the compat-libstdc++ RPM.

• The SAS Download Manager on Red Hat Enterprise Linux 5 or later requires both the 32-bit and 64-bit versions of the library, libXp.so, 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 Depot By Using the SAS Download Manager

A SAS Software Depot contains one or more deployment plans, a SAS installation data file, order data, and product data. The depot also contains the SAS Deployment Wizard executable—the tool required to install and initially configure SAS.

*Note:* There is no expiration date for downloading your SAS order. However, if the time period for your initial SAS installation data file has expired, you will have to obtain a current SAS installation data file before you can run the SAS Deployment Wizard.

Before you can create a depot by using the SAS Download Manager, you must first download it. So, there are two steps involved.

1. Download and run the SAS Download Manager.

2. Download a SAS order and automatically create a depot using the SAS Download Manager

For z/OS, see *Installation Instructions for SAS 9.4 Electronic Software Delivery for Planning 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 e-mail sent by SAS. In this e-mail, find the URL for the SAS download website from where you will download the SAS Download Manager.

*Note:* It is very important that you locate your original software order e-mail to get the correct order and SAS installation key to download the software. You cannot use the renewal order number. The renewal order is a license update and it cannot be used to download software. If you cannot locate your original software order through your e-mail, please note that you cannot proceed without the information.
e-mail, contact your SAS Installation Representative or SAS Contracts at the following URLs:

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

2. Make sure that you have met the necessary requirements described in “Prerequisites for Creating a SAS Software Depot” on page 32.

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

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

4. Launch a web browser and navigate to the URL specified in your software order e-mail.

5. In the prompt in the dialog box, select the option that enables you to save the file to disk.

6. Choose a path accessible to the machine to download the SAS Download Manager.
   Your download begins.

7. When your browser has finished downloading the SAS Download Manager, run it. 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.

We recommend that you add a description for your SAS order (for example, “TS1M3, Rev. 940_15w29”) to distinguish this from other SAS orders. The SAS Deployment Wizard will display this order information during the SAS installation.

![SAS Deployment Wizard](image1.png)

**Note:** At any time after the download, you can run the SAS Deployment Wizard to add or modify SAS order information. For more information, see “Change Order Information” on page 53.

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

This selection causes the SAS Download Manager to include all the software in the order. For more information, see “Subsetting SAS Software Orders” on page 46.
12. Specify a depot location and whether you want to remove duplicate files. Click Next.

The depot location is where you want to download SAS and build the SAS Software Depot.

We recommend that this directory be empty of any content. The exception is if this directory also contains other SAS Software Depots for the same SAS major release as this order. For more information, see “Prerequisites for Creating a SAS Software Depot” on page 32.

**CAUTION:**

Be 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** for the download manager to evaluate and optimize your depot after downloading your order. This optimization is being performed on the entire depot after the latest download has been added. 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 Copy Utility.

Depots that have been optimized can be added to later, and the optimization tool can be run on depots to which orders have been added. Optimization can also be performed on depots that have been optimized in the past.
13. 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.

14. The SAS Download Manager has finished collecting order input. This is your 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 order the information previously entered.

*Note:* SAS tracks downloads and counts only a *complete* download toward your download limit.
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.
15. Click **Finish** to close the SAS Download Manager.

16. To continue with the installation, proceed to Chapter 4, “Installing Third-Party Products,” on page 67.

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

**Create a Depot By Using the SAS Deployment Wizard**

You can use the SAS Deployment Wizard to create a copy (or subset) 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 programs, see your operating system documentation.)

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

1. Make sure that you have met the requirements described in “Prerequisites for Creating a SAS Software Depot” on page 32.

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

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

3. Start the SAS Deployment Wizard using one of two methods:
   - If you are starting the wizard from physical media, proceed as follows, depending on your operating system:
     - **Windows:**
       The **setup.exe** program starts automatically when the media is inserted into the drive.
       
       **Note:** If the SAS Deployment Wizard does not start automatically, open Windows Explorer, navigate to the media’s root directory, and double-click **setup.exe**.
     - **UNIX:**
       Navigate to the media's root directory, and enter **./setup.sh** at a command prompt.
     - **z/OS:**
       Navigate to the media's root directory, and enter **./setup.rexx** at a command prompt.
   - If you are starting the wizard from an existing SAS Software Depot, proceed as follows, depending on your operating system:
     Navigate to the depot’s root directory, and do one of the following:
     - **Windows:**
       Double-click **setup.exe**.
     - **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.

We recommend that you update the description for your SAS order to distinguish this order from other SAS orders. The SAS Deployment Wizard will display this order information during the SAS installation.

7. If you have multiple orders in your depot, you must select the order for which you want to create a depot. (Creating unique order descriptions helps you select the correct order.)
8. Select **Include complete order contents** if you do not want to subset your order. This selection causes the SAS Deployment Wizard to include all the software in the order. For more information, see “Subsetting SAS Software Orders” on page 46.

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

   We recommend that this directory be empty of any content. The exception is if this directory also contains other SAS Software Depots for the same SAS major release as this order.

   **CAUTION:**

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

   For more information, see “Prerequisites for Creating a SAS Software Depot” on page 32.
10. 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**.

11. The SAS Deployment Wizard has finished collecting order input. This is your last opportunity to change any information before writing files to the target directory. Make one of the following choices:

- Click **Start** to begin creating the depot in 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 the order information previously entered.
12. If you are running the SAS Deployment Wizard from physical media, the SAS Deployment Wizard prompts you for media. Continue to provide media as prompted.

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

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

13. 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.
14. Click the `depotsummary.html` link on the page to review the SAS QuickStart Guide.

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

16. If you are using physical media on a UNIX system with an automounter, use the `eject` command to remove the media. On a UNIX system without an automounter, you must unmount the drive using the `umount` command, and then manually open the drive. For information about the `umount` command to unmount a device on your system, see the SAS Deployment Wizard and SAS Deployment Manager User's Guide.
17. To continue with the installation, proceed to Chapter 4, “Installing Third-Party Products,” on page 67.

After you finish your SAS 9.4 deployment, be sure to keep your SAS Software Depot, because it will make 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 based on criteria such as operating system, product type, and language.

Figure 3.4 Specify Subset Options Page

The SAS Deployment Wizard also enables you to create a list of the contents of your order subset. For more information, see “List Contents of Subsetted Orders” on page 51.

Subset an Order

The SAS Deployment Wizard enables you to subset your SAS order based on operating system, product type, and language.
To subset an order, follow these steps:

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

   *Note:* Consider designating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run the SAS Download Manager installation program 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 more than one order, select the order that you want to subset, and then click **Next**.
6. We recommend that you update the description for your SAS order to distinguish this order from other SAS orders. The SAS Deployment Wizard displays this order information during the SAS installation.

![SAS Deployment Wizard](image)

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 run.
   - Select **By product languages** to choose SAS products by the language with which they will be installed.
   - Select **By products** to choose SAS products that you want to include in the SAS Software Depot by name.

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 kinds 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. Also, if you select **By products**, the SAS Migration Utility is not included in the subsetted software 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 product 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 SAS products to add to your new depot based on the operating systems on which they run, and click **Next**.
12. (This page appears if you chose By product languages in Step 9.)
Select SAS products to add to your new depot by the language in which they are installed, and click Next.

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

CAUTION:
Be 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 order.
subset. You generate this list by using submitting a command when you invoke the wizard:

- **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.

A line beginning with a:

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

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

---

**Managing SAS Orders**

**Overview of Managing SAS Orders**

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

- “Change Order Information” on page 53
Change Order Information

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

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

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

2. Start the SAS Deployment Wizard. Navigate to the SAS Software 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.

• “Delete an Order” on page 55
• “Create a Disc Image of Your Order” on page 58
5. Select **Manage this SAS Software Depot**.

6. Select the order for which you want to change information, and then click **Change Details**.
7. Update the description for your SAS order to distinguish this order from other SAS orders. The SAS Deployment Wizard will display this order information during the SAS installation.

8. When you are finished adding order information, click **OK**.

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

---

**Delete an Order**

**CAUTION:**

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

To delete a SAS order, follow these steps:

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

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

5. Select Manage this SAS Software Depot.
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 on 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 an ISO image of your order. Then, using a media creation tool of your choice you can write the ISO image to the physical media format that you specify: either CD or DVD.

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

To create an ISO image of your 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:* ConsiderDesignating one or more users to serve as SAS Software Depot administrators. Users needing to deploy SAS software or to apply maintenance require depot Read and Execute privileges. Depot administration tasks such as initially creating the depot, storing SAS installation data files, and updating order details require depot Write privileges. Windows Vista and later requires that you run the SAS Download Manager installation program 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**.
5. Select **Manage this SAS Software Depot**.

6. Select the order for which you want to create an ISO image, and then click **Create Media-Ready Image**.
7. Select the type of media (CD or DVD) for which you want to create an image of your order. Provide the target directory where you want the SAS Deployment Wizard to write this image. When you are ready, 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 complete. Click OK.

9. Click Finish to close the SAS Deployment Wizard.

The file system that the SAS Deployment Wizard creates is an ISO image of your SAS order that is logically arranged into directories that map to either CD or DVD media. Each directory contains a summary to enable you to maintain media labels.
10. Using a media creation tool of your choice, you can now write the ISO image of your SAS order to physical media that you specified earlier: either CD or DVD.

Checking Your SAS Software Depot

Overview of Checking Your SAS Software Depot

SAS provides a utility with which you can verify the integrity of your SAS Software Depot. The SAS Software Depot Checker Utility scans your depot and assembles a list of the files contained in the depot. The depot checker identifies any missing files. For each file that it finds, the depot checker attempts to validate its size, checksum, and date-and-time stamp.

The depot checker attempts to fix any problems that it encounters 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: It is recommended that you 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 the following:

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>SASDepotCheck.exe</td>
</tr>
<tr>
<td>UNIX</td>
<td>SASDepotCheck.sh</td>
</tr>
</tbody>
</table>
3. In the dialog box that appears, navigate to the top level directory of your depot.

4. From the drop-down list, select the language that you want the depot checker to use when it displays text, and click OK.

You should see a welcome page similar to the following:

The depot checker initializes.

5. Enter the path to your SAS Software Depot (for example, C:\SAS Software Depot).

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

When the scan is complete, 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 checker scan to a text file.
   - **View in Browser** launches a web browser and displays the results of the depot checker scan.
   - **Print Report** prints the results of the depot checker scan.

8. Click **Finish**.
Completed the SAS Depot Check Utility

SAS Depot Check Utility has finished running on your computer.

Click Finish to exit.
Chapter 4
Installing Third-Party Products

Deployment Process Overview: Step Four
Installing required third-party software is the fourth of six steps in deploying SAS:
1. 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. (Optional) Set up certificates.
6. Install and configure SAS.

About Installing Third-Party Products
SAS requires the following third-party products:
• PowerShell
• JUnit
Depending on your choice of a scheduler and accessibility needs, some SAS deployments additionally require these products:

- Platform Suite for SAS
- Java Access Bridge

As you install third-party products, print and fill out the appropriate third-party software checklists found in “Pre-installation Checklists for Third-Party Products” on page 69.

**Note:** You must have the necessary third-party software installed on the current machine, or the utility that you use to deploy SAS, the SAS Deployment Wizard, will not let you complete your SAS deployment.

For more information, see the system requirements for SAS 9.4, available at http://support.sas.com/resources/sysreq/index.html.

## 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
- SAS third-party software website

### SAS Software Depot: third_party Directory

Some third-party products are shipped with SAS 9.4. These products’ installation files and documentation are located in the SAS Software Depot under the `third_party` directory.

**Figure 4.1** The `third_party` Subdirectory in the SAS Software Depot

Platform Suite for SAS is an example of one third-party application that you install in this way. To determine whether any of your third-party software is distributed with your
order, refer to your *SAS Software Summary* that resides in your SAS Software Depot in your `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 from the website that SAS maintains. For more information, see “SAS Third-Party Software Website” on page 69.

### SAS Third-Party Software Website

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

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

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

### About the Java Runtime Environment

SAS Java applications require the Java Runtime Environment (JRE), which includes a Java Virtual Machine (JVM) that executes the application and a set of standard Java class libraries. On Windows, UNIX, and Linux, the SAS Deployment Wizard installs the default version of the 32-bit 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. Links to the appropriate JRE vendor’s website can be found on the SAS 9.4 third-party support site located at [http://support.sas.com/resources/thirdpartysupport/v94](http://support.sas.com/resources/thirdpartysupport/v94).

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

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

As you install third-party products, print and fill out the appropriate third-party software checklists.

*Note:* You must have the necessary third-party software installed on the current machine, or the utility that you use to deploy SAS, the SAS Deployment Wizard, will not let you complete your SAS deployment.

This section contains checklists for the following third-party products:

- PowerShell
- JUnit
• Java Access Bridge (optional)
• Platform Suite for SAS (optional)

**PowerShell**

Microsoft Windows PowerShell is a .NET-based configuration management framework that is required to deploy the SAS middle tier on Windows. The SAS Deployment Wizard uses PowerShell to run configuration scripts that modify path information. During installation, the deployment wizard prompts you to specify the PowerShell installation location.

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

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

**JUnit**

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

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

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

**Java Access Bridge**

The Java Access Bridge (JAB) is a prerequisite for JAWS, the Windows accessibility solution. JAB is shipped with SAS 9.4. For more information, see http://support.sas.com/resources/thirdpartysupport/v94/othersw.html.
Platform Suite for SAS

If you will use products from Platform Computing Incorporated either for scheduling or for grid computing, you must install several of the products from the Platform Suite for SAS offering. Platform Suite for SAS includes three products:

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

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

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

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

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

Platform Suite for SAS is distributed with SAS in the depot third_party directory, where you will find the installation programs and instructions.

You can also find the Platform Suite for SAS installation instructions on the SAS Scalability and Performance focus area on the web at [http://support.sas.com/rnd/scalability/platform/index.html](http://support.sas.com/rnd/scalability/platform/index.html).

<table>
<thead>
<tr>
<th>Table 4.3 Platform Suite for SAS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Platform Process Manager port</td>
</tr>
<tr>
<td>Product version</td>
</tr>
<tr>
<td>Platform LSF ports</td>
</tr>
<tr>
<td>Product version</td>
</tr>
<tr>
<td>Platform Grid Management Service port</td>
</tr>
<tr>
<td>Product version</td>
</tr>
</tbody>
</table>
Chapter 5
Setting Up Certificates for SAS Deployment

Deployment Process Overview: Step Five ........................................ 74
Changes to TLS and HTTPS Security .......................................... 74
What Are Certificates? ................................................................. 75
How SAS Uses Certificates ............................................................ 77
Overview of How SAS Uses Certificates .................................. 77
SAS Components That Use Certificates ..................................... 77
The Trusted CA Bundle ............................................................... 78
Managing Certificates in the SAS Environment ......................... 80
Certificate Formats Supported by SAS Middle-Tier Components .... 82
Obtaining Certificates ................................................................. 82
Overview of Obtaining Signed Certificates ............................... 82
How Many Private Keys and Signed Certificates Do I Need? ........ 84
Commands to Obtain a Signed Certificate for SAS Web Server .... 85
Commands to Obtain a Signed Certificate for Middle-Tier Components 86
Adding CA Root and Intermediate Certificates ......................... 88
Overview of Adding CA Root and Intermediate Certificates .... 88
Add Your Certificates to the Trusted CA Bundle ..................... 89
Add Your Certificates to the SAS Private JRE ......................... 92
Add Your Certificates to the Windows CA Stores .................... 93
Implementing Certificates ............................................................. 100
Overview of Implementing Certificates ................................... 100
Use Auto-Generated Certificates ............................................. 101
Provide Your Own Certificates ............................................... 104
Use a Combination of Auto-Generated and Your Own Certificates 111
Post-Deployment Tasks for Certificates .................................... 112
Overview of Post-Deployment Tasks for Certificates ............... 112
Post-Deployment Tasks for SAS Web Server ............................ 113
Post-Deployment Tasks for SAS Environment Manager .......... 114
Post-Deployment Tasks for SAS Web Application Server ........ 119
Manually Update SAS Logon Manager .................................... 122
Restart the SAS Middle Tier ...................................................... 123
Restart SAS Environment Manager Agents on the Server Tier .... 125
Validate Configured Secured Environment .............................. 126
Deployment Process Overview: Step Five

When deploying SAS 9.4, a decision that you must make is whether to use encryption. If you choose to secure communication between SAS web applications, then setting up certificates is the fifth of six tasks required to install and configure the SAS Intelligence Platform.

1. 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. (Optional) Set up certificates.
6. Install and configure SAS.

Changes to TLS and HTTPS Security

In the third maintenance release for SAS 9.4, the following changes have been made to Transport Layer Security (TLS) and HTTPS security:

- SAS provides a default truststore (the jssecacerts file) that takes precedence over the previous truststore (the cacerts file) in the SAS Private JRE.
  
  The trusted CA bundle is a copy of the Mozilla bundle, which is the list of certificate authority (CA) certificates that are distributed with Mozilla software products. (For more information, see [https://wiki.mozilla.org/CA:IncludedCAs](https://wiki.mozilla.org/CA:IncludedCAs).)


- If certificates are not used, SAS ignores SSLCALISTLOC.
  
  Refer to the order in which SAS uses when searching for certificates for more information.

- Certificate bundle management has been added to SAS Deployment Manager.
  
  Using SAS Deployment Manager, you can add and remove certificates to and from the trusted CA bundle. (For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89.)
What Are Certificates?

TLS and its predecessor, Secure Sockets Layer (SSL), are cryptographic protocols that are designed to provide communication security over the Internet. TLS and SSL are protocols that provide network data privacy, data integrity, and authentication.

*Note:* All discussion of TLS is applicable to the predecessor protocol, SSL.

TLS uses X.509 digital certificates and asymmetric cryptography to authenticate entities — whether that entity is a server process or a human user.

When messages are exchanged between entities, there is a risk that a message can be intercepted and that a process or a user can become impersonated. CAs are trusted parties that provide confidence that a public key truly belongs to an entity.

You request that the CA issue a certificate that contains your public key and that the CA has digitally signed the certificate. This is referred to as a *signed certificate*. The entity that receives your message acknowledges that your signed certificate is issued by a CA that it recognizes. If it recognizes the CA, the entity is able to substantiate your identity.
Authenticating entities is accomplished through certificates issued by three types of CAs:

- **self-signed**
  You serve as your own CA and obtain a certificate using the certificate management tool on your machine.

- **site-signed**
  You go to the IT department at your site to obtain a certificate.

- **third-party-signed**
  You go to a commercial third-party CA, such as Comodo, to purchase a certificate.

For more information about TLS, see “Providers of Encryption” in *Encryption in SAS*.
How SAS Uses Certificates

Overview of How SAS Uses Certificates

This section provides several topics that explain how SAS uses certificates:

- “SAS Components That Use Certificates” on page 77
- “The Trusted CA Bundle” on page 78
- “Managing Certificates in the SAS Environment” on page 80
- “Certificate Formats Supported by SAS Middle-Tier Components” on page 82

SAS Components That Use Certificates

Overview of SAS Components That Use Certificates

SAS components that can be secured with TLS certificates are:

- “SAS Deployment Agent” on page 77
- “SAS Environment Manager” on page 78
- “SAS Web Server” on page 78
- “SAS Web Application Server” on page 78
- “What Are Certificates?” on page 75

SAS Deployment Agent

SAS Deployment Agent and its remote client perform configuration management operations for clustering and backups. There is one SAS Deployment Agent and its remote client per machine in the deployment. SAS Deployment Agent uses a Java keystore to store its secure certificate.

SAS Deployment Wizard configures communication between SAS Deployment Agent and its remote client using two-way client authentication with auto-generated self-signed certificates by default. Therefore, the deployment agent and its remote client each has to have access to a keystore and truststore. When multiple machines are involved, having a single keystore and truststore is necessary so that all of the remote clients can communicate with all of the deployment agents.

Credentials are generated during the deployment of the SAS Metadata Server. These credentials are retrieved from the metadata server during the configuration of other SAS servers. If there are multiple metadata servers in a deployment, there is a mechanism in SAS Deployment Manager that enables you to upload a set of credentials to additional metadata servers. For more information, see “Manage SAS Deployment Agent Service” in the SAS Deployment Wizard and SAS Deployment Manager: User’s Guide.

We recommend that users who are unfamiliar with security setup use the default self-signed certificates. If your site requires a site-signed or third-party-signed certificate, then you must supply paths to both the deployment agent and remote client keystore and truststore locations and their respective passwords when prompted by the deployment wizard. For more information, see “Provide Your Own Certificates” on page 104.
If you want to provide your own certificates, we recommend that you initially configure the deployment agent with auto-generated self-signed certificates that SAS Deployment Wizard provides. Later, you can replace the auto-generated self-signed certificates with certificates that you provide, which saves you several manual configuration steps.

**SAS Environment Manager**

SAS Environment Manager is an operational monitoring and management system for SAS deployments. SAS Environment Manager incorporates Hyperic technology from VMware to offer enterprise-class operational features.

During installation, SAS Deployment Wizard can automatically create a self-signed certificate for you. However, you can specify your own site-signed or third-party-signed certificate instead. SAS Environment Manager uses a Java keystore to store its secure certificate.

**SAS Web Server**

SAS Web Server is an HTTP server based on Pivotal Web Server.

Unlike the other SAS middle-tier components, SAS Web Server is a native application built with OpenSSL and does not use Java keystores. SAS Web Server requires the following:

- A private key that is in RSA format, is not protected with a passphrase, and is saved in the ASCII (Base64-encoded) PEM format
- A certificate that contains the CA’s public key in X.509 certificate form and is saved in ASCII (Base64-encoded) PEM format.

*Note:* There is a peculiarity with the SAS Web Server in how it communicates with HTTPS clients. To address this peculiarity, if you are providing your own certificates, in addition to adding the CA root certificate, you must add all CA intermediate certificates to the trusted CA bundle (and the Windows certificates stores).

**SAS Web Application Server**

SAS Web Application Server is based on Pivotal tc Server. SAS Web Application Server uses a Java keystore to store its secure certificate.

Your deployment might include additional instances of the web application server. If your deployment includes a SAS solution, the web applications related to the solution might be deployed to managed servers with names like SASServer2_1 or SASServer12_1.

SAS Deployment Wizard does not include an option to automate HTTPS configuration for SAS Web Application Server. To implement certificates for communication with SAS Web Application Server, you must perform manual steps after running the deployment wizard.

**The Trusted CA Bundle**

The Mozilla bundle is the list of CA certificates that are distributed with Mozilla software products. (For more information, see [https://wiki.mozilla.org/CA:IncludedCAs](https://wiki.mozilla.org/CA:IncludedCAs).)

Starting with the third maintenance release for SAS 9.4, the deployment wizard copies the Mozilla bundle (cacerts.pem and cacerts.jks) to create the trusted CA bundle (trustedcerts.pem and trustedcerts.jks). These files reside in `SAS-installation`
directory/SASSecurityCertificateFramework/1.1/cacerts. On UNIX, SAS processes that are not Java use the trustedcerts.pem file to validate certificates. On Windows, SAS processes that are not Java use the Windows certificates stores to validate certificates.

The deployment wizard makes a copy of trustedcerts.jks called jssecacerts, and moves jssecacerts to SAS-installation-directory/ SASSecurityCertificateFramework/1.1/cacerts. SAS Java processes use the jssecacerts file to validate certificates. If this file resides in the same folder with cacerts, jssecacerts has precedence.

To add or remove CA certificates to or from the trusted CA bundle, you must use SAS Deployment Manager. For more information, see “Managing Certificates in the SAS Environment” on page 80

Note: Prior to the third maintenance release for SAS 9.4, you must add your CA certificates to the SAS Private JRE using the keytool -importcert command. For more information, see “Add Your Certificates to the SAS Private JRE” on page 92.
Managing Certificates in the SAS Environment

Starting with the third maintenance release for SAS 9.4, SAS Deployment Manager has been enhanced with a functionality that enables you to add or remove CA root and intermediate certificates to or from the trusted CA bundle.

**Note:** Prior to the third maintenance release for SAS 9.4, you must add your CA certificates to the SAS Private JRE using the `keytool -importcert` command. For more information, see “Add Your Certificates to the SAS Private JRE” on page 92.

**CAUTION:**
It is important to always perform the trusted CA bundle tasks in SAS Deployment Manager when adding or removing certificates to or from your SAS
environment. Failing to perform these tasks in the deployment manager leads to security failures.

The following figure shows the process for adding certificates to the trusted CA bundle:

Figure 5.3  Adding Certificates to the Trusted CA Bundle

If you are providing your own certificates, there is an order in which you must follow. First, install the SAS middle tier (if it is not already installed). Second, add your CA-signed root certificate and intermediate certificates to the trusted CA bundle. Then, configure the SAS middle tier. Your certificates must be in the trusted CA bundle when SAS Deployment Wizard loads specific products into SAS Content Server during the configuration phase of deployment. (The wizard’s load content step acts as a client and sends requests through SAS Web Server. This step fails if SAS Web Server uses the trusted CA bundle and cannot establish trust of your self-signed or site-signed certificates.)

Web applications running in SAS Web Application Server act as clients of other web applications and direct requests to web applications on other instances of SAS Web Application Server. These requests are directed through SAS Web Server. Thus, each SAS Web Application Server instance must trust the certificates used by SAS Web Server. This trust is established by adding CA certificates to the trusted CA bundle.

For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89.
On Windows middle-tier machines only, in addition to adding your CA certificates to the trusted CA bundle, you must add your CA certificates to the Windows certificates stores using the Windows Certificates Snap-in.

For more information, see “Add Your Certificates to the Windows CA Stores” on page 93.

Certificate Formats Supported by SAS Middle-Tier Components

The following table lists the SAS middle-tier components and the TLS certificate formats that they support:

<table>
<thead>
<tr>
<th>SAS Middle-Tier Component</th>
<th>Certificate Format Supported</th>
<th>CA Root and Intermediate Certificates Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Deployment Agent</td>
<td>Java keystore (One JKS file)</td>
<td>SAS Private JRE (jssecacerts)</td>
</tr>
<tr>
<td>SAS Environment Manager</td>
<td>Java keystore (One JKS file)</td>
<td>SAS Private JRE (jssecacerts)</td>
</tr>
<tr>
<td>SAS Web Application Server</td>
<td>Java keystore (One JKS file)</td>
<td>SAS Private JRE (jssecacerts)</td>
</tr>
</tbody>
</table>

Obtaining Certificates

Overview of Obtaining Signed Certificates

This topic provides an overview of how to obtain site-signed or third-party-signed certificates. Other topics in this section are the following:

- “How Many Private Keys and Signed Certificates Do I Need?” on page 84
- “Commands to Obtain a Signed Certificate for SAS Web Server” on page 85
- “Commands to Obtain a Signed Certificate for Middle-Tier Components” on page 86

The following SAS middle-tier components require one file—a Java keystore:

- SAS Deployment Agent
- SAS Environment Manager
- SAS Web Application Server
A Java keystore contains the following:

- private key
- CA root certificate
- CA intermediate certificates (if any)
- CA-signed certificate for the machine

The following figure summarizes the steps for obtaining a site-signed or third-party-signed certificate for a SAS middle-tier component (other than SAS Web Server):

**Figure 5.4  Steps for Obtaining a Site-Signed or Third-Party-Signed Certificate for a SAS Middle-Tier Component**

SAS Web Server requires two files:

- private key
  
  This private key is in RSA format, is not protected with a passphrase, and is saved in the ASCII (Base64-encoded) PEM format.

- CA-signed certificate
  
  This certificate contains the CA's public key in X.509 certificate form and is saved in ASCII (Base64-encoded) PEM format.

The following figure summarizes the steps for obtaining a site-signed or third-party-signed certificate for SAS Web Server:
How Many Private Keys and Signed Certificates Do I Need?

If you plan to provide your own signed certificates, you need to know how many to provide.

Each middle-tier machine requires at least one private key and one signed certificate to share between the SAS middle-tier components.

Except for SAS Web Server, the SAS middle-tier components require a private key and signed certificate in a Java keystore. SAS Web Server requires a private key and signed certificate in PEM format. For this reason, if SAS Web Server is located on the same machine with one or more SAS middle-tier components, you might find it easier to create a separate private key and signed certificate for SAS Web Server.

Note: If you want to use only one private key and signed certificate per machine, you must convert the signed certificate to the proper format. For more information, see https://docs.oracle.com/cd/E35976_01/server.740/es_admin/src/tadm_ssl_convert_pem_to_jks.html.

For example, if you are implementing the middle tier on machine A and the server tier on machine B, then you would require a total of three signed certificates: 1cert_machA.jks, 2cert_machB.jks, and 3cert_machB.pem.

Table 5.2  A List of Machines and Their Certificates in a Sample SAS Middle-Tier Deployment

<table>
<thead>
<tr>
<th>SAS Middle-Tier Components</th>
<th>Component Location</th>
<th>Signed Certificate File</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Metadata Server</td>
<td>Machine A</td>
<td>Not applicable</td>
</tr>
<tr>
<td>SAS Server Tier</td>
<td>Machine A</td>
<td>Not applicable</td>
</tr>
<tr>
<td>SAS Deployment Agent</td>
<td>Machine A</td>
<td>1cert_machA.jks</td>
</tr>
<tr>
<td>SAS Environment Manager Agent</td>
<td>Machine A</td>
<td>1cert_machA.jks</td>
</tr>
<tr>
<td>SAS Deployment Agent</td>
<td>Machine B</td>
<td>2cert_machB.jks</td>
</tr>
<tr>
<td>SAS Middle-Tier Components</td>
<td>Component Location</td>
<td>Signed Certificate File</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>SAS Environment Manager Server</td>
<td>Machine B</td>
<td>2cert_machB.jks</td>
</tr>
<tr>
<td>SAS Web Application Server</td>
<td>Machine B</td>
<td>2cert_machB.jks</td>
</tr>
<tr>
<td>SAS Web Server</td>
<td>Machine B</td>
<td>3cert_machB.pem</td>
</tr>
</tbody>
</table>

**Commands to Obtain a Signed Certificate for SAS Web Server**

If you have not used certificates in the past, you might want to obtain a site-signed or third-party-signed certificate. Although each SAS machine needs its own private key, you can generate the private key and a certificate signing request (CSR) on any machine. The most important thing is to safeguard the private key. This topic provides you with an overview of how to obtain a signed certificate for SAS Web Server.

Unlike the other SAS middle-tier components that require their certificates in a Java keystore, SAS Web Server requires two files:

- **private key**
  
  This private key is in RSA format, is not protected with a passphrase, and is saved in ASCII (Base64-encoded) PEM format.

- **CA-signed certificate**
  
  This certificate contains the CA's public key in X.509 certificate form and is saved in ASCII (Base64-encoded) PEM format.

To obtain a site-signed or third-party-signed certificate for SAS Web Server, perform these steps:

1. This topic explains how to obtain a signed certificate for SAS Web Server on UNIX. For steps on Windows, see “TLS on Windows: Setting Up Digital Certificates ” in *Encryption in SAS*.

2. Decide which type of CA to use at your site:
   - site-signed
   - third-party-signed

3. Establish a location on your machine where you will store your private key and signed certificates.

   For the examples in this document, `/opt/certs` is used to store the private key and certificates.

4. Change the directory to where your `openssl` commands reside.

   For example:
   ```
   cd /usr/bin
   ```

5. Use the `openssl` command to create a private key.

   For example:
   ```
   ./openssl genrsa -out /opt/certs/machine01_key.pem 2048
   ```
6. Use the `openssl` command to create a CSR.

   For example:
   ```bash
   ./openssl req -new -key /opt/certs/machine01_key.pem -out /opt/certs/machine01_csr.pem
   ```

7. Submit your CSR file and your private key to your CA.

   You should receive the following from your CA:
   - signed certificate (containing the CA's public key)
   - CA root certificate
   - CA intermediate certificate

8. Store the private key and certificates that you received from your CA in the location that you established in Step 3.

   For more information, go to the link appropriate for your operating system.
   - On Windows, see “TLS on Windows: Setting Up Digital Certificates” in *Encryption in SAS*.
   - On UNIX, see “Setting up Digital Certificates Using OpenSSL” in *Encryption in SAS*.
   - On z/OS, see “TLS on z/OS: Setting Up Digital Certificates” in *Encryption in SAS*.

**Commands to Obtain a Signed Certificate for Middle-Tier Components**

If you have not used certificates in the past, you might want to obtain a site-signed or third-party-signed certificate. This topic provides you with an overview of how to obtain a signed certificate for a SAS middle-tier component (other than SAS Web Server).

Unlike SAS Web Server, SAS Web Application Server, SAS Environment Manager, and SAS Deployment Agent require their certificates in a Java keystore.

*Note:* For commands to obtain signed certificates for SAS Web Server, see “Commands to Obtain a Signed Certificate for SAS Web Server” on page 85.

To obtain a site-signed or third-party-signed certificate for SAS middle-tier components (other than SAS Web Server), perform these steps:

1. Decide which type of CA to use at your site:
   - site-signed
   - third-party-signed

2. Establish a location on your machine where you will store your private key and signed certificates.

   For the examples in this document, `/opt/certs` is used to store the private key and certificates.

   *Tip:* If any SAS middle-tier component resides on the same machine as SAS Environment Manager, we recommend that you use the path and password that SAS Environment Manager uses by default (for example, `../../config/`)
hyperic.keystore for Hyperic). By doing so, you will not have to manually specify a new path and password later in the configuration.

3. Change the directory to where your keytool command resides.
   For example:
   ```sh
cd /usr/java/jdk1.8.0_45/bin
   ```

4. Use the keytool command to create a keystore. (By default, a keystore contains a private key.)
   For example:
   ```sh
./keytool -genkey -alias hq -keyalg RSA -keystore /opt/certs/hyperic.keystore -keysize 2048
   ```
   **TIP** For more information about the keytool command, see [http://docs.oracle.com/javase/7/docs/technotes/tools/windows/keytool.html](http://docs.oracle.com/javase/7/docs/technotes/tools/windows/keytool.html).

5. Use the keytool command to create a CSR.
   For example:
   ```sh
./keytool -certreq -alias hq -keystore /opt/certs/hyperic.keystore -file /opt/certs/hyperic.csr
   ```

6. Submit your CSR file and your private key to your CA.
   You should receive the following from your CA:
   - signed certificate (containing the CA’s public key)
   - CA root certificate
   - CA intermediate certificate

7. Store the private key and certificates that you received from your CA in the location that you established in Step 2.

8. Use the keytool command to add the CA root certificate, CA intermediate certificate, and the signed certificate (in this order) to your keystore.
   a. Add the CA root certificate to your keystore.
      In this example, root_ca.cer is the CA root certificate and hyperic.keystore is the keystore file:
      ```sh
      ./keytool -importcert -file /opt/certs/root_ca.cer -keystore /opt/certs/hyperic.keystore -trustcacerts -alias rootca
      ```
   b. Add the CA intermediate certificate to your keystore.
      In this example, int_ca.cer is the CA intermediate certificate:
      ```sh
      ./keytool -importcert -file /opt/certs/int_ca.cer -keystore /opt/certs/hyperic.keystore -trustcacerts -alias intca
      ```
   c. Add the signed certificate to your keystore.
      In this example, myserver_signed.cer is the signed certificate:
      ```sh
      ./keytool -importcert -file /opt/certs/myserver_signed.cer -keystore /opt/certs/hyperic.keystore -trustcacerts -alias myserver
      ```

9. Verify that the certificates that you added to your keystore are present:
In this example, hyperic.keystore is the keystore file:

You should see something similar to the following (look for the aliases that you added):

Keystore type: JKS
Keystore provider: SUN

Your keystore contains 4 entries

myserver, Oct 16, 2015, trustedCertEntry,
5C:29:BE:69:79:9D:2E

intca, Oct 16, 2015, trustedCertEntry,
00:AD:93:60:61:11:45

hq, Oct 16, 2015, PrivateKeyEntry,

rootca, Oct 16, 2015, trustedCertEntry,
Certificate fingerprint (SHA1): 16:E4:1B:AC:F0:0C:1B:DB:30:3A:1A:C3:EF:
4C:D6:D5:15:38:2A:25

For more information, go to the link appropriate for your operating system.

• On Windows, see “TLS on Windows: Setting Up Digital Certificates” in Encryption in SAS.

• On UNIX, see “Setting up Digital Certificates Using OpenSSL” in Encryption in SAS.

• On z/OS, see “TLS on z/OS: Setting Up Digital Certificates” in Encryption in SAS.

Adding CA Root and Intermediate Certificates

Overview of Adding CA Root and Intermediate Certificates

In the third maintenance release for SAS 9.4 and later, when providing your own signed certificates, you must add the CA root and intermediate certificates to the trusted CA bundle using SAS Deployment Manager.

In the second maintenance release for SAS 9.4 and earlier, when providing your own signed certificates, you must add the CA root and intermediate certificates to the SAS Private JRE using the Java keytool -importcert command.

Regardless of your release of SAS 9.4, on Windows, when providing your own signed certificates, you must add the CA root and intermediate certificates to the Windows certificates stores using the Windows Certificates Snap-in.

The topics in this section include the following:

• “Add Your Certificates to the Trusted CA Bundle” on page 89 (for users of the third maintenance release for SAS 9.4 and later)
Add Your Certificates to the Trusted CA Bundle

Starting with the third maintenance release for SAS 9.4, if you are providing your own certificates, then you must add the CA root certificate and all of its intermediate certificates to the trusted CA bundle. You do this using SAS Deployment Manager.

Note: You can add only one certificate at a time with the deployment manager. You must re-run the deployment manager each time you add a certificate to the trusted CA bundle.

Note: If you have any Windows machines, you must also add the CA root and intermediate certificates to the Windows certificates stores. For more information, see “Add Your Certificates to the Windows CA Stores” on page 93.

Note: These steps are to be performed for sites that are running the third maintenance for SAS 9.4 and later. If you are running the second maintenance release for SAS 9.4 or earlier, see “Add Your Certificates to the SAS Private JRE” on page 92.

To add CA root and intermediate certificates, perform these steps:

1. Log on to the primary middle-tier machine as the SAS Installer user.
2. Start SAS Deployment Manager by navigating to SAS-installation-directory/SASDeploymentManager/9.4, and launch sasdm.exe (Windows) or sasdm.sh (UNIX). On Windows, you can use the shortcut on the Start menu.
3. When prompted for the task, select Add Certificate to Trusted CA Bundle, and click Next.
4. Specify the path to your CA root certificate, and click Next.
Note: Certificate Location is the location that you established in Step 2 on page 104.

The CA root certificate must be in base64 encoding (ASCII) and have a PEM, CRT, or CER file extension.

Note: Add your CA root certificate before adding your CA intermediate certificates.

5. On the Summary page, click Start.

6. When you see a green checkmark on the Deployment Complete page, this means that your add was successful. Click Next.
7. On the Additional Resources page, click **Finish** to close the deployment manager.

8. Repeat steps 2 through 7 to add your CA intermediate certificates.

9. To verify that your CA root and intermediate certificates were successfully added, enter the following command:

```bash
path-to-keytool-command/keytool -list -keystore /SAS-installation-directory/SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.jks
```

For example:

```bash
/usr/java/jdk1.8.0_45/bin/keytool -list -keystore /opt/SASHome/SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.jks
```

You should see output similar to the following:

```
:DP:4F:B5:F7 cn=microsec e-szigno root ca,ou=e-szigno ca,o=microsec ltd.,l=budapest, c=hu, Jun 2, 2015, trustedCertEntry,
```

10. Repeat steps 1 through 9 on each machine.

11. If you have any Windows machines in your SAS deployment, then proceed to “Add Your Certificates to the Windows CA Stores”.
Add Your Certificates to the SAS Private JRE

Prior to the third maintenance release for SAS 9.4, there is no trusted CA bundle or SAS Deployment Manager task to help you manage any certificates that you provide. If you are providing your own certificates, then you must add the CA root certificate and all of its intermediate certificates to the SAS Private JRE using the `keytool -importcert` command.

Note: If you have any Windows machines, you must also add the CA root and intermediate certificates to the Windows certificates stores. For more information, see “Add Your Certificates to the Windows CA Stores” on page 93.

Note: These steps are to be performed for sites that are running the second maintenance for SAS 9.4 or earlier. If you are running the third maintenance release for SAS 9.4 and later, see “Add Your Certificates to the SAS Private JRE” on page 92.

To add CA root and intermediate certificates, perform these steps:

1. Log on to the primary middle-tier machine as the SAS Installer user.
2. Change the directory to where your `keytool` commands reside.
   
   For example:
   
   ```
   cd /usr/java/jdk1.8.0_45/bin
   ```
3. Enter the following command. Refer to the table for information that you must provide.

   ```
   ```

   Note: The `keytool` command must be on one line. It is shown on more than one line in the preceding code sample for display purposes only.

   **TIP** For more information about the `keytool` command, see [http://docs.oracle.com/javase/7/docs/technotes/tools/windows/keytool.html](http://docs.oracle.com/javase/7/docs/technotes/tools/windows/keytool.html).

   **Table 5.3 User-Supplied Values for the keytool Command**

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS-installation-directory</td>
<td>Location on the machine where SAS is installed</td>
<td>C:\Program Files\SASHome \SASPrivateJavaRuntimeEnvironment \9.4\jre\lib\security</td>
</tr>
<tr>
<td>myhost</td>
<td>Fully qualified machine name</td>
<td>my_server.example.com</td>
</tr>
<tr>
<td>path-to-keystore.jks</td>
<td>Absolute path to the keystore</td>
<td>/opt/certs/my_keystore.jks</td>
</tr>
<tr>
<td></td>
<td>Refer to Step 2 on page 104</td>
<td></td>
</tr>
</tbody>
</table>

4. Repeat step 3 to add your CA intermediate certificates.

5. To verify that your CA root and intermediate certificates were successfully added, enter the following command:
path-to-keytool-command/keytool -list -keystore /SAS-installation-directory/SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.jks

For example:

/usr/java/jdk1.8.0_45/bin/keytool -list -keystore /opt/SASHome/SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.jks

You should see output similar to the following:


6. Repeat steps 1 through 5 on each machine.

7. If you have any Windows machines in your SAS deployment, then proceed to “Add Your Certificates to the Windows CA Stores”.

---

Add Your Certificates to the Windows CA Stores

If you are providing your own certificates, then you must add the CA root certificate and all of its intermediate certificates to the Windows certificates stores using the Windows Certificates Snap-in.

Note: If you have not already done so, you must add your CA root and intermediate certificates to the trusted CA bundle or to the SAS Private JRE. For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89 or “Add Your Certificates to the SAS Private JRE” on page 92.

To add CA root and intermediate certificates, perform these steps:

1. Click the Windows Start button, select Run, enter mmc, and click OK.

2. In the Console window, select File ⇒ Add/Remove Snap-in.
3. Select **Certificates** from the list of available snap-ins, and click **Add**.

4. In the dialog box that appears, select **Computer account**, and click **Next**.
5. In the dialog box that appears, click **Finish**.

6. In the dialog box that appears, click **OK**.
7. In the Console window, expand **Certificates (Local Computer)** on the left.

8. Right-click **Trusted Root Certification Authorities**, and select **All Tasks** ➪ **Import**.
9. On the Certificate Import Wizard page, click **Next**.

10. On the second wizard page, click **Browse**, navigate to the location that contains your CA root certificate and any intermediate certificates, and select the appropriate certificate. Click **Next**.

    **Note:** This location is the path that you established in **Step 2 on page 104**.
11. Make sure that Place all certificates in the following store is selected, and click Next.

12. Click Finish.
13. Click **OK**.

14. In the Console window, expand **Trusted Root Certification Authorities** to make sure that the certificate that you imported is listed.

15. Repeat steps 8 through 14 for any CA intermediate certificates.

16. Repeat steps 1 through 15 on any additional Windows machines in your SAS deployment.
Implementing Certificates

Overview of Implementing Certificates

The options for implementing certificates consist of the following:
- Self-signed certificates automatically generated by SAS Deployment Wizard
- Certificates that you provide
- Combination of automatically generated certificates and provided certificates

The following table lists the certificate options for the SAS middle-tier components:

<table>
<thead>
<tr>
<th>Middle-Tier Component</th>
<th>Certificate Source</th>
<th>Certificate Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Deployment Agent</td>
<td>Self-signed only</td>
<td>Any type*</td>
</tr>
<tr>
<td>SAS Environment Manager</td>
<td>Self-signed only</td>
<td>Any type</td>
</tr>
<tr>
<td>SAS Web Server</td>
<td>None</td>
<td>Any type</td>
</tr>
<tr>
<td>SAS Web Application Server</td>
<td>None</td>
<td>Any type</td>
</tr>
</tbody>
</table>

* All instances of “Any type” refers to self-signed, site-signed, and third-party-signed certificates that you provide.
** Self-signed certificate auto-generated by SAS Deployment Wizard.

The following list summarizes the steps to implement the various certificate options:
- **Using self-signed certificates automatically generated by SAS Deployment Wizard.**
  This option consists of installing and configuring the SAS middle tier using the deployment wizard.
- **Providing your own certificates.**
  This option consists of these high-level steps:
  1. If you do not already have them, obtain your certificates and private keys. Store these certificates and private keys on any machine that has the SAS components that use them.
  2. Install and configure your SAS metadata tier and SAS server tier.
     (Use SAS Deployment Wizard.)
When prompted, use the auto-generated certificates for SAS Deployment Agent and its remote client. Later, you can replace the auto-generated certificates with certificates that you provide.

3. On both Windows and UNIX on the SAS metadata tier and SAS server tier machines, depending on your release of SAS 9.4, add your CA root certificate and intermediate certificates either to the trusted CA bundle or to the SAS Private JRE.

(Use SAS Deployment Manager or the Java keytool -importcert command.)

4. On Windows on the SAS metadata tier and SAS server tier machines, you must also add your CA root certificate and intermediate certificates to the Windows certificates stores using the Windows Certificates Snap-in. (Most third-party-signed CA certificates already exist in the Windows certificates stores.)

5. Install your SAS middle tier.

(Use SAS Deployment Wizard.)

6. On both Windows and UNIX middle tier machines, add your certificates to the trusted CA bundle.

(Use SAS Deployment Manager.)

7. On Windows middle tier machines, you must also add any pre-existing self-signed and site-signed certificates to the Windows certificates stores using the Windows Certificates Snap-in. (Most third-party-signed CA certificates already exist in the Windows certificates stores.)

8. Configure your SAS middle tier.

(Use SAS Deployment Wizard.)


   Note: Implementing certificates for SAS Web Application Server consists of manual, post-deployment steps.

   • Using a combination of self-signed certificates automatically generated and providing your own certificates.

   This option has the same steps as providing your own certificates. The only difference is that you do not replace the auto-generated certificates with your own certificates.

**Use Auto-Generated Certificates**

If you want SAS Deployment Wizard to generate self-signed certificates to secure SAS Deployment Agent and its remote client and the SAS Environment Manager server and its agents, perform these steps:

Note: Using auto-generated certificates secures your SAS Deployment Agent and SAS Environment Manager only. To secure all of the components in your SAS middle tier, you must provide your own certificates or use a combination of your own certificates and certificates auto-generated by SAS Deployment Wizard. For more information, see “Overview of Implementing Certificates” on page 100.

1. Run SAS Deployment Wizard. Make sure that both **Install SAS Software** and **Configure SAS Software** are selected.
2. When you are prompted for the SAS Deployment Agent remote communication configuration, select **Generate credentials to secure the connection**.

3. When you are prompted for the configuration prompting level, select **Custom**.
4. When you are prompted, make sure that you select Generate a default JKS format keystore from SAS Environment Manager.

5. When you are prompted, make sure that you select Establish secure communication.
Provide Your Own Certificates

For SAS Deployment Agent and its remote client and for the SAS Environment Manager server and its agents, SAS Deployment Wizard provides auto-generated, self-signed certificates by default. Because these certificates have intermachine connections, are behind your firewall, and do not involve users, there is less of a reason to implement site-signed or third-party-signed certificates. However, if you must use your own certificates, you can.

This topic explains how to accept the default action—that is, let SAS Deployment Wizard install auto-generated self-signed certificates for you. After the deployment wizard is finished, you can go back and replace the auto-generated, self-signed certificates with certificates that you provide, which saves you several manual configuration steps.

To provide your own certificates to secure your SAS middle tier, follow these steps:

1. If you do not already have them, obtain your certificates.
   
   See “Obtaining Certificates” on page 82.

2. Decide on a location on each machine in your SAS environment where you will store your certificates. Make sure that your certificates reside in these locations.

3. Use the following table to record keystore and truststore locations and passwords for SAS Deployment Agent and its remote client.

   SAS Deployment Wizard prompts you for these locations and passwords during SAS installation and configuration. The deployment wizard encodes the passwords that you provide into SAS proprietary format (SAS002).

   Note: Your keystore must be in JKS format.

   **Tip:** We recommend that instead of providing your own certificates to SAS Deployment Agent during installation, that you accept the default and let SAS Deployment Wizard install auto-generated self-signed certificates for you. After the deployment wizard is finished, you can go back and replace the auto-
generated, self-signed certificates with certificates that you provide, which saves you several manual configuration steps.

Table 5.5  SAS Deployment Agent Keystore and Truststore Information

<table>
<thead>
<tr>
<th>Keystore and Truststore Properties</th>
<th>Actual Value You Are Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Deployment Agent keystore path</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent keystore password</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent truststore path</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent truststore password</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent remote client keystore path</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent remote client keystore password</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent remote client truststore path</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Agent remote client truststore password</td>
<td></td>
</tr>
</tbody>
</table>

4. Use the following table to record keystore locations and passwords for the SAS Environment Manager server and its agents.

SAS Deployment Wizard prompts you for these locations and passwords during SAS installation and configuration. The deployment wizard encodes the passwords that you provide into SAS proprietary format (SAS002).

Table 5.6  SAS Environment Manager Keystore Information

<table>
<thead>
<tr>
<th>Keystore Properties</th>
<th>Actual Value You Are Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Environment Manager server keystore path</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager server keystore password</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager alias</td>
<td></td>
</tr>
</tbody>
</table>
5. Use the following table to record certificate and private key locations for SAS Web Server. SAS Deployment Wizard prompts you for these locations and passwords during SAS installation and configuration.

**Table 5.7  SAS Web Server Private Key and Certificate Information**

<table>
<thead>
<tr>
<th>Private Key and Certificate Properties</th>
<th>Actual Value You Are Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Web Server X.509 certificate path</td>
<td></td>
</tr>
<tr>
<td>SAS Web Server RSA private key path</td>
<td></td>
</tr>
</tbody>
</table>

6. Use the following table to record keystore locations and passwords for SAS Web Application Server and its agents. SAS Deployment Wizard does not prompt you for these locations and passwords. You must manually update the SAS Web Application Server configuration with this information after you deploy SAS. For more information, see “Post-Deployment Tasks for SAS Web Application Server” on page 119.

**TIP** You can use the same keystore for SAS Environment Manager and SAS Web Application Server if they reside on the same machine.

**Table 5.8  SAS Web Application Server Keystore Information**

<table>
<thead>
<tr>
<th>Keystore Properties</th>
<th>Actual Value You Are Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Web Application Server keystore path</td>
<td></td>
</tr>
<tr>
<td>SAS Web Application Server keystore password</td>
<td></td>
</tr>
</tbody>
</table>

7. Install and configure your SAS metadata tier and SAS server tier machines.

Follow the steps documented in “Use Auto-Generated Certificates” on page 101.

8. Add your CA root certificate and intermediate certificates to your SAS metadata tier and SAS server tier machines.

Follow the steps documented in “Adding CA Root and Intermediate Certificates” on page 88.

9. On each of your middle-tier machines, start SAS Deployment Wizard by navigating to `SAS-installation-directory/SASDeploymentManager/9.4`, and
launch `setup.exe` (Windows) or `setup.sh` (UNIX). On Windows, you can use the shortcut on the Start menu.

10. On the Select Deployment Type page, select **Perform a Planned Deployment** and **Install SAS Software**.

   **Note:** Make sure that **Configure SAS Software** is deselected.

11. When prompted by the deployment wizard, select **Generate credentials to secure the connection**, and click **Next**.

   **TIP** We recommend that instead of providing your own certificates to SAS Deployment Agent during installation, that you accept the default and let SAS Deployment Wizard install auto-generated self-signed certificates for you. After the deployment wizard is finished, you can go back and replace the default SAS Environment Manager auto-generated JKS keystore with certificates that you provide. Choosing **Generate credentials to secure the connection** saves you several manual configuration steps.
12. On the Additional Resources page, click Finish to close the deployment wizard.

13. If you have additional middle-tier machines, repeat steps 4 through 9 on each middle-tier machine.

Otherwise, proceed to the next step.

14. Perform one of the following steps based on your operating system:

   - **Windows**
     - Depending on your release of SAS 9.4, add your CA root certificate and intermediate certificates either to the trusted CA bundle or to the SAS Private JRE on each of your middle-tier machines.
     
     For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89 or “Add Your Certificates to the SAS Private JRE” on page 92.
     
     - Using the Windows Certificates Snap-in, add your CA root certificate and intermediate certificates to the Windows certificates stores on each of your middle-tier machines.
     
     For more information, see “Add Your Certificates to the Windows CA Stores” on page 93.
     
   - **UNIX**:
     
     Depending on your release of SAS 9.4, add your CA root certificate and intermediate certificates either to the trusted CA bundle or to the SAS Private JRE on each of your middle-tier machines.
     
     For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89 or “Add Your Certificates to the SAS Private JRE” on page 92.

15. On each of your middle-tier machines, start SAS Deployment Wizard by navigating to $SAS$-installation-directory/SASDeploymentManager/9.4, and launch setup.exe (Windows) or setup.sh (UNIX). On Windows, you can use the shortcut on the Start menu.

16. On the Select Deployment Type page, select Perform a Planned Deployment and Configure SAS Software.
Note: Make sure that Install SAS Software is deselected.

17. When prompted for the configuration prompting level, select Custom.

19. The deployment wizard prompts you for the following information. Enter the values that you recorded earlier in Table 5.7, and click **Next**:

- In the X.509 certificate field, enter the path to the X.509 certificate with the DNS name of the current machine as the common name.
- In the RSA private key field, enter the path to the RSA private key that is not protected by a passphrase.

**Note:** SAS Web Server does not use a passphrase so that it can start without having to prompt the administrator for a passphrase.

20. When prompted by the deployment wizard, select **Generate a default JKS format keystore from SAS Environment Manager**, and click **Next**.
We recommend that instead of providing your own certificates to SAS Environment Manager during installation, that you accept the default and let SAS Deployment Wizard install auto-generated self-signed certificates for you. After the deployment wizard is finished, you can go back and replace the default SAS Environment Manager auto-generated JKS keystore with certificates that you provide. Choosing Generate a default JKS format keystore from SAS Environment Manager saves you several manual configuration steps.

21. Proceed to “Post-Deployment Tasks for Certificates”.

Use a Combination of Auto-Generated and Your Own Certificates

For SAS Deployment Agent and its remote client and for the SAS Environment Manager server and its agents, SAS Deployment Wizard provides auto-generated, self-signed certificates by default. Because these certificates have intermachine connections, are behind your firewall, and do not involve users, there is less of a reason to implement site-signed or third-party-signed certificates. For the other middle-tier components—the SAS Web Server and the SAS Web Application Server—you provide your own certificates.

The steps for using a combination of certificates are almost identical to the steps documented in Provide Your Own Certificates, except that you replace the auto-generated certificates with your own certificates.
Post-Deployment Tasks for Certificates

Overview of Post-Deployment Tasks for Certificates

The post-deployment tasks that you perform for SAS Web Server and SAS Environment Manager depend on whether you are providing your own certificates or using the certificates auto-generated by SAS Deployment Wizard.

Note: The post-deployment tasks for SAS Web Application Server are the same, regardless of the source of your certificates.

• The following post-deployment tasks should be performed if you are using the certificates auto-generated by SAS Deployment Wizard only (and not providing your own certificates):
  • “Disable HTTP for SAS Environment Manager” on page 115
  • “Add SAS Web Server Certificate to the SAS Environment Manager Keystore” on page 117
  • “Change Security Callback URLs” on page 116
  • “Post-Deployment Tasks for SAS Web Application Server” on page 119
  • “Manually Update SAS Logon Manager” on page 122
  • “Restart the SAS Middle Tier” on page 123
  • “Restart SAS Environment Manager Agents on the Server Tier” on page 125
  • “Validate TLS Settings” on page 127
  • “Validate Listening Ports” on page 126
  • “Verify Cookie Settings” on page 129

• The following post-deployment tasks should be performed if you are providing your own certificates or using a combination of your own certificates and certificates auto-generated by SAS Deployment Wizard:
  • “Post-Deployment Tasks for SAS Web Server” on page 113
  • “Post-Deployment Tasks for SAS Environment Manager” on page 114
  • “Post-Deployment Tasks for SAS Web Application Server” on page 119
  • “Manually Update SAS Logon Manager” on page 122
  • “Restart the SAS Middle Tier” on page 123
  • “Restart SAS Environment Manager Agents on the Server Tier” on page 125
  • “Validate TLS Settings” on page 127
  • “Validate Listening Ports” on page 126
  • “Verify Cookie Settings” on page 129
Post-Deployment Tasks for SAS Web Server

Overview of Post-Deployment Tasks for SAS Web Server

When you are providing your own certificates, the post-deployment steps for SAS Web Server consist of the following:

- “Manually Update httpd.conf” on page 113
- “Manually Update sas.conf” on page 113

Note: The manual TLS configuration changes must be reverted to the original non-TLS values before applying any maintenance releases or upgrades to the system. Then, the manual TLS configuration changes can be reapplied to the system.

Manually Update httpd.conf

To manually update httpd.conf for SAS Web Server when you are providing your own certificates, perform these steps:

Note: The manual TLS configuration changes must be reverted to the original non-TLS values before applying any maintenance releases or upgrades to the system. Then, the manual TLS configuration changes can be reapplied to the system.

1. Log on to the machine running SAS Web Server as the SAS Installer user.
3. Uncomment the Listen port option, and insert localhost: immediately before the port number.
   For example:
   - UNIX
     Listen localhost:7980
   - Windows
     Listen localhost:80
4. Uncomment the following lines after the Listen line:

   RewriteEngine On
   RewriteCond %{HTTPS} off
   RewriteRule ^/(.*) https://your-machine:secure-port/$1 [L,R=permanent]
5. Make sure that the following line is uncommented:

   Include conf/extra/httpd-ssl.conf
6. Save and close the file.
7. Proceed to “Manually Update sas.conf”.

Manually Update sas.conf

To manually update sas.conf for SAS Web Server when you are providing your own certificates, perform these steps:

Note: The manual TLS configuration changes must be reverted to the original non-TLS values before applying any maintenance releases or upgrades to the system. Then, the manual TLS configuration changes can be reapplied to the system.
1. Log on to the machine running SAS Web Server as the SAS Installer user.

2. Using a text editor, open \texttt{SAS-configuration-directory/Web/WebServer/conf/sas.conf}.

3. Add the following lines to the top of the file, before the \texttt{ProxyStatus} line:
   \begin{verbatim}
   SSLProxyEngine on
   SSLProxyVerify require
   SSLProxyVerifyDepth 10
   SSLProxyCACertificateFile "\texttt{certificates-directory/signed-certificate.pem}"
   \end{verbatim}
   \textbf{Note:} \texttt{certificates-directory} is the location that you established in \texttt{Step 2 on page 104}.

4. Make the following global replacements in the file:
   \begin{table}[h]
   \centering
   \begin{tabular}{|l|l|}
   \hline
   Property to Change & New Value \\
   \hline
   http & https \\
   \hline
   Non-Secure SAS Web Server port & Secure SAS Web Server port \\
   Examples: 80, 8080 & Examples: 443, 8343 \\
   \hline
   Non-Secure SAS Web Application Server ports & Secure SAS Web Application Server ports \\
   Examples: 8180, 9080, 9180 & Examples: 8543, 9443, 9543 \\
   \hline
   \end{tabular}
   \caption{sas.conf Properties and Their Values}
   \end{table}

5. Save and close the file.

6. This completes the manual, post-deployment configuration for SAS Web Server.
   Proceed to “Post-Deployment Tasks for SAS Environment Manager”.

\section*{Post-Deployment Tasks for SAS Environment Manager}

\subsection*{Overview of Post-Deployment Tasks for SAS Environment Manager}

When you are using certificates auto-generated by SAS Deployment wizard, and you are not providing your own certificates, the post-deployment steps for SAS Environment Manager consist of the following:

- “Update the Cipher List” on page 115
- “Disable HTTP for SAS Environment Manager” on page 115
- “Change Security Callback URLs” on page 116
- “Add SAS Web Server Certificate to the SAS Environment Manager Keystore” on page 117

When you are providing your own certificates, the post-deployment steps for SAS Environment Manager consist of the following:
• “Disable HTTP for SAS Environment Manager” on page 115
• “Change Security Callback URLs” on page 116
• “Manually Update web.xml” on page 118
• “Manually Update hq-server.conf” on page 118

Note: The manual TLS configuration changes must be reverted to the original non-TLS values before applying any maintenance releases or upgrades to the system. Then, the manual TLS configuration changes can be reapplied to the system.

**Update the Cipher List**
To avoid the following web browser error message, you must update the cipher list used by SAS Environment Manager:

```
Server has a weak ephemeral Diffie-Hellman public key
ERR_SSL_WEAK_SERVER_EPHEMERAL_DH_KEY
```

To update the cipher list for SAS Environment Manager, perform these steps:
1. Log on to the machine hosting SAS Environment Manager as the SAS Installer user.
3. In the HTTPS connector, locate the cipher element. Change the value to the following:

   ```
ciphers="TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256,TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA,
   TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384,TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA,
   TLS_ECDHE_RSA_WITH_RC4_128_SHA,TLS_RSA_WITH_AES_128_CBC_SHA256,
   TLS_RSA_WITH_AES_128_CBC_SHA,TLS_RSA_WITH_AES_256_CBC_SHA256,
   TLS_RSA_WITH_AES_256_CBC_SHA,SSL_RSA_WITH_RC4_128_SHA"
```
4. Save and close the server.xml file.

**Disable HTTP for SAS Environment Manager**
By default, the SAS Environment Manager server listens on both HTTP (7080) and HTTPS (7443) ports. When using site-signed and third-party-signed certificates, you should disable HTTP and change security callback URLs on page 116 for the SAS Environment Manager server.

Note: The manual TLS configuration changes must be reverted to the original non-TLS values before applying any maintenance releases or upgrades to the system. Then, the manual TLS configuration changes can be reapplied to the system.

Note: After you have disabled HTTP, SAS Environment Manager agents are not able to monitor and collect metrics for the Apache Tomcat instance hosting the SAS Environment Manager server.

To disable HTTP for SAS Environment Manager, perform these steps:
1. Log on to the machine hosting SAS Environment Manager as the SAS Installer user.
3. Locate the HTTP connector and surround it with comment tags:
4. Save and close the server.xml file.


**Change Security Callback URLs**

You should change the security callback URLs when you want your web browsers to access SAS Environment Manager on HTTPS, whether you are providing your own certificates or using the certificates generated by SAS Deployment Wizard.

*Note:* If you are using a self-signed certificate, do not perform this task. If you do, you will get a warning in your web browser about the self-signed certificate.

To change the security callback URLs for the SAS Environment Manager server, perform these steps:

1. Log on to the machine hosting SAS Environment Manager as the SAS Installer user.


3. Change all four occurrences of the SAS Environment Manager HTTP protocol and port to `https` and the secured port. (The default port for Lev1 is 7080.)

   For example:

   ```
   https://hostname:7443
   ```

   **TIP** If you used non-default ports or a configuration level other than Lev1, refer to `SAS-configuration-directory/Instructions.html` to determine the correct port to use.

   *Note:* One of the port occurrences is encoded. Be sure to change the occurrence of the encoded port. Do not change the port for SAS Web Server (for example, 443 or 8443). After you make the change, it should resemble the following:

   ```
   https://myserver.example.com:443/SASLogon/
   logout?sas_svcs_logon_LogonUrl=https%3A%2F%2Fmyserver.example.com%3A7443
   ```

   **CAUTION:** Be careful not to change the SASLogon URLs.

4. Save and close the security-web-context.xml file.

5. • If you are using certificates auto-generated by SAS Deployment Wizard only and not providing your own certificates, proceed to “Add SAS Web Server Certificate to the SAS Environment Manager Keystore”.

   • If you are providing your own certificates or using a combination of your own certificates and auto-generated certificates, proceed to “Manually Update web.xml” on page 118
Add SAS Web Server Certificate to the SAS Environment Manager Keystore

If you selected Use the default JKS format keystore from SAS Environment Manager and you are using the certificates auto-generated by SAS Deployment Wizard, after installation, you must add the SAS Web Server certificate to the SAS Environment Manager keystore. Failure to add the certificate results in receiving a certificate error in your web browser when using the SAS Environment Manager console.

To add the SAS Web Server certificate to the SAS Environment Manager keystore, perform these steps:

1. Stop the SAS Environment Manager server using the following step for your operating system:
   - Windows
     Using the Services Snap-in, right-click SAS Environment Manager Server, and select Stop.
   - UNIX
     Run `SAS-configuration-directory/sas.servers stop`.

2. Change the directory to where your SAS Web Server certificate resides.
   (Refer to Step 3.)

3. Using the `openssl` command, combine the private key, signed certificate, and CA certificates into a PKCS #12 file with the following command:

   ```bash
   ```

   When prompted for a password, enter hyperic.

   For more information, see https://www.openssl.org/docs/apps/openssl.html.

4. Import the PKCS #12 file created in step 3 into the SAS Environment Manager keystore using the following command:

   ```bash
   ```

   When you see a prompt similar to the following, type yes, and press Enter:

   Existing entry alias hq exists, overwrite? [no]:

5. Using the PostgreSQL `psql` console, connect to the SAS Environment Manager database using the following command:

   ```sql
   ```

6. Using the PostgreSQL `psql` console, remove its default keystore using the following command:

   ```sql
   delete from eam_keystore;
   ```
7. Quit the PostgreSQL psql console by entering `\q`. Restart SAS Environment Manager using the following step for your operating system:

- **Windows**
  
  Using the Services Snap-in, right-click **SAS Environment Manager Server**, and select **Restart**.

- **UNIX**:
  
  Run `SAS-configuration-directory/sas.servers restart`.

This completes the manual, post-deployment configuration for SAS Environment Manager when you are using certificates auto-generated by SAS Deployment Wizard only and not providing your own certificates.

8. Proceed to “Post-Deployment Tasks for SAS Web Application Server” on page 119.

### Manually Update web.xml

To manually update web.xml for SAS Environment Manager when you are providing your own certificates, perform these steps:

1. Log on to the machine hosting SAS Environment Manager as the SAS Installer user.


3. Change all occurrences of the SAS Web Server HTTP protocol and port to `https` and the secured port. (The default port for Lev1 is 7980.)

   For example:
   
   `https://fully-qualified-web-server-hostname:843`

   **Tip** If you used non-default ports or a configuration level other than Lev1, refer to `SAS-configuration-directory/Instructions.html` to determine the correct port to use.

4. Save and close the web.xml file.

5. Proceed to “Manually Update hq-server.conf”.

### Manually Update hq-server.conf

To manually update hq-server.conf for SAS Web Server when you are providing your own certificates, perform these steps:

1. Log on to the machine hosting SAS Environment Manager as the SAS Installer user.


3. Make the following property changes in the file:

   **Table 5.10  hq-server.conf Properties That Must Be Changed**

<table>
<thead>
<tr>
<th>Property to Change</th>
<th>Old Value</th>
<th>New Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>server.keystore.path</td>
<td><code>../../conf/hyperic.keystore</code></td>
<td>Use the value entered in Table 5.6 on page 105.</td>
</tr>
<tr>
<td>server.keystore.password</td>
<td><code>hyperic</code></td>
<td>Use the value entered in Table 5.6 on page 105.</td>
</tr>
</tbody>
</table>
4. Save and close the hq-server.conf file.

5. This completes the manual, post-deployment configuration for SAS Environment Manager when you are providing your own certificates.

   Proceed to “Post-Deployment Tasks for SAS Web Application Server”.

---

**Post-Deployment Tasks for SAS Web Application Server**

**Overview of Post-Deployment Tasks for SAS Web Application Server**

You must perform the following post-deployment tasks for SAS Web Application Server regardless of the source of your certificates:

- “Manually Update server.xml” on page 119
- “Set the Secure Attribute for Session Cookies” on page 120
- “Manually Update setenv.sh” on page 121

**Manually Update server.xml**

SAS Web Application Server must be manually configured for HTTPS whether you are providing your own certificates or using the certificates auto-generated for you by SAS Deployment Wizard.

To manually update server.xml to configure SAS Web Application Server for HTTPS, perform these steps:

1. Log on to the machine hosting the primary SAS Web Application Server as the SAS Installer user.


3. Add the following connector element after the existing connector element. Refer to the table for information that you must provide.

   ```xml
   <Connector acceptCount="100" bindOnInit="false"
   connectionTimeout="20000" executor="tomcatThreadPool"
   maxHttpHeaderSize="16384" maxKeepAliveRequests="15" port="${bio.https.port}"
   proxyName="web-application-server-machine-name" proxyPort="secure-port"
   redirectPort="${bio.https.port}" scheme="https" useBodyEncodingForURI="true"
   secure="true" SSLEnabled="true"
   keystoreFile="keystore-path"
   keystorePass="keystore-password"/>
   ```

**Table 5.11  Connector Element Properties That Must Be Changed**

<table>
<thead>
<tr>
<th>Property to Change</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>proxyName</td>
<td>Fully qualified host name for the SAS Web Application Server machine</td>
<td>MyMachine.example.com</td>
</tr>
<tr>
<td>proxyPort</td>
<td>Secure port</td>
<td>8343, 443</td>
</tr>
</tbody>
</table>
### Property to Change | Description | Examples
--- | --- | ---
keystoreFile | Absolute path to the keystore | /opt/certs/my_keystore.jks
      | Refer to Table 5.8 on page 106 |  
keystorePass | Password for the keystore | my_password
      | Refer to Table 5.8 on page 106 |  

4. Save and close the server.xml file.

5. Repeat steps 3 through 4 for the remaining SAS Web Application Server instances on every machine in your SAS middle tier.

   For example:
   ```
   SAS-configuration-directory/Web/WebAppServer/SASServer2_1/conf/server.xml
   SAS-configuration-directory/Web/WebAppServer/SASServer11_1/conf/server.xml
   SAS-configuration-directory/Web/WebAppServer/SASServer12_1/conf/server.xml
   ```

   **Note:** Depending on your SAS order, you might have a different number of SAS Web Application Server instances.

6. Proceed to “Set the Secure Attribute for Session Cookies”.

### Set the Secure Attribute for Session Cookies

The secure attribute for cookies directs a web browser to send cookies only through an encrypted HTTPS connection. To configure SAS Web Application Server to return the session ID with the secure attribute, you must set the secure attribute for cookies for each instance of SAS Web Application Server.

To set the secure attribute for cookies for the primary SAS Web Application Server, perform these steps:

1. Log on to the machine hosting the primary SAS Web Application Server as the SAS Installer user.


3. Add the following content before the `<session-config>` tag:

   ```xml
   <cookie-config>
   <secure>true</secure>
   </cookie-config>
   ```

   After you have added the new content, the web.xml file should resemble the following:

   ```xml
   <!-- ==================== Default Session Configuration =================-->
   <!-- You can set the default session timeout (in minutes) for all newly -->
   <!-- created sessions by modifying the value below. -->
   <session-config>
   <session-timeout>30</session-timeout>
   </session-config>
   ```
4. Save and close the web.xml file.

5. Repeat steps 3 through 4 for the remaining SAS Web Application Server instances on every machine in your SAS middle tier.

For example:

SAS-configuration-directory/Web/WebAppServer/SASServer2_1/conf/web.xml
SAS-configuration-directory/Web/WebAppServer/SASServer11_1/conf/web.xml
SAS-configuration-directory/Web/WebAppServer/SASServer12_1/conf/web.xml

Note: Depending on your SAS order, you might have a different number of SAS Web Application Server instances.

6. Proceed to “Manually Update setenv.sh”.

**Manually Update setenv.sh**

SAS Web Application Server must be manually configured for HTTPS whether you are providing your own certificates or using the certificates auto-generated for you by SAS Deployment Wizard.

To manually update setenv.sh to configure SAS Web Application Server for HTTPS, perform these steps:

1. Log on to the machine hosting the primary SAS Web Application Server as the SAS Installer user.

2. Using a text editor, open `SAS-configuration-directory/Web/WebAppServer/SASServer1_1/bin/setenv.sh`.

3. In setenv.sh, make the following property changes:

   **Table 5.12 setenv.sh Properties That Must Be Changed**

<table>
<thead>
<tr>
<th>Property to Change</th>
<th>Old Value</th>
<th>New Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Dsas.scs.scheme</td>
<td>http</td>
<td>https</td>
</tr>
<tr>
<td>-Dsas.auto.publish.protocol</td>
<td>http</td>
<td>https</td>
</tr>
<tr>
<td>-Dsas.scs.port</td>
<td>Non-secure port</td>
<td>Secure port</td>
</tr>
<tr>
<td></td>
<td>Examples: 80, 8080</td>
<td>Examples: 443, 8443</td>
</tr>
<tr>
<td>-Dsas.auto.publish.port</td>
<td>Non-secure port</td>
<td>Secure port</td>
</tr>
<tr>
<td></td>
<td>Examples: 80, 8080</td>
<td>Examples: 443, 8443</td>
</tr>
</tbody>
</table>

4. Save and close the setenv.sh file.

5. For the remaining SAS Web Application Server instances on every machine in your SAS middle tier, make the following property change:
Table 5.13  setenv.sh Property That Must Be Changed

<table>
<thead>
<tr>
<th>Property to Change</th>
<th>Old Value</th>
<th>New Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Dsas.auto.publish.port</td>
<td>Non-secure port, Examples: 8180, 9080, 9180</td>
<td>Secure port, Examples: 8543, 9443, 9543</td>
</tr>
</tbody>
</table>

For example:

SAS-configuration-directory/Web/WebAppServer/SASServer2_1/bin/setenv.sh
SAS-configuration-directory/Web/WebAppServer/SASServer11_1/bin/setenv.sh
SAS-configuration-directory/Web/WebAppServer/SASServer12_1/bin/setenv.sh

**Note:** Depending on your SAS order, you might have a different number of SAS Web Application Server instances.

6. This completes the manual, post-deployment configuration for SAS Web Application Server when you are configuring for HTTPS.

Proceed to “Manually Update SAS Logon Manager”.

**Manually Update SAS Logon Manager**

SAS Logon Manager must be updated so that the CAS ticket-granting cookie is secured. SAS Logon Manager can be updated in the SASHOME location, and then it can be rebuilt and redeployed. Updating SAS Logon Manager ensures that any changes are maintained after applying a hotfix. Alternatively, the deployed file in SASServer1_1 can be updated, and changes are effective as soon as SASServer1_1 is restarted. Or, the changes can be made in both places, which is what is described in this document.

To manually update SAS Logon Manager to secure the CAS ticket-granting cookie, perform these steps:

1. Log on to the machine hosting the primary SAS Web Application Server as the SAS Installer user.


3. In the ticketGrantingTicketCookieGenerator.xml file, change the value of p:cookieSecure="false" to p:cookieSecure="true".

After you have added the new content, the ticketGrantingTicketCookieGenerator.xml file should resemble the following:

```xml
<bean id="ticketGrantingTicketCookieGenerator" class="org.jasig.cas.web.support.CookieRetrievingCookieGenerator" p:cookieSecure="true"
    p:cookieMaxAge="-1"
    p:cookieName="CASTGC"
    p:cookiePath="/SASLogon"/>
```

4. Save and close the ticketGrantingTicketCookieGenerator.xml file.

5. Using a text editor, open SAS-configuration-directory/Web/WebAppServer/SASServer1_1/sas_webapps/sas.svcs.logon.war/
In the `ticketGrantingTicketCookieGenerator.xml` file, change the value of `p:cookieSecure="false"` to `p:cookieSecure="true"`.

After you have added the new content, the `ticketGrantingTicketCookieGenerator.xml` file should resemble the following:

```xml
<bean id="ticketGrantingTicketCookieGenerator"
     class="org.jasig.cas.web.support.CookieRetrievingCookieGenerator"
     p:cookieSecure="true"
     p:cookieMaxAge="-1"
     p:cookieName="CASTGC"
     p:cookiePath="/SASLogon"/>
```

7. Save and close the `ticketGrantingTicketCookieGenerator.xml` file.

8. Repeat steps 2 through 4 for every machine in your SAS middle tier.

(Steps 5 through 7 are performed only on the SAS middle-tier machine that contains SASServer1_1.)

9. Proceed to “Restart the SAS Middle Tier”.

**Restart the SAS Middle Tier**

After you perform the required post-deployment tasks on the SAS middle tier, you must restart the SAS middle tier.

For the SAS Environment Manager server, the process requires a few more steps. Stop the SAS Environment Manager server, remove its keystore (on the SAS server tier), and then restart the SAS Environment Manager server.

To restart the SAS middle tier, perform these steps:

1. Log on to the SAS Environment Manager server machine as the SAS Installer user.
2. Use the method appropriate for your operating system:
   - **Windows**
     - Using the Services Snap-in, right-click on each of the services in the list (in the order in which they are listed), and select **Stop**:
     - SAS Environment Manager Agent
     - SAS Web App Server: SASServer2_1
     - SAS Web App Server: SASServer12_1
     - SAS Web App Server: SASServer1_1
     - SAS Web Server
     - SAS Cache Locator Service: ins_41415
     - SAS JMS Broker
   - **UNIX**
     - Run `SAS-configuration-directory/sas.servers stop`.

Post-Deployment Tasks for Certificates

123
3. If the SAS server tier is on a different machine, log on to the SAS server-tier machine that contains the SAS Web Infrastructure Platform Data Server as the SAS Installer user.

4. Using the PostgreSQL psql console, connect to the SAS Environment Manager database using the following command:

   ```
   SAS-installation-directory/
   ```

5. Using the PostgreSQL psql console, remove its default keystore using the following command:

   ```
delete from eam_keystore;
   ```

6. Quit the PostgreSQL psql console by entering `\q`.

7. If the SAS middle tier is on a separate machine, go back to the middle-tier machine, and run the command appropriate for your operating system:

   - **Windows**
     
     Using the Services Snap-in, right-click on each of the services in the list (in the order in which they are listed), and select **Start**:
     
     ```
     SAS JMS Broker
     SAS Cache Locator Service: ins_41415
     SAS Web Server
     SAS Web App Server: SASServer1_1
     SAS Web App Server: SASServer12_1
     SAS Web App Server: SASServer2_1
     SAS Environment Manager
     SAS Environment Manager Agent
     ```

   - **UNIX**
     
     Run `SAS-configuration-directory/sas.servers start`.

8. On any remaining SAS middle-tier machines, run the command appropriate for your operating system:

   - **Windows**
     
     Using the Services Snap-in, right-click on each of the services in the list (in the order in which they are listed), and select **Restart**:
     
     ```
     SAS JMS Broker
     SAS Cache Locator Service: ins_41415
     SAS Web Server
     SAS Web App Server: SASServer1_1
     SAS Web App Server: SASServer12_1
     SAS Web App Server: SASServer2_1
     SAS Environment Manager
     SAS Environment Manager Agent
     ```
9. Proceed to “Restart SAS Environment Manager Agents on the Server Tier”.

**Restart SAS Environment Manager Agents on the Server Tier**

To ensure that the SAS Environment Manager agents on each of the server-tier machines are still able to communicate with the SAS Environment Manager server, you must stop each SAS Environment Manager agent, delete its data directory, and then restart it.

To restart a SAS Environment Manager agent, perform these steps:

1. Log on to a server-tier machine as the SAS Installer user.
2. Use the method appropriate for your operating system to stop the SAS Environment Manager agent:
   - Windows
     Using the Services Snap-in, right-click **SAS Environment Manager Agent**, and select **Stop**:
   - UNIX
     Enter the following command: `SAS-configuration-directory/Web/SASEnvironmentManager/agent-5.8.0-EE/bin/hq-agent.sh stop`.
3. Use the command appropriate for your operating system to delete the SAS Environment Manager agent’s data directory:
   - Windows
     `rmdir /S SAS-configuration-directory/Web/SASEnvironmentManager/agent-5.8.0-EE/data`
   - UNIX
     `rm -rf SAS-configuration-directory/Web/SASEnvironmentManager/agent-5.8.0-EE/data/*`
4. Use the method appropriate for your operating system to start the SAS Environment Manager agent:
   - Windows
     Using the Services Snap-in, right-click **SAS Environment Manager Agent**, and select **Start**:
   - UNIX
     Enter the following command: `SAS-configuration-directory/Web/SASEnvironmentManager/agent-5.8.0-EE/bin/hq-agent.sh start`.
5. Perform steps 1 through 4 on every machine in your SAS server tier.
6. Proceed to “Validate Configured Secured Environment”.

**Post-Deployment Tasks for Certificates**

125
Validate Configured Secured Environment

Overview of Validate Configured Secured Environment
This section contains the following topics:

- “Validate Listening Ports” on page 126
- “Validate TLS Settings” on page 127
- “Verify Cookie Settings” on page 129

Validate Listening Ports
To confirm that the TCP listening ports on the SAS middle tier are functioning, perform these steps:

1. Log on to the SAS middle-tier machine as the SAS Installer user.  
   Note: If there is more than one SAS middle-tier machine, log on to the primary SAS middle-tier machine.

2. Enter the `netstat` command to list listening ports on SAS Web Server:

   ```
   netstat -an | grep LISTEN | grep "8343\|7980"
   ```

   You should see the following:

   tcp 0 0 127.0.0.1:7980 0.0.0.0:* LISTEN
   tcp 0 0 :::8343 ::::*

   If the SAS Web Server has been automatically configured for HTTPS, the listening port on 7980 is disabled, so only port 8343 is shown.

3. Enter the `netstat` command to list listening HTTPS ports on SAS Web Application Server:

   ```
   netstat -an | grep LISTEN | grep "8443\|8543\|9443\|9543"
   ```

   You should see the following:

   tcp 0 0 :::8543 ::::* LISTEN
   tcp 0 0 :::9443 ::::* LISTEN
   tcp 0 0 :::9543 ::::* LISTEN
   tcp 0 0 :::8443 ::::* LISTEN

4. Enter the `netstat` command to list listening HTTP ports on SAS Web Application Server:

   ```
   netstat -an | grep LISTEN | grep "8080\|8180\|9080\|9180"
   ```

   You should see the following:

   tcp 0 0 :::8080 ::::* LISTEN
   tcp 0 0 :::8180 ::::* LISTEN
   tcp 0 0 :::9080 ::::* LISTEN
   tcp 0 0 :::9180 ::::* LISTEN

5. Enter the `netstat` command to list listening ports on the SAS Environment Manager server:

   ```
   netstat -an | grep LISTEN | grep "7080\|7443"
   ```

   You should see the following:

   tcp 0 0 :::7443 ::::* LISTEN
6. Perform steps 1 through 5 for every machine in your SAS middle tier.
7. Proceed to “Validate TLS Settings”.

**Validate TLS Settings**

To validate TLS settings for the SAS middle tier, perform these steps:

1. Log on to the primary SAS middle-tier machine as the SAS Installer user.
2. Change the directory to the location where the trusted CA bundle resides.
   
   For example:
   ```
   cd /opt/SASHome/SASSecurityCertificateFramework/1.1/cacerts/trustedcerts.pem
   ```
3. Enter the following `openssl` command to validate SAS Web Server:
   ```
   path-to-openssl s_client -connect my_server.example.com:secured-port -CAfile trustedcerts.pem
   ```
   
   For example:
   ```
   /usr/bin/openssl s_client -connect my_server.example.com:8343 -CAfile trustedcerts.pem
   ```
   
   You should see the following:

   ```plaintext
   CONNECTED(00000003)
   depth=1 C = US, ST = My State, L = My Town, O = Example, OU = ACME, CN = BUS Env Root CA, emailAddress = nr@example.com verify return:1 depth=0 C = US, ST = My State, L = My Town, O = Example, OU = Acme, CN = my_server.example.com verify return:1
   
   Certificate chain
   0 s:/C=US/ST=My State/L=My Town/O=Example/CN=my_server.example.com
   i:/C=US/ST=My State/L=My Town/O=Example/CN=Root CA/emailAddress=nr@example.com
   
   Server certificate
   -----BEGIN CERTIFICATE-----
   MIIEfjCCAmVCCQDwIBq1Lz36jANBgkqhkiG9w0BAQsFADCBkDELMAkGA1UEBhMCVVMxFzAVBgNVBAsMDk
   FYXJ5MQwvCQYDVQQIEw5O b3J0aCBDYXJvbGluYTENMAsGA1UEBxMD
   wCgYD VQQKDANTQVMxDDAKBgNVBAMTFWdlbHNhczAzLnJhY2xvZ2blingvEvBz20QaEBChMD
cygYD VQQLEWHRWHxxHjAcBgNVBAMTFWdlbHNhczAzLnJhY2xvZ2blingvEvBz20QaEBChMD
   -----END CERTIFICATE-----
   subject=/C=US/ST=My State/L=My Town/O=Example/CN=my_server.example.com issuer=/C=US/ST=My State/L=My Town/O=Example/CN=Root CA/emailAddress=nr@example.com
   
   No client certificate CA names sent
   Server Temp Key: DH, 768 bits
   
   SSL handshake has read 3419 bytes and written 431 bytes
   
   New, TLSv1/SSLv3, Cipher is DHE-RSA-AES128-SHA
   ```
Server public key is 2048 bit
Secure Renegotiation IS supported
Compression: NONE
Expansion: NONE
SSL-Session:
   Protocol : TLSv1.2
   Cipher : DHE-RSA-AES128-SHA
   Session-ID:
      55CCB690344AD774698249F4148748C00B4C3A18886520859A70007B15A65D4
   Session-ID-ctx:
   Master-Key:
      8B19E0A0F74AD10EEF69523BDEB6B70AA7E437F722D2152717ACDEE89ACC540C29DCB206F866B296EB237E33059BE95
      Key-Arg : None
      Krb5 Principal: None
      PSK identity: None
      PSK identity hint: None
      Start Time: 1439479440
      Timeout : 300 (sec)
      Verify return code: 0 (ok)

---

The following line indicates that TLS is properly configured for the SAS middle-tier component whose secured port you entered:

Verify return code: 0 (ok)

4. Press CTRL-C to quit the `openssl` command.

5. Repeat step 3 for each SAS middle-tier component using the secured ports from the following table:

<table>
<thead>
<tr>
<th>SAS Middle-Tier Component</th>
<th>Default Secured Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Web Server</td>
<td>8343</td>
</tr>
<tr>
<td></td>
<td>443 (Windows)</td>
</tr>
<tr>
<td>SAS Deployment Agent</td>
<td>5660</td>
</tr>
<tr>
<td>SAS Environment Manager</td>
<td>7443</td>
</tr>
<tr>
<td>SAS Web Application Server 1</td>
<td>8443</td>
</tr>
<tr>
<td>SAS Web Application Server 2</td>
<td>8543</td>
</tr>
<tr>
<td>SAS Web Application Server 11</td>
<td>9443</td>
</tr>
<tr>
<td>SAS Web Application Server 12</td>
<td>9543</td>
</tr>
</tbody>
</table>

6. Proceed to “Verify Cookie Settings”.
Verify Cookie Settings
This topic explains how you can validate cookie settings in the Google Chrome web browser by accessing the SAS portal from a Windows client machine.

To validate cookie settings in the Google Chrome web browser on Windows, perform these steps:

2. Select Advanced ⇒ Proceed to my_server.example.com (unsafe).
3. Log on to SAS Information Delivery Portal.
4. After SAS Information Delivery Portal has loaded, open a new web browser tab, and enter chrome://settings/cookies.
5. Select my_server.example.com ⇒ CASTGC, and make sure that Send for: Secure connections only is selected.
Chapter 6
Installing and Configuring Your SAS Software

Deployment Process Overview: Step Six ............................................. 132
Preparing to Install and to Configure ............................................. 132
  Overview of Preparing to Install and to Configure ....................... 132
  SAS Deployment Wizard Options ................................................. 133
  About Deployment Plans ............................................................ 133
  Reducing the Number of Password Prompts ................................ 134
  Re-entry Feature of the Deployment Wizard .................................. 135
  Installing SAS on z/OS .............................................................. 135
  SAS Visual Analytics Administration and Reporting ....................... 135
  SAS Deployment Agents ............................................................ 136
  Update Your SAS Documentation Only ........................................ 136
  Metadata Server Clustering ........................................................ 138
  SAS Web Application Server Clustering ........................................ 139
  Installation Order Rules for Multiple Machine Deployments .......... 139
  SAS Metadata Server Recommendation ....................................... 140
  Metadata Content Repository Considerations ............................... 140
  Locale and Encoding Considerations ......................................... 140
  A Note about Host Names .......................................................... 144
  How the Deployment Wizard Names SAS Web Application Servers .... 144
  Reviewing Third-Party Database Requirements .............................. 144
  Deploy SAS BI Lineage When LSF Scheduler Is on a Separate Machine from the Workspace Server ........................................ 146

Install and Configure SAS Interactively ....................................... 151
Validate the SAS 9.4 Servers ....................................................... 188
About SAS Deployment Tester ....................................................... 191

Automating the SAS Installation on Multiple Machines .................... 191
  Overview of Automating the SAS Installation on Multiple Machines 191
  Overview of Automating the SAS Installation on Multiple Machines 191
  Recording a SAS Deployment Wizard Response File ....................... 192
  Playing Back a SAS Deployment Wizard Response File .................. 194
  Verifying the Playback Install .................................................... 197
  Monitoring the SAS Deployment Wizard during Playback ................ 197
  More about Monitoring the SAS Deployment Wizard on UNIX and z/OS 198
Deployment Process Overview: Step Six

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

Installing and configuring SAS is the sixth and final step in deploying SAS.

1. 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. (Optional) Set up certificates.

⇒ 6. Install and configure SAS.

Preparing to Install and to Configure

Overview of Preparing to Install and to Configure

The topics contained in this section are:

• “SAS Deployment Wizard Options” on page 133
• “About Deployment Plans” on page 133
• “Reducing the Number of Password Prompts” on page 134
• “Re-entry Feature of the Deployment Wizard” on page 135
• “Installing SAS on z/OS” on page 135
• “SAS Visual Analytics Administration and Reporting” on page 135
• “SAS Deployment Agents” on page 136
• “Update Your SAS Documentation Only” on page 136
• “Metadata Server Clustering” on page 138
• “SAS Web Application Server Clustering” on page 139
• “Installation Order Rules for Multiple Machine Deployments” on page 139
• “SAS Metadata Server Recommendation” on page 140
• “Metadata Content Repository Considerations” on page 140
• “Locale and Encoding Considerations” on page 140
• “A Note about Host Names” on page 144
• “How the Deployment Wizard Names SAS Web Application Servers” on page 144
• “Reviewing Third-Party Database Requirements” on page 144
• “Deploy SAS BI Lineage When LSF Scheduler Is on a Separate Machine from the Workspace Server” on page 146
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 (SID file) and a deployment plan (plan.xml) for its initial input, the wizard is designed to prompt the customer for all of the remaining input at the start of the session so that the customer does not have to monitor an entire deployment.

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

• interactively
  This is a standard method of providing input via fields on wizard pages with a Back and Next button navigation method. You can choose from three levels of configuration prompting: Express (minimum set of prompts), Typical (basic set of prompts), and Custom (all prompts). For more information, see “Install and Configure SAS Interactively” on page 151.

• non-interactively
  A record and playback feature 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” on page 191.

About Deployment Plans

A deployment plan describes what software should be installed and configured 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 custom. A standard deployment plan describes a common configuration. Standard deployment plans are included in the SAS Software Depot. A custom deployment plan is created by a SAS representative specifically for a site.

• If a SAS representative created a custom deployment plan for you, an XML file (or a ZIP file containing an XML file) will have been e-mailed to you.

• If your SAS representative recommended that you use a standard deployment plan, you just need the name of the plan that you will use; the actual deployment plan is downloaded with your SAS custom order (or included in your custom media that is shipped to you). During the installation, the standard deployment plan will be available from a drop-down list in the SAS installation program.

• 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 wizard stores a copy of the deployment plan in the SAS configuration directory in the utilities directory, and inserts a date and time stamp to the deployment plan filename. For example:

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

To download the latest SAS 9.4 standard deployment plans that also contain a corresponding architectural diagram and pre-installation checklist, go to http://support.sas.com/installcenter/plans.
Reducing the Number of Password Prompts

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

When you select the Set passwords using the Unrestricted Administrator password check box on the SAS Internal Account: Unrestricted Administrator page, the SAS Deployment Wizard reuses 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)
- 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 the third maintenance release for SAS 9.4, a re-entry feature has been added to the SAS Deployment Wizard.

If, for any reason, 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, steps that failed and then the user intentionally directed the wizard to continue anyway).

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 the installation or configuration or of the point in the installation or configuration chain 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 supply, 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 Start Up Commands for the SAS Deployment Wizard on page 153.

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 that you installed SAS in your initial deployment. Before you can start the SAS Deployment Wizard, the cell where you are going to perform the software upgrade must be running.

For more information, see: http://support.sas.com/documentation/installcenter/94/mvs/index.html.

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, available at http://support.sas.com/documentation/installcenter/en/ikdeploywizug/66034/PDF/default/user.pdf.

SAS Visual Analytics Administration and Reporting

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

SAS Visual Analytics Administration and Reporting is a component piece 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 the administration and reporting portion of your order until later. However, SAS Mobile BI will not be operable until you have deployed administration and reporting. For more information, refer to your SAS solutions documentation.

If you are upgrading your deployment with SAS 9.4, Rev. 940_14w41, review the constraint for administration and reporting in “Add SAS Visual Analytics Administration and Reporting” on page 260.

For more information, contact SAS Technical Support.

**SAS Deployment Agents**

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

For more information, see “How SAS Uses Certificates” on page 77.

**Update Your SAS Documentation Only**

Starting in the second maintenance release for SAS 9.4, 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 after your original order and installs updates to your SAS product documentation only.

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

When you have obtained a SAS software order that contains later versions of the SAS products that you are currently running, follow these steps to update your SAS product documentation:

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

Table 6.1  Start-Up Commands for the SAS Deployment Wizard
You should see a welcome page similar to the following:

3. Follow the wizard prompts as they appear. For more information, click Help and refer to “Install and Configure a Software Update” in SAS Guide to Software Updates.

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 “Administering 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 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, will be used to run the 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 process is complete. For instructions, see “Specifying a Backup User Manually” in SAS Intelligence Platform: System Administration Guide available at http://support.sas.com/documentation/cdl/en/bisag/67481/HTML/default/viewer.htm#p1ugntmt9ufvtpn1tux6i272hwzl.htm.

Clustering provides redundancy and high availability of the metadata server.

Client applications and users interact with the cluster in the same way that they would interact with a 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 only on Windows and UNIX machines. Starting in the second maintenance release for SAS 9.4, clustering is also supported 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\sassv1gn. On UNIX and zOS, the nodes are started by the SAS Installer account. For more information, see “Prerequisites for Cluster Configuration” in SAS Intelligence Platform: System Administration Guide.

All of the nodes in the cluster must have the same operating system.

You deploy your metadata cluster by installing an initial metadata server, and then moving to another machine and running the 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.
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 also supported and can be configured easily.

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: Make sure to consult the “Deployment Steps” document 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 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. We recommend that you make a backup after deploying each SAS tier as you move through the deployment process.
2. If you are implementing metadata server clusters, install the metadata server nodes next.

3. Install the SAS application servers (such as workspace or stored process servers) on machines other than the 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 metadata server and middle tier reside on the same machine, remember that the SAS server tier (the compute tier) must be configured after the 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 will host only clients last.

**SAS Metadata Server Recommendation**

We recommend that you deploy the SAS Metadata Server on a dedicated server machine. A machine running only the metadata server greatly simplifies tuning, management, and diagnostics.

For more recommendations, see the SAS Metadata Server section in the System Requirements document for your SAS product.

**Metadata Content Repository Considerations**

We recommend that your metadata repositories reside either on a local file system or 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 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.

Additionally, 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, you would enter the following command:

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

On UNIX and Linux, there are differences in the spelling and case of language-encoding pairs. For this reason, we suggest that you 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 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” on page 284.)

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

**Figure 6.3 Choose Language Dialog Box**

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

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

**Figure 6.4 Select Language Support Page**

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

**CAUTION:**

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

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

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

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

A Note about Host Names

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

How the 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 server for deployment. This distribution helps balance the load on each server, and defines a recommended number of servers based on the products in each configuration.

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

If you use the default names (for example, SASserver\(n\)) in your configuration, then we recommend that you also maintain the default numbering scheme.

Reviewing Third-Party Database Requirements

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

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

- In postgresql.conf, make sure that \texttt{fsync=on}.
  (The storage device hosting Postgres must support its operating system \texttt{fsync()} call.)
- The storage device should use ECC (error correcting) 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 your PostgreSQL documentation available at http://www.postgresql.org/docs/9.1/static/creating-cluster.html.

\textbf{Note:} The database used by SAS Environment Manager, the SAS Deployment Backup and Recovery Tool, and certain SAS solutions, such as SAS Visual Analytics, will be
PostgreSQL regardless of the database 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 solution software. (The deployment wizard gives you this option when 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. If you have not already done so, make sure that you review Appendix 5, “Configuring an Alternate Database for SAS Web Infrastructure Platform Services,” on page 287.

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 6.6 SAS Web Infrastructure Platform Database: Data Server

On the SAS Web Infrastructure Platform: Database Type page, select the database management system type for the database that you plan to use.
The 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 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.

For more information, see “SAS Web Infrastructure Platform Database: JDBC Properties” on page 179.

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

The most common topology involving the Load Sharing Facility Scheduler (LSF Scheduler) is to locate it on the same machine as the SAS workspace server.

However, an alternative topology could consist of the following:

- Machine 1 hosts the metadata and workspace servers.
- Machine 2 hosts the LSF Scheduler and BI Lineage Scheduling servers.

To achieve this configuration, you run the 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. When running the SAS Deployment Wizard on machine 1, the metadata and workspace server machine, make sure that you deselect **SAS BI Lineage Scheduling Server** on the Select Product to Install page.

   For information about how to run the deployment wizard, see “Install and Configure SAS Interactively” on page 151.
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 will install and initially configure machine 1 based on the input that you have provided.

6. After the wizard completes running on machine 1, 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*.

7. Be sure to restart any servers that you stopped for purposes of creating a backup.
8. When you are finished completing any manual configuration tasks called for in Instructions.html, and you have made the necessary backups, log on to machine 2 (the BI Lineage Scheduling and LSF Scheduler servers machine) and launch the wizard a second time.

For information about how to run the deployment wizard, see “Install and Configure SAS Interactively” on page 151.

9. Use the same deployment plan and again select the Server and Middle Tier machine when prompted for products to install.

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 will install and initially configure machine 2 based on the input that you have provided.

14. 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, go to the Third-Party Software Downloads site at http://support.sas.com/resources/thirdpartysupport/v94/appservers/index.html and select the product name of your web application server.

15. 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” on page 188.

---

**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 or unplanned)
  - deployment plan location (if planned)
  - machine type (single machine, server machine, and so on)
  - SAS components to be installed on the machine
  - valid paths to any required pre-installed, third-party software
- Providing configuration information such as the following:
  - prompting level (express, typical, custom)
This topic describes some of the more important configuration pages that you will encounter during the installation and configuration phases of a SAS 9.4 deployment. The type and number of configuration-related pages that you will see depend on the prompt level that you choose, the SAS tier that you are currently deploying, and the contents of your SAS 9.4 custom order. “Configuration Options by Prompt Level” on page 212 lists which configuration options are available for each prompt level. For information about all SAS Deployment Wizard prompts, see the online Help for the wizard page in question.

Note: To run the deployment wizard on operating systems that do not have windowing systems, see the SAS Deployment Wizard and SAS Deployment Manager User’s Guide, available at http://support.sas.com/documentation/installcenter/en/ikdeplywizug/66034/PDF/default/user.pdf.

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 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.

   For more information, see “Add Your Certificates to the Trusted CA Bundle” on page 89.

2. Make sure that you have reviewed all of the documents listed in “Step 1: Review Additional Documentation” on page 2. The SAS Deployment Wizard checks the version of the operating system and will not proceed if the correct patch level is not met.

3. Verify that you have performed the earlier required steps outlined in “Deployment Process Overview: Step Six” on page 132.

4. If you use any garbage collection scripts, temporarily suspend these scripts during SAS Deployment Wizard execution. If any wizard temporary files are deleted during wizard 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 the following topic before proceeding, “Add SAS Visual Analytics Administration and Reporting” on page 260.

6. Review information about where to source your SAS metadata repositories described in “Metadata Content Repository Considerations” on page 140.

7. Review information about SAS Deployment Wizard configuration prompting levels described in “Overview of Configuration Options by Prompt Level” on page 211.
8. 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” on page 139.

9. Log on to the machine with a user ID that meets the requirements for the appropriate operating system:
   - Windows:
     Use an account that is available for the long term (for future SAS maintenance) and 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.
   - z/OS:
     Use the same account on all machines on which you are deploying SAS.

10. 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

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>setup.exe</td>
</tr>
<tr>
<td>UNIX</td>
<td>setup.sh</td>
</tr>
</tbody>
</table>
| z/OS             | First invocation of the deployment wizard to install the metadata server as a 64-bit application: setup.rexx -z64  
                   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 the second maintenance release for SAS 9.4, the deployment wizard automatically records your responses, regardless of whether you run the wizard with the -record option. This 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 and z/OS).

By default, the deployment wizard writes the response file in the following location:

- Windows:
  C:\Documents and Settings\current-user\sdwresponse.properties
- UNIX and z/OS:
  ~/sdwresponse.properties
You should see a welcome page similar to the following:

11. Choose Language

Select the language for the deployment wizard, and click OK.
- From the drop-down list, select the language that you want the SAS Deployment Wizard to use when it displays text.

For more information, see “Locale and Encoding Considerations” on page 140.

12. Select Deployment Task

Select the deployment task that you want to perform, and click Next.
- Select Install SAS Software.

13. Specify SAS Home

 Specify the location where you want to install SAS, and click Next.
- If you want to specify a different location where SAS is installed other than the default, enter this path in SAS Home.

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

**CAUTION:**

There should be one SAS installation directory (SAS Home) per SAS deployment. Therefore, when deploying multiple tiers on the same host, the SAS installation directory location 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 the first time you run the wizard. On any subsequent wizard sessions on this machine, the wizard uses the previously specified location for the SAS installation directory.

14. Select Deployment Type

Specify the type of deployment that you want to perform, and click Next.
- Confirm that Perform a Planned Deployment, Install SAS Software, and Configure SAS Software are all selected, unless you are providing your own Transport Layer Security (TLS) certificates.
15. Specify Deployment Plan

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

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

- standard deployment plan

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

  For more information, see “About Deployment Plans” on page 133.
16. Select Deployment Step and Products to Install

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

- In the Deployment Step drop-down list, 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” on page 139.

  *Note:* When a machine has multiple deployment steps, the deployment wizard attempts to default to the correct step. However, 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 2, “Deploying SAS Web Parts for Microsoft SharePoint,” on page 221.

- In the table, by default, all products that are displayed will be installed. Deselect any products that you do not want to install. When you are finished, click Next.

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

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

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.
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 multi-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.

- Click **Clear All**. (English remains selected as the default language.)

- Add any 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 how SAS sorts data. Then, click Next.

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

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

  For more information, see “Locale and Encoding Considerations” on page 140.

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, and 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 Office application is launched, the activated SAS add-in automatically loads, and users see 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 to the file that defines SAS environments, and click Next.

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

The SAS environment file, named sas-environment.xml, defines a set of SAS deployments at your site. Your administrator makes this file available on your site network and can provide you with its URL. In order to log on to some client applications, the URL must be specified in this dialog box. 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 look as follows: **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. (unsecure: 80 on Windows, 7980 on UNIX; secure: 443 on Windows, 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 complete in order to find the file and deploy it to your web server.

For more information, see “Configuring the SAS Environment File” in SAS Intelligence Platform: Middle-Tier Administration Guide.

26. SAS Quality Knowledge Base for Contact Information
Specify configuration information for SAS Quality Knowledge Base for Contact Information, and click **Next**.

- **In Data Directory**, enter the location for data content—chop tables, grammars, and so on.

  The SAS Quality Knowledge Base for Contact Information directory can be located outside of the SAS installation directory (SAS Home).

- **In Enable for all users**, select **Yes** to enable all authenticated users full access rights to the data directory.

  If you do not select this option and you want to grant this privilege later, your site’s Windows administrator must provide users with explicit access.

27. SAS Quality Knowledge Base for Contact Information: License Location

Specify the location of the license for the Data Management products that you are deploying, and click **Next**.

- **In License**, enter the absolute path to the license for SAS Quality Knowledge Base for Contact Information.

  SAS Quality Knowledge Base for Contact Information locales are licensed with DataFlux Data Management Studio and DataFlux Data Management Server.

28. Specify Remote Communication Configuration

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

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

  For more information, see “SAS Deployment Agents” on page 136.

- **In Specify how to secure the remote connection**, make one of the following selections:
  
  - Select **Generate credentials to secure the connection** if you want the deployment wizard to create a self-signed certificate, generate a keystore, and import the certificate into the keystore.
  
  - Select **Specify existing credentials to secure the connection** if you have already implemented CA-signed, site-signed, or self-signed certificates. On the next page, the wizard prompts you for the keystore location and password.
  
  - Select **Do not secure the connection** if you do not want to secure SAS Deployment Agent communication or 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 “How SAS Uses Certificates” on page 77.

29. Specify SAS Deployment Agent Keystore Credentials

Specify the location and credentials for the keystore used to verify credentials for outgoing communications from your SAS Deployment Agent machine, and click **Next**.

- **In Agent Keystore Location**, enter your SAS Deployment Agent keystore file location (path and filename).
• In Agent Keystore Password, enter the password that you used when you created the keystore using the Java keytool command.

• In Confirm Agent Keystore Password, re-enter the password.

For more information, see “Provide Your Own Certificates” on page 104.

30. The deployment wizard scans your machine to determine whether any pre-existing 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 running, quit SAS and add Write permission to the files listed. When you are finished, click Next.

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


   • 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 A - Install a new SAS system.

   • 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 will 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.

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

   The 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 at [http://support.sas.com/documentation/installcenter/94](http://support.sas.com/documentation/installcenter/94), and use the operating system and SAS version to locate the appropriate SAS Foundation Configuration Guide.

33. **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 of third-party software depends on the SAS software that you are installing on the current machine.)

   - On 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 installing on the current machine.

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

   For more information, see the following resources:

   “Pre-installation Checklists for Third-Party Products” on page 69.

   Third-Party Software for SAS 9.4
34. 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.

35. Select Configuration Prompting Level

Specify the amount of information to provide to the SAS Deployment Wizard for configuring the SAS software that you are installing on the current machine. Select one of the three prompting levels, and click Next:

- **Express**
  
  Displays the minimum number of wizard pages needed to complete the SAS configuration.

  *Note:* When deploying the SAS middle tier, by default 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 procedure 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 needed to complete the SAS configuration.

  See “Overview of Configuration Options by Prompt Level” on page 211 for more information about the SAS Deployment Wizard prompting levels.

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

*Note:* This topic describes some of the more important pages that you will 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 and, in multiple machine deployments, which machine you are currently deploying. “Configuration Options by Prompt Level” on page 212 lists which configuration options are available for each prompt level. For information about all SAS Deployment Wizard prompts, see the online Help for the wizard dialog box in question.

Specify Configuration Information

Select the path where the SAS Deployment Wizard will write SAS configuration files and logs and the level that you want to deploy. Then, click Next.

- In **Configuration Directory**, enter the path for SAS configuration files and logs.

- In **Configuration Level**, enter the level that you want to deploy (for example, Lev1 = production).

  In UNIX environments, the SAS Installer generally overrides the default configuration directory with the site’s preferred location (for example, /opt/sas/config). The SAS Installer must have Write permission on this location.

  *Note:* The last digit of the default port number reflects the configuration level that you select in the deployment wizard. For example, when you select Lev1, the default port for the 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 directories can share the same parent directory, one directory should not reside inside another. Defining 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 will create the necessary subdirectories.

Local Machine Name
Identify the local machine in various ways, and 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).

  **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 method of referring to the host, usually only a single word (for example, MyMachine).

Migration Information
Specify the path to the migration package, and click **Next**.

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

  **Note:** Ignore this page unless you are migrating.

  For more information, see “Introduction” in SAS Intelligence Platform: Migration Guide.

Authentication Domain
Specify the authentication domain SAS uses to authenticate logins to servers, and click **Next**.

- Accept the default value (DefaultAuth) unless you are planning to use a different SAS 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.

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

Windows Options (run as managed scripts or services)
Select Windows options available for the Windows operating system, and click **Next**.

- In **Server Operation Type**, select how to run your SAS servers. They can be run using management scripts or they can be run as Windows services.

  If you select the management script option, then the user account that runs the SAS Object Spawner must be the administrator or a member of the Windows Administrators group. Or, it must have the following Windows local user rights on the SAS Object Spawner machine:

  - **Adjust memory quotas for a process**
• **Replace a process level token**

• **Select Create Windows Shortcuts** to create shortcuts to start and stop your SAS servers.

These shortcuts function whether the servers are running as Windows services or by using management scripts.

**Integrated Windows Authentication**

Indicate whether you are using Integrated Windows authentication (IWA) for SAS client/server connections, and 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 clients has no effect.


A metadata server running on Windows has IWA turned on by default. For more information, see “SSPI System Option” in *SAS Intelligence Platform: Application Server Administration Guide*.

**Token Based Authentication**

Indicate whether you are using token-based authentication for SAS client/server connections, and click **Next**.

• **Select Use SAS Token authentication** to cause clients of the workspace server to request a token from the metadata server.

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

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


**Note:** If you choose to use token-based authentication, you cannot also implement IWA.
Specify connection information for the metadata server, and click **Next**.

- **In SAS Metadata Server Logical Name**, enter the logical name of the metadata server. The maximum number of characters in the name is 60. Do not use special characters (for example, dashes, underscores, hyphens, and so on). Use only 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 server 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 metadata server. The maximum number of characters in the name is 60. Do not use special characters (for example, dashes, underscores, hyphens, and so on). Use only 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 server name with the application server name (SASMeta). A server name is the definition for a physical server. Servers are contained within a logical server (server component) that matches its server type (for example, a metadata server definition is contained in a logical metadata server).

- **In Host Name**, enter the name of the machine on which the metadata server runs.

- **In Port**, enter the 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**

Indicate a different location for the metadata server backup directory if necessary. When you are finished, click **Next**.

- If you want to change the location of the 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 and foundation repositories, and click **Next**.

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

  After deployment, you should apply appropriate operating system security on this directory. For more information, see “First-Priority Setup Tasks” on page 200.
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 above. All metadata repositories created during configuration are created as subdirectories in this location. Do not use special characters (for example, dashes, underscores, hyphens, and so on). Use only 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, dashes, underscores, hyphens, and so on). Use only 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
Indicate a different default service login user account for the metadata server. When you are finished, click **Next**.

- If you want to change the service login user account for the metadata server, select **Specify the service login account for the SAS Metadata Server**. The local system account is the default Windows service login user account for the metadata server.

  When configuring a metadata server cluster on Windows, you must specify the external user account that is used to start the 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 which type of user accounts to use for initial deployment SAS identities, and click **Next**.

- Select **Use SAS internal accounts when appropriate** for SAS to use accounts known only to SAS.

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

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

  For more information, see “Internal User Accounts” on page 7.

External Account: Installer
Specify the operating system account (external account) used to initialize the metadata server, and 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) and is 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” on page 6.

Automatic Script Execution

(UNIX only) Specify your preference for automatic script execution, and click Next.

- Select Run setuid.sh with my ID and password for the deployment wizard to attempt to run the script with the credentials that you provide.

You see this page on UNIX for SAS products that require you run the setuid.sh script with sudo privileges. If you select this option, you will be asked on a subsequent page for the sudo password (if you are deploying a metadata server, you have already provided this information), and as it installs your software, the deployment wizard attempts to run the script with the credentials that you provided.

If you do not select this option, you have to run setuid.sh manually during installation (and configuration if you have chosen to configure). Note that setuid.sh must be run as root in order to complete successfully. If you have any concerns about the deployment wizard running as root or you do not know the sudo information for the machine that you are installing on, you should not select this option.

SAS Internal Account: Unrestricted Administrator

Enter the metadata password for the first unrestricted administrator identity, and click Next.

- In New Internal Password, enter a password for the internal account (sasadm@saspw) that the wizard will create to serve as an unrestricted administrator for configuring the metadata server.

Note: Remember and record this password as you will need it in the future.

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

For more information, see “Defining User Accounts” on page 6.

- Select Set passwords using the Unrestricted Administrator password if you want to reuse this password for the internal metadata server accounts and SAS Web Infrastructure 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.

For more information, see “Reducing the Number of Password Prompts” on page 134.

SAS Internal Account: Trusted User

Specify the metadata password for the Trusted User identity, and click Next.

- In New Internal Password, enter a password for an internal account (sastrust@saspw) that the wizard will create to enable SAS server and spawner components to communicate securely with each other.
Note: Remember this password as you will need it in the future.

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

For more information, see “Defining User Accounts” on page 6.

SAS BI Web Services: Authentication Method
Select the method by which users of SAS BI Web Services are authenticated, and click **Next**.

- In **Authentication Method**, make one of the following selections and click **Next**:
  - **SAS Authentication** is managed by the 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:

- Partially configures web authentication BI Web Services for Java. For more information, see “Securing SAS BI Web Services for Java” in *SAS Intelligence Platform: Middle-Tier Administration Guide*.
- Has no effect on the 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.
- Prevents you from setting up an anonymous web user (as this is incompatible with web authentication).

Anonymous Web Access
When using SAS authentication, you can select this option to set up a SAS identity for anonymous access to certain web services and web applications that support this feature. When you are finished, 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 metadata password for the anonymous web access identity, and click **Next**.

- In **New Internal Password**, enter a password for the internal SAS account that the wizard will create to be used 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 access identity.

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

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

- In **Confirm New Internal Password**, re-enter the password, and 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, and 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: Remember this password because you will need it in the future.

For more information, see “Defining User Accounts” on page 6.

Create Common Directories
Indicate the common directories that you want the deployment wizard to create. On Windows, you can specify a data directory, and click Next.

- Select the appropriate check box to create common directories for server and spawner logs, user-specific files, data (SAS libraries for tables and cubes), and temporary work tables and files.

  When you select this option, the deployment wizard creates the specified directory (Logs, Users, Data, and Temp) under the SAS configuration directory.

- In Data Directory, enter a location to contain SAS libraries for tables and cubes.

  This directory is required when configuring SAS BI Dashboard.

Enable FIPS-certified Encryption Algorithms
Indicate whether you want to use AES encryption, and click Next.

- Select the check box to use the Advanced Encryption Standard (AES) algorithm to encrypt communications to and from a SAS Metadata Server. A block cipher that encrypts 128-bit blocks by using a 256-bit key, AES complies with Federal Information Processing Standards (FIPS).

  For more information, see “FIPS 140-2 Standards Compliance” in Encryption in SAS.

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

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

  Selecting Everything can affect your SAS performance.

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

  For more information, see “Encryption Model” in SAS Intelligence Platform: Security Administration Guide and “SAS Proprietary Encryption” in Encryption in SAS.
Client-side Credentials Policy
Set the policy for client-side storage of credentials, and 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 on the metadata server for desktop applications.

  When set, SAS enables OMA_SASSEC_LOCAL_PW_SAVE in omaconfig.xml.

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

Estimated System Size
Size your system configuration based on user number, system size, and workload size. Then, click Next.

- In **Size Estimate**, select one of the following: Small System, Medium System, or Large System.

  The deployment wizard uses your sizing selection as a tuning hint during SAS server configuration. This option appears only during metadata server configuration and 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 *SAS Web Applications: Tuning for Performance and Scalability*.

E-mail Server
Specify e-mail server configuration information, and click Next.

- In **Host Name**, enter the host name for an SMTP e-mail 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 deployment wizard uses this e-mail server as the default for the SAS Application Server to provide e-mail 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 e-mail to dashboard users and administrators, the port and host name must be configured for the e-mail server.

  For more information, see “Pre-installation Checklist for Ports for SAS” on page 22 and “Managing Alert E-mail Options for the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*.

- In **Port**, enter the port that the SMTP e-mail 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 E-mail 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 context, and click Next.

- In **SAS Application Server Context Name**, accept the default (SASApp) or enter a different name of the SAS Application Server context for that the wizard will create in metadata.
A server context is 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. The server context name is prepended to all server names defined 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, and click Next.

- In Logical SAS Pooled Workspace Server Name, enter the name of the logical pooled workspace server to be stored in SAS metadata.
- In SAS Pooled Workspace Server Name, enter the name of the pooled workspace server to be stored in SAS metadata.
- In Host Name, enter the name of the machine on which the pooled workspace server runs. The machine name should match the name specified to the SAS Object Spawner.
- In Port, enter the port on which the object spawner will listen for client requests to launch 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 information for the SAS Web Infrastructure Platform Data Server, and 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 is correct. However, a machine can have more than one network interface card (NIC) or host name alias. If so, to determine whether the default is correct, see your Pre-Installation Checklist.
- In Port, enter the TCP/IP port number on which SAS Web Infrastructure Platform Data Server listens or accept the default value.
- In Data Server Administrator, enter the user ID for administering SAS Web Infrastructure Platform Data Server.
- In Data Server Administrator Password, enter the password for the user ID associated with the SAS Web Infrastructure Platform Data Server administrator.

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

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

For more information, see “Reviewing Third-Party Database Requirements” on page 144.
Query Cache Library
Enter the physical location on the file system where the SAS library will exist for temporary files used when creating optimized tables for query lookup. When you are finished, click Next.

- In **Query Cache Libref**, enter the SAS library reference which SAS will use to refer to the query optimizer SAS library.

  The name must be eight characters or shorter and should be unique from other librefs used 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 will be used in conjunction with the server context name to form the SAS library name for the optimizer library.

- Select **Enable Query Cache** to allow the query optimizer to run. If this selection is not made, then the query optimizer will not attempt to optimize queries and will not create temporary data sets for improving performance during rendering.

  A typical installation will have this selection turned on. The temporary files created within the query cache library will be visible to anyone with Read permission on the Renderer Optimizer directory, so if you have security concerns with the authorization on this folder, you might want to leave the optimizer off.

  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 set definition tables for reports which will be distributed by e-mail, and click Next.

- In **Output Management Library Directory**, enter the physical location on the file system where the SAS library will exist for burst set definition tables for reports that will be distributed by e-mail.

  A burst definition table will contain e-mail addresses, channels, and possibly by group information.

- In **Output Management Library Libref**, enter the SAS library reference that SAS will use to refer to the output management SAS library. The name must be eight characters or shorter and should be unique from other librefs used 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 will be used in conjunction with the server context name to form the SAS library name for the distribution library.

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

SAS Remote Services Application: JVM
Specify the appropriate heap sizes for the SAS Remote Services application using the JVM option format, and click Next.

- In **Initial JVM Heap Size**, enter the appropriate initial heap size for the SAS Remote Services Application using the JVM option format.

  **Note:** SAS 9.4 no longer requires SAS Remote Services. However, some custom SAS applications still require SAS Remote Services. The deployment wizard deploys SAS Remote Services, but it is not automatically started by default.
• In **Max JVM Heap Size**, enter the appropriate maximum heap size for the remote services application using the JVM option format.

• In **Additional JVM Options**, enter any additional Java options that you want the SAS Remote Services JVM to use. For example, you might want to add `-Dmulticast_udp_ip_ttl=1` to restrict multicast traffic to a single subnet based on your network topology.

For more information, see **SAS Web Applications: Tuning for Performance and Scalability**.

Web Server: Automated or Manual Configuration Option

Indicate whether to have the deployment wizard automatically configure your SAS Web Server, and click **Next**.

• Select **Configure SAS Web Server automatically**, for the deployment wizard to automatically build and configure the SAS Web Server for use with SAS 9.4. (To use this wizard feature, make sure that your web application server is not running before proceeding.)

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

If you choose not to automatically configure your web application server, you will still be prompted for web application server information. The deployment wizard executes the stages such as Configure Products, Deploy Web Applications, and Start Web Application Servers to create instructions for a manual deployment. When configuration is complete, follow these manual instructions on how to configure your server and deploy your web applications in “Configuration Guidelines and Details” (Instructions.html).

SAS Web Server: Configuration

Specify SAS Web Server configuration options, and 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 that you must start servers as root if you want servers to listen on ports lower than 1024. We recommend that you install and configure as a less-privileged user, and then start SAS Web Server manually as root.

For more information, see “Pre-installation Checklist for Ports for SAS” on page 22 and “Managing Alert E-mail Options for the SAS Metadata Server” in **SAS Intelligence Platform: System Administration Guide**.

• The standard port for Transport Layer Security (TLS) traffic is 443. If you want to change this 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 (unsecured) and HTTPS (secured).

If you select HTTPS, 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 Chapter 5, “Setting Up Certificates for SAS Deployment,” on page 73.

• In **Administrator Mail Address**, enter an e-mail address for e-mail to be sent to the SAS Web Server administrator.
SAS Web Server: Location of X509 Certificate and RSA Private Key
If you already have an X.509 certificate, enter their locations. When you are finished, click Next.

- In **X509 Certificate**, enter the path to the valid X.509 certificate with the DNS name of this machine as the Common Name (CN).
- In **RSA private key**, enter the path to the RSA private key that is not protected by a passphrase.

For more information, see Chapter 5, “Setting Up Certificates for SAS Deployment,” on page 73.

Web Application Server: Configure Internet Proxy Server
Indicate whether to configure an Internet proxy server and specify proxy information, and click Next.

- In **Proxy Host**, enter the fully qualified host name for the proxy server.
  
  If you are using SAS Information Delivery Portal RSS feeds, then you have to provide proxy server information.
- In **Proxy Port**, enter the port that your site uses to access the Internet.
- In **NonProxy Hosts**, enter the DNS names of all the machines that should not be accessed through the proxy server. Separate each machine name with a vertical line character (|). Use an asterisk (*) as a wildcard for an entire subnet. For example, *.subnet.com excludes all machines with a DNS name that ends with .subnet.com.

  If your site does not allow Internet access on production systems, see the configuration information available at this SAS website: [http://support.sas.com/resources/thirdpartysupport/v94](http://support.sas.com/resources/thirdpartysupport/v94), and select your SAS Web Application Server.

Web Application Server: Multiple Servers
Indicate whether to configure multiple SAS Web Application Servers on which to deploy SAS web applications, and click Next.

- Select **Configure multiple servers** to have the deployment wizard automatically configure multiple managed servers for you. The deployment wizard uses SAS best practices for choosing the server to deploy each application to.

  In some situations, it might be preferable to split the SAS web applications across multiple managed 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 settings in a generated instructions file (Instructions.html) when the deployment wizard completes.

  More advanced performance configuration considerations are documented in the *SAS Intelligence Platform: Middle-Tier Administration Guide*.

Web Application Server: Server Configuration
Specify the web application server name and JVM options, and click Next.

- In **Server Name**, enter a logical name for your managed server. This name will be displayed in your application server administrative console and used in administrative scripting.

  Enter a logical name for your server. A suffix is automatically added to the name that is provided here in order to distinguish cluster members. For
example, if the name SASServer1 is selected, the actual name will be SASServer1_1. If the multiplier provided on the next page is greater than one, additional servers will be created with unique suffixes. For example, if the multiplier is 2, then servers named SASServer1_1 and SASServer1_2 will be created.

**CAUTION:**

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

- In **Additional JVM Options** enter any additional Java options that you want the managed server JVM (Java Virtual Machine) to use. These JVM options are tagged onto the end of the managed server’s command line. Options that are deployment wizard defaults can be overridden in this way.

Enter any additional Java options that you want the server JVM to use. These JVM options are tagged onto the end of the server's command line. Options that are hardcoded into the SAS Deployment Wizard default set can be overridden in this way.

**Note:** If the machine that you are deploying SAS on matches these characteristics:

- uses IPv6 (Internet Protocol version6)
- runs Windows
- communicates with the SAS Foundation Server tier

then you must add the following JVM start-up options either here or later to your web application server start-up script:

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

For more information, see “Designating Ports and Multicast Addresses” on page 21.

Web Applications: Automatic Deployment

Indicate whether you want the wizard to automatically deploy SAS web applications to the SAS Web Application Server, and 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 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 procedure 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 wizard automatically explodes web application archive files (EAR files).

For more information, see “Deploying 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, and click Next.

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

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

  For example:

  \[https://myserver:443/, http://example.com\]

  For security reasons, you must list any host name URLs for any site that could redirect browsers to your solution. This might include corporate sites linking to your solution 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.

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

  For more information, see “Configuring the Cross Domain Proxy Servlet through a Whitelist” in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

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

Web Applications: Advanced Options for Allowed URL White List

Enter a comma-separated list of HTTP methods to exclude from filtering, and click Next.

- Select **Enable restrictions** to use the URLs white list. Deselecting **Enable restrictions** causes SAS to ignore all white list restrictions.

  For more information, see “Whitelist of Websites and Methods Allowed to Link to SAS Web Applications” in *SAS Intelligence Platform: Middle-Tier Administration Guide*.

- In **Disable restrictions for a comma-separated list of HTTP methods**, enter a comma-separated list of HTTP methods to exclude from filtering (for example, `GET, OPTIONS, TRACE`).

- In **URL Overrides**, enter a comma-separated list of specific URLs to override if you are using wildcards in the URLs white list.

  For example, suppose that you have added `http://example.*.com` to your URLs white list, but you want to block one URL from the domain. Therefore, you would enter the following exception in **URL Overrides**: `http://example.sales.com`.

IP Multicast Version

(UNIX only) Specify the IP version to use for the IP multicast address, and click Next.

- In **IP Version**, select the IP version appropriate for your system.

  The deployment wizard detects that the machine has an IPv4 address and an IPv6 address. If you select IPv6, you are confirming that all servers running
SAS products are connected to an IPv6-enabled network and have IPv6-enabled network interfaces.

For more information, see “Designating Ports and Multicast Addresses” on page 21.

IP Multicast
Specify IP multicast information between SAS applications. Accept the IP multicast settings or enter new settings. If you choose to use an authentication token, you must enter token information. When you are finished, click Next.

- In **IP Multicast Address**, enter a new multicast address.

  A multicast group communications protocol is used to communicate among middle-tier SAS applications in a single SAS deployment (the set of applications connected to the same metadata server). The combination of IP multicast address and multicast UDP port should be different for each SAS deployment and different from those used by other multicast applications at your site. The default values are most appropriate for deployments in a firewall-isolated data center environment.

  For more information, see “Designating Ports and Multicast Addresses” on page 21.

- In **IP Multicast UDP Port**, enter a valid UDP port for use on all the machines where a SAS middle-tier application is installed.

- In **IP Multicast UDP TTL**, enter a valid multicast TTL property (default = 1, range = 0–255). This property affects the number of network hops a multicast packet takes before being dropped. This TTL value must be greater than or equal to the largest number of hops between any two servers running SAS products.

- Choose **Use an authentication token to connect** to prevent access to the multicast group from unauthorized listeners. The authentication token can be any password-like string. You must provide the same authentication token string to each tier in the same SAS deployment (each tier associated with the same metadata server).

SAS Web Report Studio: Scheduling
Indicate whether to enable scheduling in SAS Web Report Studio, and click Next.

- Select **Enable Scheduling**, to enable the SAS Web Report Studio scheduling feature that enables you to schedule reports.

  If you select this feature and Platform Suite for SAS is in your deployment plan, then you will be prompted on a later page to choose between Platform Process Manager or SAS In-Process Services.

  For more information, see “Setting Up Scheduling Using Platform Suite for SAS” in *Scheduling in SAS* or “Setting Up Scheduling Using SAS In-Process Scheduling” in *Scheduling in SAS*.

SAS Content Server: Repository Directory
Specify SAS Content Server repository options, and click Next.

- In **Repository Directory**, enter the location on the disk for the SAS Content Server indexes and repository configuration file. You can click **Browse** to search for this location.

  For more information, see “Administering the SAS Content Server” in *SAS Intelligence Platform: Middle-Tier Administration Guide*. 
• Select **Start initial node as clustered** when this machine is (or might be) part of a clustered deployment.

**CAUTION:**

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

Deselect **Start initial node as clustered** when you are not deploying the SAS middle tier on a machine cluster. (This setting enables journaling and the necessary cluster synchronization processes.)

If you redeploy the middle tier on a machine cluster in the future, you can manually set the Java system property

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

SAS Web Infrastructure Platform Database: Data Server
Specify whether to use a third-party database for the SAS Web Infrastructure Platform database, and click **Next**.

• Clear **Use SAS Web Infrastructure Platform Data Server** to use a different database to store SAS Web Infrastructure Platform data.

In SAS 9.4, the following third-party database management systems are supported: DB2, MySQL, Oracle, PostgreSQL, and SQL Server.

SAS Web Infrastructure Platform: Database Type
Specify the alternate database that you want to use for the SAS Web Infrastructure Platform Database, and click **Next**.

• In **Database Type**, select one of the following supported databases: DB2, MySQL, Oracle, PostgreSQL, or SQL Server.

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

For more information, see “Reviewing Third-Party Database Requirements” on page 144.

SAS Information Delivery Portal: Unchallenged Access
In this page and the one that immediately follows, indicate whether to allow access to public SAS content from the SAS information Delivery Portal, and click **Next**.

• Select **Enable Unchallenged Access**, to allow access to public SAS content from the SAS information Delivery Portal.

When unchallenged access is enabled, users can access the portal and interact with selected content without providing a user ID and password.

• Enter a user ID that SAS will use to grant unchallenged access to portal users.

On Windows, be sure to qualify the user ID as appropriate (for example, `myDomain\sasguest`).

• Deselect **Display Search Menu for Unchallenged Access** if you want to suppress the search link from displaying in the main portal banner.

• Specify what should appear in the portal banner for unchallenged users:
logoff
Display the Log Off link.

logon
Display the Log On link (which users can click to display the SAS Logon Manager).

hide
Hide the Log Off and Log On links.

For more information, see “Enabling Unchallenged Portal Access” in SAS Intelligence Platform: Web Application Administration Guide.

SAS Web Infrastructure Platform Database: Database Connection Properties
Specify connection information for the SAS Web Infrastructure Platform Data Server database, and click Next.

- Select **Automatically create tables and load data** to have the SAS Deployment Wizard automatically create tables and load the selected pre-existing database with initial data.

If you are using MySQL, the SAS Web Application Server configuration process also creates a new MySQL database named according to the value specified in **Database SID or Service Name** on the SAS Web Infrastructure Platform Database: JDBC Properties page.

- In **Host Name**, enter the host name where the database server is installed.
- In **Port**, enter the port number to which the database server is listening.
- Select **Use Catalog** to indicate that the database catalog needs to be specified to uniquely locate a table in the database.

Select **Use catalog** if you are using MySQL or SQL Server.

- Select **Use schema pattern** to indicate that the database schema needs to be specified to uniquely locate a table in the database.

Select **Use schema pattern** if you are using Oracle or DB2.

- In **Directory containing JDBC driver JAR files**, identify the appropriate JDBC driver JAR files and your selected RDBMS and version. Inappropriate or additional JAR files cause configuration failures, so copy the minimum required JDBC driver JAR files to this directory.

SAS Web Infrastructure Platform Database: JDBC Properties
If you selected a database server other than the SAS Web Infrastructure Platform Data Server, then the following fields are editable. If you are using the SAS Web Infrastructure database server, the database name and user ID are Read-Only. When you are finished, click Next.

- In **Database Name**, enter the name of the database that contains the SAS Web Infrastructure Platform Database tables.
- 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.
- In **Password**, enter a valid password for the user ID associated with the SAS Web Infrastructure Platform Database Server account. The deployment wizard uses this password to create the database server account.

*Note:* Remember this password because you will need it in the future.
• In **Confirm Password**, re-enter the password.

**SAS Web Infrastructure Platform Database: Metadata Properties**
Specify the metadata information for the SAS Web Infrastructure Platform Data Server database, and click **Next**

• The field on this page changes depending on the database type that you chose earlier.

• In **Catalog**, enter the name of the database catalog to use to uniquely locate a table in the database.

• In **Schema Pattern**, enter the name of the schema pattern to use to uniquely locate a table in the database.

**SAS Environment Manager: Administration Database Configuration**
Specify administrator credentials for the SAS Environment Manager database, and click **Next**.

• In **User ID**, specify 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 Database 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:* Remember 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 metadata password for the SAS Environment Manager service, and 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:* Remember this password because you will need it in the future.

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

  For more information, see “SAS Environment Manager and SAS Metadata Users” in *SAS Environment Manager: User's Guide*.

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

**Choose SAS Environment Manager: Keystore**
Indicate whether to use the built-in or customized keystore, and click **Next**.

• By default, the SAS Environment Manager uses the trusted CA list supplied by SAS.
If you want to use a different keystore, in the SSL Keystore list, select Use a customer-supplied JKS format keystore.

For more information, see “How SAS Uses Certificates” on page 77.

SAS Environment Manager: Keystore Configuration
Provide a keystore path, filename, and password, and click Next.

• In Keystore Path and Filename, enter a valid path and filename of the keystore that you are using when communicating with the SAS Environment Manager.

For more information, see Table 5.6 on page 105.

• In Keystore Password, enter a password for the keystore.

Note: SAS Environment Manager requires that the keystore password and private key password be identical. For more information, see http://pubs.vmware.com/vfabric5/index.jsp?topic=/com.vmware.vfabric.hyperic.4.6/Configure_SSL_Options.html.

• In Confirm Password, re-enter the password.

SAS Environment Manager: Database Configuration
Specify SAS Environment Manager database credentials. EVManager is a default Postgres database supplied by SAS that is used to store collected server metrics. When you are finished, click Next.

• In Database User, enter a user ID used for accessing the EVManager database.

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

Note: Remember 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 used 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: Remember this passphrase because you will need it in the future.

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

SAS Environment Manager Agent Communication
Specify SAS Environment Manager agent information, and click Next.

• Select Establish secure communication to enable secure communication using Transport Layer Security (TLS) between the SAS Environment Manager and its agents.

For more information, see Chapter 5, “Setting Up Certificates for SAS Deployment,” on page 73.

Choose SAS Environment Manager Agent: Keystore
Indicate whether to use the built-in or customized keystore, and click Next.

• By default, the SAS Environment Manager Agent uses the trusted CA list supplied by SAS.
If you want to use a different keystore, in the **SAS Environment Manager SSL Keystore** list, select **Use a customer-supplied JKS format keystore**.

For more information, see “How SAS Uses Certificates” on page 77.

**SAS Environment Manager Agent**

Provide a keystore path, filename, and password, and click **Next**.

- In **Keystore Alias**, enter a valid alias for your keystore.

  *Note:* SAS Environment Manager requires that the keystore alias and its password be identical.

- In **Keystore Path and Filename**, enter a valid path and filename of the keystore that you are using when communicating with the SAS Environment Manager.

  For more information, see “How SAS Uses Certificates” on page 77.

- In **Keystore Password**, enter a password for the keystore.


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

**SAS Environment Manager Enablement Kit Database Credentials**

Specify database connection information, and click **Next**.

- In **User ID**, enter the user ID for accessing the database used with SAS Environment Manager Enablement Kit.

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

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

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

**DataFlux Data Management Server**

Specify information for the DataFlux Data Management Server, and click **Next**.

- In **DataFlux Data Management Server Name**, enter the short name of the DataFlux Data Management Server definition. Do not use quotation marks.

- In **Host Name**, enter the fully qualified domain name of the server machine.

- In **Port**, enter the DataFlux Data Management 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.


**SAS Job Monitor Database Server Administration**

Specify SAS Job Monitor Database Server information, and click **Next**.

- Enter a TCP/IP port number that the SAS Job Monitor Data Server listens to, or accept the default, 9452.

- Enter a user name for the administrator account used to create the SAS Job Monitor Data Server.

- Enter a password for the administrator account.

  For more information, see the online Help for SAS Job Monitor.
SAS Visual Process Orchestration Runtime Server
Specify the configuration for SAS Visual Process Orchestration Runtime Server, and click Next.

- In Port, enter a TCP/IP port number that the SAS Visual Process Orchestration Runtime Server listens to, or accept the default, 21050.

Select the license file (identified in your Software Order E-mail) that contains the SAS Data Management Advanced Server. If you are performing installation and configuration at the same time, the default location does not exist because it points to a location in SAS installation directory (SAS Home). Copy the license file to a location that is accessible to the installation, and select the correct license.


SAS Visual Analytics Services Database Credentials
Specify JDBC connection information for the SAS Visual Analytics Services database, and click Next.

- In User ID, enter the user account that SAS uses to create a JDBC connection to the SAS Visual Analytics Services database. (The default is vatadm.)

- In Password, enter a password for the user account (vatadm).

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

- In Confirm Password, re-enter the password.

SAS Visual Analytics Transport Service: Whitelist Mobile Devices
Specify whether to enforce a whitelist for SAS Mobile BI, and click Next.

- Select Enforce whitelist for mobile devices to use a whitelist to control access to SAS Mobile BI.

A deployment enforces either the blacklist or the whitelist. If the whitelist is not selected to be enforced, the blacklist is enforced by default. If the whitelist is enforced, only devices that are on the whitelist can use SAS Mobile BI. If the blacklist is enforced, any device that is not on the blacklist can use SAS Mobile BI. Although only one list is enforced, you can make changes to both lists.

For more information, see “Managing Mobile Devices” in SAS Intelligence Platform: Middle-Tier Administration Guide.

SAS Visual Analytics Admin: Context Root
Specify the context root, and click Next.

- In Context Root for SAS Visual Analytics Admin, enter the context root that ties the user to the EAR file that is specified in the Display Name field.

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, and click Next.

- In **Context Root for SAS Visual Analytics Hyperlink Service**, enter the context root that ties the user to the EAR file that is specified in the **Display Name** field.

  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, and click Next.

- Select **Enable central vault storage of backup files**, to enable central storage of backup files by specifying a network-accessible vault directory.

**CAUTION:**

If your SAS deployment is not current with the second maintenance release for SAS 9.4, then a central vault location is required if your middle-tier environment includes a clustered SAS Content Server.

The default value for the shared centralized vault location is kept blank. The feature of storing backup at a centralized location is disabled as default.

To enable this feature, in the two pages that follow, 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 centralized shared location and you want to change retention period, select this option.

(On Windows only.) Finally, provide a valid operating system (external) user account and password to be used to execute commands using the SAS Deployment Agent. This user account must:

- be an external account that has access to and sufficient privileges for each host machine to be included in the backup.
- be known to the host machine that contains the central vault.
- have Read and Write access to the following directories:
  - the central vault directory
  - `SAS-configuration-directory/SASMeta/MetadataServer`

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

SAS Studio: Context Root
Specify the context root, and click Next.

- In **Context Root for SASStudio Mid-Tier**, enter the context root that ties the user to the EAR file that is specified in the **Display Name** field.

  The form of the URL for SAS Studio is `http://machine:port/SASStudio`. Although the machine and port are configured elsewhere and typically apply to the web container as a whole, the `SASStudio` portion is the context root, and you can change it (within the constraints of URL rules).

For more information, see the *SAS Studio: Administrator's Guide*.
Review the summary of software that the deployment wizard will 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 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.

**CAUTION:**

If you encounter a situation in which the deployment wizard reports a configuration failure, leave the error message displayed and 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 will be 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 those values will remain in your Windows registry after their use, thus posing 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 risks of convenience for automatic logon after restart against the security policies in place at your site.
38. Deployment Complete

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

- Green check marks next to every item on this page indicate that your deployment completed successfully. Click Next.
- If you received errors during your deployment, then contact SAS Technical Support at mailto:support@sas.com. Attach to your e-mail the files listed in “Review SAS Deployment Tool Documents, Reports, and Logs” on page 232.

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

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

40. Configuration Guidelines and Details

Review Configuration Guidelines and Details for post-deployment steps, and click **Next**.

- To complete your SAS deployment, review Configuration Guidelines and Details and perform the steps listed.

  Configuration Guidelines and Details (Instructions.html) is automatically generated by the deployment wizard and has post-installation steps specific to your SAS order that you must perform.

- The SAS Deployment Wizard writes the Configuration Guidelines and Details (Instructions.html) file to the **Documents** directory under the SAS configuration path. For example:

  - UNIX and z/OS:
    
    `/opt/SAS/Levl/Documents/Instructions.html`
  
  - Windows:
    
    `C:\SAS\Config\Levl\Documents\Instructions.html`
41. 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.

42. 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, go to the Third-Party Software Downloads site at http://support.sas.com/resources/thirdpartysupport/v94/appservers/index.html and select the product name of your web application server.

43. 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.

44. 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.

45. 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

<table>
<thead>
<tr>
<th>Server</th>
<th>Validation Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metadata server</td>
<td>Successful login using the SAS Management Console.</td>
</tr>
<tr>
<td>Object spawner</td>
<td>If either the stored process server or one of the workspace servers validates (see below), then the object spawner is running.</td>
</tr>
</tbody>
</table>
| OLAP server          | Right-click the validate command in SAS Management Console. Default path:  
                        | *Server Manager ⇄ SASApp ⇄ Logical OLAP Server.*                                                                                                                                                           |
| Pooled workspace server | Right-click the validate command in SAS Management Console. Default path:  
                          | *Server Manager ⇄ SASApp ⇄ Logical Pooled Workspace Server.*                                                                                                                                               |
| Stored process server | Right-click the validate command in SAS Management Console. Default path:  
                          | *Server Manager ⇄ SASApp ⇄ Logical Stored Process Server.*                                                                                                                                               |
| Workspace server     | Right-click the validate command in SAS Management Console using external account credentials. Default path:  
                        | *Server Manager ⇄ SASApp ⇄ Logical Workspace Server.*                                                                                                                                                     |
| DATA step batch server | Successful launch of 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 AppServer context.             |
| Grid server          | Successful launch of the grid test program, available at http://support.sas.com/rnd/scalability/grid/gridfunc.html#testprog. For more information, see “Verifying SAS Job Execution” in Grid Computing in SAS. |

* Use the value that you entered during the deployment for the server context name. The default is SASApp.

This procedure is meant to provide validation for an out-of-the-box, basic deployment. For more complex server configurations, please 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 following command for the appropriate operating system:
   - Windows:
     
     Start menu ⇄ Programs ⇄ 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 and connect to the z/OS machine(s) where the SAS 9.4 server tier is running.

3. Log on to the metadata server using a set of valid credentials, such as for 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. Highlight the server that you want to validate, such as the SASApp - Logical OLAP Server.

7. Right-click the highlighted server, 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 workspace server, if you are prompted for credentials, we suggest that you 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 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 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/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:
11. To validate the 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 batch server is successful.
   a. From SAS Management Console, right-click the Schedule Manager plug-in (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 located in, see “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 is shipped with 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 following topics are contained in this section:

- “Overview of Automating the SAS Installation on Multiple Machines” on page 191
- “Recording a SAS Deployment Wizard Response File” on page 192
- “Playing Back a SAS Deployment Wizard Response File” on page 194
- “Verifying the Playback Install” on page 197
- “Monitoring the SAS Deployment Wizard during Playback” on page 197
- “More about Monitoring the SAS Deployment Wizard on UNIX and z/OS” on page 198

**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.


The SAS Deployment Wizard can be run in one of the three playback modes. Each 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 levels of automation when playing back a SAS Deployment Wizard response file.

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

CAUTION:
If you choose to use the deployment manager’s record and playback mechanism 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 is present only if you use the record and playback mechanism, 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” on page 192.

2. 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.

3. Verify that the installation completed successfully.
   Check the SAS Deployment Wizard log file for the presence of any errors.
   See “Verifying the Playback Install” on page 197.

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 on 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:* In the second maintenance release for SAS 9.4, the deployment wizard automatically records your responses, regardless of whether you run the wizard with the `-record` option. This record of your wizard inputs is written to a file called `ResponseRecord_yyyyMMdd-hh.mm.ss.log` in the following location: `C:\Users\SAS-Installer\AppData\Local\SAS\SASDeploymentWizard` (Windows) and `~/.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” on page 8.

*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 filename 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 that 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” on page 197.

**TIP** You can also use a pre-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

<table>
<thead>
<tr>
<th>Mode</th>
<th>Level of Automation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiet</td>
<td>High</td>
<td>No visual feedback from the SAS Deployment Wizard.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See “Installing SAS in Quiet Mode” on page 195.</td>
</tr>
<tr>
<td>Partial</td>
<td>Medium</td>
<td>Users only see SAS Deployment Wizard pages for values not contained in the response file.</td>
</tr>
<tr>
<td>prompt</td>
<td></td>
<td>See “Installing SAS in Partial Prompt Mode” on page 195.</td>
</tr>
<tr>
<td>Full prompt</td>
<td>Low</td>
<td>Users see all SAS Deployment Wizard pages with response file values supplied. Users can confirm these values or change them.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>See “Installing SAS in Full Prompt Mode” on page 196.</td>
</tr>
</tbody>
</table>

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 order will 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 be at 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 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” on page 197.

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” on page 8.

When running in quiet mode, the SAS Deployment Wizard’s default action is to look for its response file by default in the current user’s home directory. For example, the default path and filename 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"
```

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” on page 197
- “Monitoring the SAS Deployment Wizard during Playback” on page 197

**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 pick and 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 necessary to
prompt for certain sensitive pieces of 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 on 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” on page 8.

When running in partial prompt mode, the SAS Deployment Wizard’s default action is to look for its response file by default in the current user’s home directory. For example, the default path and filename 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” on page 197.

**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 on 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” on page 8.

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

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

For more information, see “Verifying the Playback Install” on page 197.

### 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 an incorrect or a 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:**
  ```bash
  C:\Documents and Settings\current-user\Local Settings\Application Data\SAS\SAS Deployment Wizard\SDW.log
  ```
- **UNIX and z/OS:**
  ```bash
  ~/.SASAppData/SASDeploymentWizard/9.4/SDW.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:

```bash
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 the 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 such 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” on page 198.

**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 would be 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 in a process list:

```
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

Overview of Administration Tasks

Before you perform the administration tasks that are outlined 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 now begin performing administration tasks that are necessary to fully implement the SAS Intelligence Platform in your environment. These include the following categories of tasks:

- “First-Priority Setup Tasks” that 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” that enable the users in your organization to begin using SAS Intelligence Platform client applications to access and analyze your data.
• “Optional Setup Tasks” that you might want to perform to address specific requirements in your environment.
• “Ongoing System Administration Tasks” to 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

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 will 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” on page 201. 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” on page 204. |
Establish a formal, regularly scheduled backup process.

SAS includes a server-based facility that performs 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 “Backing Up and Recovering the SAS Metadata Server” in SAS Intelligence Platform: System Administration Guide.

It is important to also back up the physical data that is associated with the metadata so that related information will be 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 metadata server as well as 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 “Using the Deployment Backup and Recovery Tool” in SAS Intelligence Platform: System Administration Guide.

For guidance in setting up a backup process, see:

- “Setting Up Your Backups” in SAS Intelligence Platform: System Administration Guide

### Recommended Operating System Protections for Windows Machines

On Windows server machines, we recommend that you 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

<table>
<thead>
<tr>
<th>Directories</th>
<th>Users</th>
<th>Recommended Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>SAS-configuration-directory</code></td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>List Folder Contents, Read</td>
</tr>
<tr>
<td><code>SAS-configuration-directory\Lev1</code></td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>SAS Spawned Servers (sassrv)</td>
<td>On Windows Vista, Windows 7, and Windows Server 2008: Special Permissions to read and execute&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On Windows XP: Read and Execute&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>List Folder Contents, Read</td>
</tr>
</tbody>
</table>

<sup>*</sup> Special permissions are required for system-specific operations.
<table>
<thead>
<tr>
<th>Directories</th>
<th>Users</th>
<th>Recommended Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SASMeta\MetadataServer</td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>SAS Metadata Server: Service Login Account (for example, sassvlgn)**</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>Remove all other users and groups</td>
<td></td>
</tr>
<tr>
<td>SASMeta\MetadataServer\Backups (or other metadata server backup location)</td>
<td>SAS Deployment Backup and Recovery Tool User Account, also referred to as the backup user (for example, sasbackup)**</td>
<td>Read</td>
</tr>
<tr>
<td>Lev1\SASApp</td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>SAS Spawned Servers (sassrv)</td>
<td>Windows Vista, Windows 7, and Windows Server 2008 only: Special Permissions to read and execute’</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>List Folder Contents, Read</td>
</tr>
<tr>
<td>Lev1 subdirectories: Documents, ReportBatch, SASMeta, Utilities, Web</td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>List Folder Contents, Read</td>
</tr>
<tr>
<td>Lev1 subdirectories:</td>
<td>SYSTEM and Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td>• ConnectSpawner</td>
<td>Remove all other users and groups</td>
<td></td>
</tr>
<tr>
<td>• Logs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ObjectSpawner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SASApp\OLAPServer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ShareServer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SASApp subdirectories: PooledWorkspaceServer, StoredProcessServer</td>
<td>SYSTEM, Administrators</td>
<td>Full Control</td>
</tr>
<tr>
<td></td>
<td>SAS Spawned Servers (sassrv)</td>
<td>On Windows Vista, Windows 7, and Windows Server 2008 only: Read &amp; Execute, List Folder Contents, and Read’</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>No access</td>
</tr>
</tbody>
</table>
Directories | Users | Recommended Permissions
---|---|---
SASApp subdirectories: PooledWorkspaceServer | SYSTEM, Administrators, and SAS Spawned Servers (sassrv) | Full Control*
\Logs, StoredProcessServer | \Logs | 

SASApp subdirectories:
- ConnectServer | SYSTEM, Administrators, and SAS Spawned Servers (sassrv) | Full Control
- Data\wrstdist
- Data\wrstemp
- PooledWorkspaceServer\sasuser
- StoredProcessServer\sasuser
- WorkspaceServer\Logs

Sasv9_meta.cfg file
- SYSTEM and Administrators
- Full Control
- 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 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 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 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 metadata server clustering or middle-tier clustering, make 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 will 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 will be 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 will be stored.

  - If you enable logging for a workspace server, then you will need to grant all users of the 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 details 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

<table>
<thead>
<tr>
<th>Directories</th>
<th>Users</th>
<th>Default Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>SAS-configuration-directory</code></td>
<td>SAS Installer</td>
<td>Read, Write, and Execute</td>
</tr>
<tr>
<td><code>SAS-configuration-directory/Lev1</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lev1 subdirectories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <code>Documents</code>, <code>ReportBatch</code>, <code>SASApp</code>, <code>SASMeta</code>, <code>Utilities</code>, <code>Web</code></td>
<td>SAS Installer</td>
<td>Read, Write, and Execute</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>Read and Execute</td>
</tr>
<tr>
<td><code>Lev1</code> subdirectories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <code>ConnectSpawner</code></td>
<td>SAS Installer</td>
<td>Read, Write, and Execute</td>
</tr>
<tr>
<td>• <code>Logs</code></td>
<td>All other users</td>
<td>No access</td>
</tr>
<tr>
<td>• <code>ObjectSpawner</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <code>SASApp/OLAPServer</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <code>SASMeta/MetadataServer</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <code>ShareServer</code></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>SASApp</code> subdirectories:</td>
<td>SAS Installer</td>
<td>Read, Write, and Execute</td>
</tr>
<tr>
<td>PooledWorkspaceServer, StoredProcessServer</td>
<td>sas group</td>
<td>Read and Execute</td>
</tr>
<tr>
<td><code>sasv9_meta.cfg</code> file</td>
<td>SAS Installer</td>
<td>Read and Write</td>
</tr>
<tr>
<td></td>
<td>All other users</td>
<td>no access</td>
</tr>
</tbody>
</table>

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 will 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, \texttt{SAS-configuration-directory/Lev1/Logs}).

• If users will be 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 will be stored.

• If you enable logging for a workspace server, then you will need to grant all users of the workspace server Read, Write, and Execute permission on the log directory. (See “Create a Log File for Workspace Server Troubleshooting” in \textit{SAS Intelligence Platform: System Administration Guide}.)

• For details about the configuration directory structure, see “Overview of the Configuration Directory Structure” in \textit{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**

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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 details, see “Selected Tasks” in \textit{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 details, see “Connecting to Common Data Sources” in \textit{SAS Intelligence Platform: Data Administration Guide}. |
| 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 provides a separate area for shared data. Within these folders, you should create a customized folder structure that meets your specific needs. For details, see “Working with SAS Folders” in \textit{SAS Intelligence Platform: System Administration Guide}.  
**Note:** Be sure to secure access to the folders as described in the \textit{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>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install <code>sas.servers</code> as a boot script.</td>
<td>On UNIX machines, you can choose to install the <code>sas.servers</code> script as a boot script so that the SAS servers will start automatically when you start the machine. The comments in the <code>sas.servers</code> script contain installation instructions that are specific to your operating environment. For details, see “Using the <code>sas.servers</code> Script on UNIX or z/OS to Start or Stop All Servers” in <em>SAS Intelligence Platform: System Administration Guide</em>.</td>
</tr>
<tr>
<td>Optimize the performance of the metadata server.</td>
<td>To optimize the performance of the 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 <em>SAS Intelligence Platform: System Administration Guide</em>. For other performance-related tasks, see “Managing Metadata Server Memory” in <em>SAS Intelligence Platform: System Administration Guide</em>.</td>
</tr>
</tbody>
</table>
| Modify the configuration of your processing servers. | The following are some server configuration changes that you might want to make for performance optimization or other reasons:  
  • Define a cluster of load-balanced workspace servers in order to balance a load across 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 workspace server for relatively long-running jobs. For details, see “Understanding Server Load Balancing” in *SAS Intelligence Platform: Application Server Administration Guide*.  
  • Modify load balancing or algorithms for stored process servers and pooled workspace servers. For details, 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 `LOCAL=` system option that accommodates those characters. For details, see “Encoding and Locale Information” in the *SAS Intelligence Platform: Application Server Administration Guide*.  
  • If you will be submitting large jobs (for example, JAVA GRAPH jobs) on z/OS servers, then you might need to specify a larger region size. For details, 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 will prevent users from specifying different time zones. For details, 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*. |
## 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>
<thead>
<tr>
<th>Task</th>
<th>Documentation Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust server logging.</td>
<td>You can change your server configurations to obtain additional logging information for troubleshooting, performance management, or other purposes. For details, see “Administering Logging for SAS Servers” in SAS Intelligence Platform: System Administration Guide and SAS Logging: Configuration and Programming Reference.</td>
</tr>
<tr>
<td>Enable job and report scheduling.</td>
<td>To enable SAS scheduling features, you can install and configure scheduling software, configure operating system scheduling, or configure in-process scheduling. For details, see Scheduling in SAS.</td>
</tr>
<tr>
<td>Increase Java heap memory allocation for desktop applications.</td>
<td>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.</td>
</tr>
<tr>
<td>Set up change management for SAS Data Integration Studio users.</td>
<td>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 details, see “Administering SAS Data Integration Studio” in SAS Intelligence Platform: Desktop Application Administration Guide.</td>
</tr>
<tr>
<td>Collect ARM log information for SAS Data Integration Studio batch jobs.</td>
<td>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 details, see “Collecting ARM Log Information for SAS Data Integration Studio Jobs” in SAS Intelligence Platform: System Administration Guide.</td>
</tr>
</tbody>
</table>

### Task Description

- **Adjust server logging.**
  - You can change your server configurations to obtain additional logging information for troubleshooting, performance management, or other purposes. For details, see “Administering Logging for SAS Servers” in SAS Intelligence Platform: System Administration Guide 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 details, 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 details, 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 details, see “Collecting ARM Log Information for SAS Data Integration Studio Jobs” in SAS Intelligence Platform: System Administration Guide.
Task | Documentation Reference
--- | ---
Create a new metadata repository. | “Managing SAS Metadata Repositories” in SAS Intelligence Platform: System Administration Guide
Promote individual metadata objects or groups of objects. | “Promotion Tools Overview” in SAS Intelligence Platform: System Administration Guide

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: 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.

To access these documents, go to http://support.sas.com/94administration.

Best Practices for Ensuring the Integrity of Your System

Allow Only the 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 metadata server processes.
- Do not place other files in these directories.
• Maintain a daily schedule of metadata server backups, as described in “Backing Up and Recovering the SAS Metadata Server” in *SAS Intelligence Platform: System Administration Guide*.

**Use Best Practices for Working with SAS Folders**

The folders that appear in the **Folders** tab of SAS Management console are used by client applications to store business intelligence 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 “Working with SAS Folders” in *SAS Intelligence Platform: System Administration Guide*. If you need to move or copy the contents of these folders, use the procedures that are provided in “Promotion Tools Overview” in *SAS Intelligence Platform: System Administration Guide*.

**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.
Appendix 1

Configuration Options by Prompt Level

Overview of Configuration Options by Prompt Level

Shortly after you begin running the SAS Deployment Wizard to interactively install and initially configure SAS, you will be asked to choose between three wizard prompting levels:

**Express**
- displays the minimum number of wizard pages needed to complete the SAS configuration.

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

**Custom**
- displays all the wizard pages needed to complete the SAS configuration.
Figure A1.1  Select Configuration Prompting Level Page

The table in “Configuration Options by Prompt Level” on page 212 lists the SAS Deployment Wizard pages found in these prompting levels.

**Configuration Options by Prompt Level**

The following table lists the configuration options and the prompt level in which they are displayed for the SAS Intelligence Platform only. Depending on your configuration, you might see differences for the prompt level in which a particular option is displayed. This is one example of a prompt level and configuration option mapping for a sample configuration. See the SAS Deployment Wizard online Help for information about all options.

*Note:* The configuration options that you encounter depend on which SAS products are identified in your deployment plan, and, in multiple machine deployments, the machine that you are currently deploying.

**Table A1.1  Configuration Options by Prompt Level**

<table>
<thead>
<tr>
<th>Configuration Option in the SAS Deployment Wizard</th>
<th>Prompt Level That Displays the Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Configuration Prompting Level on page 162</td>
<td>X  X  X</td>
</tr>
<tr>
<td>Specify Configuration Information on page 162</td>
<td>X  X  x</td>
</tr>
<tr>
<td>Select Products to Configure</td>
<td>X  X  X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Migration Information on page 163</td>
<td>X X X</td>
</tr>
<tr>
<td>Deployment Accounts: Type of Accounts on page 166</td>
<td>X X X</td>
</tr>
<tr>
<td>External Account: Installer on page 166</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Internal Account: Unrestricted Administrator on page 167</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Internal Account: Trusted User on page 167</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Internal Account: Anonymous Web User on page 168</td>
<td>X X X</td>
</tr>
<tr>
<td>External Account: SAS Spawned Servers Account on page 169</td>
<td>X X X</td>
</tr>
<tr>
<td>E-mail Server on page 170</td>
<td>X X X</td>
</tr>
<tr>
<td>E-mail Addresses</td>
<td>X X X</td>
</tr>
<tr>
<td>E-mail Server: Authentication Credentials</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Data Server on page 171</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Web Server: Configuration on page 173</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Web Server: Location of X509 Certificate and RSA Private Key on page 174</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Web Application Server: Server Ports</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database: JDBC Properties on page 179</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Environment Manager: Administration Database Configuration on page 180</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Internal Account: SAS Environment Manager Service Account on page 180</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Environment Manager: Database Configuration on page 181</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Job Monitor Database Server Administration on page 182</td>
<td>X X X</td>
</tr>
<tr>
<td>SAS Environment Manager Enablement Kit Database Credentials on page 182</td>
<td>X X X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>SAS Visual Analytics Services Database Credentials on page 183</td>
<td>Express</td>
</tr>
<tr>
<td>Local Machine Name on page 163</td>
<td>X</td>
</tr>
<tr>
<td>Windows Options on page 163</td>
<td>X</td>
</tr>
<tr>
<td>Windows Shortcuts</td>
<td>X</td>
</tr>
<tr>
<td>Integrated Windows Authentication on page 164</td>
<td>X</td>
</tr>
<tr>
<td>Token Based Authentication on page 164</td>
<td>X</td>
</tr>
<tr>
<td>SAS Metadata Server on page 165</td>
<td>X</td>
</tr>
<tr>
<td>SAS Metadata Server: Override Backup Location on page 165</td>
<td>X</td>
</tr>
<tr>
<td>SAS Metadata Server: Service Login Account</td>
<td>X</td>
</tr>
<tr>
<td>Automatic Script Execution on page 167</td>
<td>X</td>
</tr>
<tr>
<td>Anonymous Web Access on page 168</td>
<td>X</td>
</tr>
<tr>
<td>Deployment Accounts: First User</td>
<td>X</td>
</tr>
<tr>
<td>External Account: First User</td>
<td>X</td>
</tr>
<tr>
<td>Server Encryption on page 169</td>
<td>X</td>
</tr>
<tr>
<td>Estimated System Size on page 170</td>
<td>X</td>
</tr>
<tr>
<td>SAS Object Spawner</td>
<td>X</td>
</tr>
<tr>
<td>SAS Object Spawner: Port Bank</td>
<td>X</td>
</tr>
<tr>
<td>SAS Application Server: Server Context on page 170</td>
<td>X</td>
</tr>
<tr>
<td>SAS Workspace Server</td>
<td>X</td>
</tr>
<tr>
<td>SAS Pooled Workspace Server on page 171</td>
<td>X</td>
</tr>
<tr>
<td>SAS Stored Process Server</td>
<td>X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Express</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>SAS Content Server: Repository Directory on page 177</td>
<td>X</td>
</tr>
<tr>
<td>SAS Information Delivery Portal: Samples</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database JDBC Driver Validation</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager: Configuration</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager Agent Configuration on page 181</td>
<td></td>
</tr>
<tr>
<td>SAS Environment Manager Agent Communication on page 181</td>
<td></td>
</tr>
<tr>
<td>SAS Flex Application Themes</td>
<td></td>
</tr>
<tr>
<td>DataFlux Data Management Server on page 182</td>
<td></td>
</tr>
<tr>
<td>DataFlux Data Management Server: Server Component Name</td>
<td></td>
</tr>
<tr>
<td>SAS Visual Process Orchestration Runtime Server on page 183</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Backup and Recovery Tool: Enable Central Vault on page 184</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Backup and Recovery Tool on page 184</td>
<td></td>
</tr>
<tr>
<td>SAS Deployment Backup and Recovery Tool: User Account on page 184</td>
<td></td>
</tr>
<tr>
<td>Authentication Domain on page 163</td>
<td></td>
</tr>
<tr>
<td>SAS Metadata Server: Invocation Options</td>
<td></td>
</tr>
<tr>
<td>SAS Metadata Server: Repository Configuration on page 165</td>
<td></td>
</tr>
<tr>
<td>SAS Metadata Server: Windows Service</td>
<td></td>
</tr>
<tr>
<td>SAS BI Web Services: Authentication Method on page 168</td>
<td></td>
</tr>
<tr>
<td>SAS User Group: SAS General Servers</td>
<td></td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>SAS User Group: BI Web Services Users</td>
<td>X</td>
</tr>
<tr>
<td>Create Common Directories on page 169</td>
<td>X</td>
</tr>
<tr>
<td>Common Directory Information on page 169</td>
<td>X</td>
</tr>
<tr>
<td>Enable FIPS-certified Encryption Algorithms on page 169</td>
<td>X</td>
</tr>
<tr>
<td>Client-side Credentials Policy on page 170</td>
<td>X</td>
</tr>
<tr>
<td>SAS Object Spawner: Server Component Name</td>
<td>X</td>
</tr>
<tr>
<td>SAS Object Spawner: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS Object Spawner: Windows Service</td>
<td>X</td>
</tr>
<tr>
<td>SAS Application Server Librefs</td>
<td>X</td>
</tr>
<tr>
<td>SAS Workspace Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS Pooled Workspace Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS Stored Process Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS OLAP Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS OLAP Server: Windows Service</td>
<td>X</td>
</tr>
<tr>
<td>SAS/Connect Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS/Connect Spawner: Server Component Name</td>
<td>X</td>
</tr>
<tr>
<td>SAS/Connect Spawner: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS/Connect Spawner: Windows Service</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Data Server (Windows Services)</td>
<td>X</td>
</tr>
<tr>
<td>Operating System Services Scheduling Server: Invocation Options</td>
<td>X</td>
</tr>
<tr>
<td>SAS Deployment Tester Server: Windows Service</td>
<td>X</td>
</tr>
<tr>
<td>Query Cache Library on page 172</td>
<td>X</td>
</tr>
<tr>
<td>Output Management Library on page 172</td>
<td>X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>SAS Remote Services Application</td>
<td>X</td>
</tr>
<tr>
<td>SAS Remote Services Application: Windows Service</td>
<td>X</td>
</tr>
<tr>
<td>SAS Remote Services Application: JVM on page 172</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Application Server: Secure JMS Resources</td>
<td>X</td>
</tr>
<tr>
<td>Web Application Server: Secure JMS Credentials</td>
<td>X</td>
</tr>
<tr>
<td>Web Application Server: Configure Internet Proxy Server on page 174</td>
<td>X</td>
</tr>
<tr>
<td>Web Application Server: Proxy Information on page 174</td>
<td>X</td>
</tr>
<tr>
<td>Web Application Server: Multiple Servers on page 174</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Report Studio: Scheduling on page 177</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Report Studio: Deployment Instance Name</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Report Studio</td>
<td>X</td>
</tr>
<tr>
<td>SAS BI Dashboard Context Root</td>
<td>X</td>
</tr>
<tr>
<td>SAS BI Web Services: General Information</td>
<td>X</td>
</tr>
<tr>
<td>SAS BI Web Services: New Web Services</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform: JES File Logging</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform: JES File Logging Directory</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database: Data Server on page 178</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform: Database Type on page 178</td>
<td>X</td>
</tr>
<tr>
<td>SAS Information Delivery Portal: Banner</td>
<td>X</td>
</tr>
<tr>
<td>SAS Information Delivery Portal: Unchallenged Access on page 178</td>
<td>X</td>
</tr>
<tr>
<td>SAS Information Delivery Portal: Unchallenged Access Information on page 178</td>
<td>X</td>
</tr>
<tr>
<td>Configuration Option in the SAS Deployment Wizard</td>
<td>Prompt Level That Displays the Option</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>SAS Information Delivery Portal: Context Root</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database: Database Connection Properties on page 179</td>
<td>X</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Database: Metadata Properties on page 180</td>
<td>X</td>
</tr>
<tr>
<td>Choose SAS Environment Manager: Keystore on page 180</td>
<td>X</td>
</tr>
<tr>
<td>SAS Environment Manager: Keystore Configuration on page 181</td>
<td>X</td>
</tr>
<tr>
<td>SAS Environment Manager Agent Communication on page 181</td>
<td>X</td>
</tr>
<tr>
<td>Choose SAS Environment Manager Agent: Keystore on page 181</td>
<td>X</td>
</tr>
<tr>
<td>SAS Environment Manager Agent on page 182</td>
<td>X</td>
</tr>
<tr>
<td>SAS BI Portlets</td>
<td>X</td>
</tr>
<tr>
<td>SAS BI Portlets: Context Root</td>
<td>X</td>
</tr>
<tr>
<td>SAS Visual Analytics Hyperlink Service: Context Root on page 184</td>
<td>X</td>
</tr>
<tr>
<td>SAS Visual Analytics Admin: Context Root on page 183</td>
<td>X</td>
</tr>
<tr>
<td>SAS Studio Mid-Tier: Context Root on page 184</td>
<td>X</td>
</tr>
</tbody>
</table>
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?” on page 221.

• Choose the type of user access that you plan to implement.

  For more information, see “Configuring SAS Web Parts for Microsoft SharePoint User Access” on page 222.


**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:

![SAS Deployment Wizard](image)

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” on page 151.

1. Follow the instructions for deploying SAS listed in “Install and Configure SAS Interactively” on page 151, 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” on page 222.
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 will be 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 will be 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 will be 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 will be installed.

• In the **Site Collection URL** field, specify the site collection URL of the SharePoint server. This site collection is where the web parts will be 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.

    For more information, see “Configure HTTPS Connections for SAS Web Parts for Microsoft SharePoint” on page 229.

---

**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 Internet Explorer’s Trusted Root Certification Authorities store.
For more information about how to create and install a self-signed certificate, see the following SAS Note:

http://support.sas.com/kb/39/912.html
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, available at http://support.sas.com/kb/42/197.html.

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.
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.

The following topics are contained in this section:

- “Review SAS Deployment Tool Documents, Reports, and Logs” on page 232
- “Troubleshooting the SAS Server Tier” on page 234
- “Troubleshooting SAS Web Applications” on page 236

**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 Levn/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 Level/Documents subdirectory (for example: C:\SAS\Config\Level1\Documents).

• ConfigurationErrors.html contains a list of configuration errors that require further attention. ConfigurationErrors.html resides under the SAS configuration directory in the Level/Documents subdirectory (for example: C:\SAS\Config\Level1\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 Level/Documents subdirectory (for example: C:\SAS\Config\Level1\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 Level/Logs/Configure subdirectory (for example: C:\SAS\Config\Level1\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 the second maintenance release for SAS 9.4, 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
Troubleshooting the SAS Server Tier

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

<table>
<thead>
<tr>
<th>Error</th>
<th>Explanation</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>There is no temporary directory defined on the host machine's operating system.</td>
<td>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.</td>
</tr>
<tr>
<td>Pooled workspace server fails to start during the configuration of SAS Web Infrastructure Platform.</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>Error</td>
<td>Explanation</td>
<td>Resolution</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>You cannot validate the logical workspace server from SAS Management Console (SASApp) using the Server Manager plug-in.</td>
<td>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.</td>
<td>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 <strong>Log in as a batch job</strong> user rights. One account that meets these requirements is the SAS Spawned Servers account (sasrv).</td>
</tr>
<tr>
<td>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.</td>
<td>The credentials cache must be cleared before you try to connect or validate again.</td>
<td>To clear the credentials cache, in SAS Management Console, click <strong>File ➤ Clear Credentials Cache</strong>. 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 <strong>Connect</strong> in the pop-up menu. After you have connected, right-click the host node again, and choose <strong>Refresh Spawner</strong> in the pop-up menu.</td>
</tr>
<tr>
<td>You cannot start a pooled workspace server and cannot start a stored process server.</td>
<td>Most likely, something is wrong with the object spawner. The metadata server might not be able to authenticate the object spawner.</td>
<td>Make sure that the object spawner is running. For more information, see “Operating Your Servers” in <strong>SAS Intelligence Platform: System Administration Guide</strong>. 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 <strong>SAS Intelligence Platform: System Administration Guide</strong>. 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 <strong>SAS-configuration-directory/ObjectSpawner/metadataConfig.xml</strong> file, or reconfigure the spawner using the SAS deployment tools. For more information, see “Overview of Managing Your SAS Deployment” on page 239. 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: <strong>Objspawn is executing on host machine.name.domain.com (10.101.0.98)</strong>. If you see something similar to: <strong>Objspawn is executing on host localhost (127.0.0.1)</strong> or, if you see a host name that you cannot ping from a remote machine, you might need to replace the -<strong>dnsMatch</strong> option with the -<strong>hostknownby</strong> option. Refer to the following SAS Note: <strong><a href="http://support.sas.com/kb/42/905.html">http://support.sas.com/kb/42/905.html</a></strong>.</td>
</tr>
</tbody>
</table>
## Troubleshooting SAS Web Applications

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

<table>
<thead>
<tr>
<th>Error</th>
<th>Explanation</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You cannot start your SAS server.</td>
<td>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.</td>
<td>Generate the sas.servers file manually by running <code>SAS-installation-directory/SASDeploymentManager/9.4/products/cfgwizard_94340_prt_xx_sp0__1/Config/level_root/generate_boot_scripts.sh.unx.orig</code>. 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.</td>
</tr>
<tr>
<td>You see an error message about the location of the JUnit JAR file not being specified for SAS Deployment Tester.</td>
<td>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.</td>
<td>On Windows, the JUnit JAR file is available from the Third-Party Software Downloads site at <a href="http://support.sas.com/resources/thirdpartysupport/v94/othersw.html#tab_junit">http://support.sas.com/resources/thirdpartysupport/v94/othersw.html#tab_junit</a>. Place the JUnit JAR file in this location: <code>C:\junit3.8.1\junit.jar</code>. On UNIX, modify <code>provider.config</code> in <code>SAS-configuration-directory/DeploymentTesterServer/Config</code> and update the <code>ReadOnlyVar._junitJar</code> parameter (for example, <code>ReadOnlyVar._junitJar=/apps/sas/third_party/junit/junit4.8.1/junit-4.8.1.jar</code>).</td>
</tr>
<tr>
<td>A Deployment Tester error message in the Windows Event Viewer reads: System error 1067</td>
<td>The Deployment Tester cannot start because it is configured to run as a Windows Local Service instead of a Local System account.</td>
<td>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 <a href="http://support.sas.com/kb/35/418.html">http://support.sas.com/kb/35/418.html</a>.</td>
</tr>
</tbody>
</table>
### Table A3.2  Troubleshooting the SAS Web Applications

<table>
<thead>
<tr>
<th>Error</th>
<th>Explanation</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS Web Report Studio or the SAS Information</td>
<td>Either your servlet container or web application server is not running.</td>
<td>Make sure that your servlet container or web application server is running. If it is not running, start it. This will</td>
</tr>
<tr>
<td>Delivery Portal displays a “Cannot find server” error.</td>
<td>There is problem with the URL that you are using to start the application.</td>
<td>probably solve the problem. If the server is already running, the problem could be with the URL that you are using</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to start the web application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use the correct URL: <code>http://host-name:port-number/application-name</code>. Make sure that the host name is the fully</td>
</tr>
<tr>
<td></td>
<td></td>
<td>qualified name of the host on which your servlet container or web application server is running. Make sure that the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>port number identifies the port on which the server is listening. For the SAS Web Application Server, this will</td>
</tr>
<tr>
<td></td>
<td></td>
<td>normally be port 8080. Finally, make sure that the application name in the URL matches the actual name of the web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>application (including case).</td>
</tr>
<tr>
<td>Each time your web application requests a new</td>
<td>When a Java Server Page (JSP) is requested for the first time, you can expect</td>
<td>Tune your servlet container or web application server.</td>
</tr>
<tr>
<td>page, there is a long delay.</td>
<td>a significant delay. When all of your JSPs have been converted to compiled</td>
<td></td>
</tr>
<tr>
<td></td>
<td>servlets, the problem will be resolved.</td>
<td></td>
</tr>
<tr>
<td>The SAS Information Delivery Portal displays a</td>
<td>The user is not registered in the metadata repository. On Windows, if the</td>
<td>In SAS Management Console, add a login to the Person object that contains at least a user name. On Windows, make sure</td>
</tr>
<tr>
<td>“Could not authenticate user” error.</td>
<td>user that is trying to log on is registered in the metadata, but the user</td>
<td>the user name has the form <code>host\user-ID</code> or <code>domain\user-ID</code>. For more information, see “About User Administration”</td>
</tr>
<tr>
<td></td>
<td>name is not domain qualified, the user will not be able to log on.</td>
<td>in SAS Intelligence Platform: Security Administration Guide.</td>
</tr>
<tr>
<td>You receive a server error when accessing the</td>
<td>SAS Help Viewer Metadata Configuration is not configured.</td>
<td>Rerun the SAS Deployment Wizard to install and configure SAS Help Viewer Metadata Configuration. For more information,</td>
</tr>
<tr>
<td>Help menu from a SAS web application.</td>
<td></td>
<td>see “Install and Configure SAS Interactively” on page 151.</td>
</tr>
<tr>
<td>An error page appears when you access the Help</td>
<td>The online Help for the SAS application was not installed or the SAS Help</td>
<td>Verify that the online Help was installed. If not, install it using the SAS Deployment Wizard. Once the Help is</td>
</tr>
<tr>
<td>menu from a SAS application or the Help menu</td>
<td>Viewer Metadata Configuration web application was not rebuilt after the</td>
<td>installed, rebuild the SAS Help Viewer Metadata Configuration web application using the SAS Deployment Manager and</td>
</tr>
<tr>
<td>item for a SAS application is not displayed.</td>
<td>online Help was installed.</td>
<td>redeploy the SAS Help Viewer Metadata Configuration EAR. For more information, see “Install and Configure SAS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interactively” on page 151 and “Rebuilding the SAS Web Applications” in SAS Intelligence Platform: Middle-Tier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administration Guide.</td>
</tr>
</tbody>
</table>
Overview of Managing Your SAS Deployment

The sections that follow 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” on page 309.

The following topics are contained in this section:

- “Adding, Updating, and Upgrading SAS Software” on page 240
- “Adding SAS Products” on page 244
- “Configuring SAS Products” on page 261
- “Removing a SAS Configuration” on page 274

Adding, Updating, and Upgrading SAS Software

Overview of Adding, Updating, and Upgrading SAS Software

The following topics are contained in this section:

- “What Is Adding, Updating, and Upgrading?” on page 240
- “Summary of Adding, Updating, and Upgrading SAS Software” on page 240
- “How the SAS Deployment Wizard Adds, Updates, and Upgrades Software” on page 241

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.

- “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 version 4.2). Upgrading should not be confused with migration or promotion.

  For more information, see SAS Guide to Software Updates.

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 SAS Home).
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 will 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 contained in your SAS order.

CAUTION:
Consult SAS Guide to Software Updates before performing any SAS updates.

For more information, see the following:
- “How the SAS Deployment Wizard Adds, Updates, and Upgrades Software” on page 241
- “Adding SAS Products” on page 244
- “Configuring SAS Products” on page 261
- SAS Guide to Software Updates

---

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 version 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 SAS Home on the machine, the wizard goes into Update mode. (SAS Home 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 deployment wizard updates page is broken into two sections that list new product versions and new product updates (or maintenance). In the example of the updates page shown earlier, SAS Providers for OLE DB (64-bit) represents a new product version (for example, 9.4 to 9.41). SAS Threaded Kernel Core Routines (64-bit) represents an update (for example, 9.4 to 9.41_M1). If you choose to proceed with your deployment from this order, to the specified SAS Home, 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 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 product set already deployed in the specified SAS Home. If the update contains updated language support for a specific product (such as, SAS, SAS Enterprise Guide, and SAS Add-In for Microsoft Office), the wizard installs only the update for the languages previously installed. If you are adding new products or language support to an existing SAS deployment, you will 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 software order has an older release level than any products deployed in the specified SAS Home 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 SAS Home 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 SAS Home 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 A4.1  SAS Deployment Wizard Flowchart**
Adding SAS Products

Overview of Adding SAS Products

The following topics are contained in this section:

- “About SAS Software Orders and SAS Software Depots” on page 244
- “Add SAS Products That Do Not Require Configuration” on page 245
- “Add SAS Products That Require Configuration” on page 250
- “Add SAS Products to a SAS Middle-Tier Horizontal Cluster” on page 257
- “Add a SAS Deployment Agent Service (Windows Only)” on page 259
- “Add SAS Visual Analytics Administration and Reporting” on page 260

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

1. configuring new products from your initial SAS 9.4 order.
   For one reason or another, you ordered the software and did not install it. Or you installed the software, but chose not to configure it.

2. deploying additional products from a new SAS 9.4 order.
   The additional products are not a part of your original SAS 9.4 order. So you made another order and now have to download and deploy the new order.

3. re-installing and reconfiguring (redeploying) a SAS product.
   You want to move the SAS product to a new machine.

4. applying updates (maintenance) to a SAS product that requires also updating its configuration.
   For some reason, you were unable to finish applying the updates and 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 the SAS server and middle tiers and run the SAS Deployment Wizard to install the new products. Then, you restart the SAS servers and some middle-tier 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 the SAS server and middle tiers, install the new products, and then restart what you shut down.

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 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, 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 your 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 Depot By Using the SAS Download Manager” on page 33.

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, first make sure that you have fulfilled the necessary requirements described in “Prerequisites for Creating a SAS Software Depot” on page 32.

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” on page 69.

   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 all the machines on which you are installing SAS. If this 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” on page 58.

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” on page 244.

4. Shut down your SAS server and middle-tier 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” on page 8.

6. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system.

   Table A4.1 Start Up Commands for the SAS Deployment Wizard

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>setup.exe -record -deploy</td>
</tr>
<tr>
<td>Operating System</td>
<td>Command</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>UNIX</td>
<td><code>setup.sh -record -deploy</code></td>
</tr>
</tbody>
</table>
| 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” on page 32.

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. For more information, see “Summary of Adding, Updating, and Upgrading SAS Software” on page 240.

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* before performing any SAS updates.

b. Perform any required manual configuration steps.

*Note:* If you performed an update on a machine, we recommend that you 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.

11. Restart the SAS Deployment Wizard, following the directions in Step 6 on page 245.

12. On the Select Deployment Type page, choose one of the following options:

• **Install SAS Foundation and Related Software**

  This option provides a quick installation of all SAS Foundation and related software (such as SAS Enterprise Guide) without using a plan file. If you want to
install one piece of SAS Foundation only, such as SAS/ACCESS Interface to Oracle, do not choose this 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.

   **Note:** If the product that you are adding is a SAS Foundation product, then select **Install Additional Software**. The subsequent page lists the SAS Foundation products from which you choose the product that you want to add.

13. (UNIX and z/OS only) Specify the location (SAS Home) where you want to install SAS.

14. In 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 only installs the software.
15. Some products listed on the Select Products to Install page include multiple sub-products, such as SAS Foundation, which you see on the next page. In these situations, select additional products, such as SAS/ACCESS Interface to Oracle, and click Next.

16. 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.
17. 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.

18. Provide the remaining information as the wizard prompts you for it. For more information, see “Install and Configure SAS Interactively” on page 151.

When you see a page similar to the following, the SAS Deployment Wizard is finished:
19. Click **Next** to go to the Additional Resources page.

20. Click **Finish** to close the deployment wizard.


   For more information, see “Operating Your Servers” in *SAS Intelligence Platform: System Administration Guide*.

22. To verify that your SAS product was actually installed, please run a registry report.

   For more information, see [http://support.sas.com/kb/35/968.html](http://support.sas.com/kb/35/968.html).

### Add SAS Products That Require Configuration

Most SAS products that you add to your deployment require that you install and configure them in a two-step process: you shut down the SAS server and middle tiers and run the SAS Deployment Wizard to install the new products. Then, you restart the SAS servers and some middle-tier 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” on page 69.

   **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 all the machines on which you are installing SAS. If this 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” on page 58.
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” on page 244.

4. Make sure that you use a deployment plan that contains any add-on products as well as all original products for each machine that you are configuring.

<table>
<thead>
<tr>
<th>Table A4.2 Where is My Deployment Plan?</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS 9.4 Products Being Added</td>
</tr>
<tr>
<td>Are part of my original SAS 9.4 order</td>
</tr>
<tr>
<td>Are on a machine where a SAS 9.4 server, middle tier, or data tier already resides</td>
</tr>
<tr>
<td>Are part of my new SAS 9.4 order</td>
</tr>
</tbody>
</table>

5. Shut down your SAS server and middle-tier servers, except for the SAS Deployment Agent running on each of your servers.

For more information, see “Operating Your Servers” in SAS Intelligence Platform: System Administration Guide.

6. 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.

7. Close all SAS clients, such as SAS Management Console.

8. 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, following this order:
   a. Metadata server or servers
   b. SAS servers
   c. SAS data servers
   d. SAS middle-tier servers
   e. SAS clients

9. 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” on page 8.

10. Start the SAS Deployment Wizard from the highest-level directory in your SAS Software Depot using the command appropriate for your operating system:
Table A4.3  Start Up Commands for the SAS Deployment Wizard

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>setup.exe -record -deploy</td>
</tr>
<tr>
<td>UNIX</td>
<td>setup.sh -record -deploy</td>
</tr>
<tr>
<td>z/OS</td>
<td>setup.rexx -record -deploy</td>
</tr>
</tbody>
</table>

To use a temporary directory other than /tmp, specify -templocation new-temp-dir.

For more information, see “Creating SAS Software Depots” on page 32.

You should see a welcome page similar to the following:

11. Select the language that you want the SAS Deployment Wizard to use when it displays text.

12. Select **Install SAS Software**.

13. 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.

14. 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” on page 240.

   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* before performing any SAS updates.

   b. Perform any required manual configuration steps.

   **Note:** If you performed an update on a machine, we recommend that you 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.

15. Restart the SAS Deployment Wizard, following the directions in **Step 10 on page 251**.
16. On the Select Deployment Type page, choose Perform a Planned Deployment and Install SAS Software.

Note: Make sure that Configure SAS Software is deselected.

17. (UNIX and z/OS only) Specify the location (SAS Home) where you want to install SAS.

18. Specify the type of deployment plan that you are using.

   • customized deployment plan
     Choose Specify the full path to a 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.
19. 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” on page 139.

b. By default, all products displayed will be installed. Leave all products selected. If there are no product changes, then the deployment wizard will not re-install any pre-existing products.

20. 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.

21. 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.

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


   - **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 will 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.

23. 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.

24. 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.)

25. 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 will not let you continue with the installation.

26. 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:

27. Click **Next** to go to the Additional Resources page.
28. Click **Finish** to close the deployment wizard.

29. To configure the SAS products that you just installed, proceed to “Configure SAS Products” on page 261.

---

**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 the primary 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” on page 250.

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” on page 250.

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 you are clustering. For example, your middle tier might resemble the following:

- Machine 1: 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 $\text{SAS-installation-directory}$ from the Windows Start menu All Programs $\Rightarrow$ SAS $\Rightarrow$ SAS Deployment Manager 9.4.

2. In the Choose Language dialog box, select a language, and click OK.


4. Make your agent start-up options selections and click Next:

   • Select Start SAS Deployment Agent After Configuration to restart the SAS Deployment Agent when this configuration is complete.

   • 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 in 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 also 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 that have not yet been configured.

For more information, see “Configure SAS Products” on page 261.

Your SAS configuration is affected when you add SAS products to a deployment that requires configuration.

For more information, see “Adding SAS Products” on page 244.

• 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” on page 274.

---

**Configuring SAS Products**

**About Configuring SAS Products**

You can configure SAS products that are new to your deployment, or configure SAS products that you are updating or upgrading:

• “Configure SAS Products” on page 261
• “Configure Updated or Upgraded SAS Products” on page 269

Note: As 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, refer to the *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, we recommend that you reuse the former configuration directory instead of creating a new directory.

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 2, “Setting Up Users, Groups, and Ports,” on page 5.
2. 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.

3. 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.

4. 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.

   Note: Some SAS products require that the SAS Web Infrastructure Platform Data Server be running during their configuration. For more information, see “Use Individual Scripts to Operate Servers” in SAS Intelligence Platform: System Administration Guide.

5. Start the SAS Web Server or the third-party 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 A4.4  Where Is My Deployment Plan?

<table>
<thead>
<tr>
<th>SAS 9.4 Products Being Added</th>
<th>Location of My Deployment Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are part of my original SAS 9.4 order</td>
<td>In the plan_files directory in the original SAS Software Depot</td>
</tr>
<tr>
<td>Are on a machine where a SAS 9.4 server, middle tier, or data tier already resides</td>
<td>In the SAS configuration directory in the Utilities directory</td>
</tr>
<tr>
<td>Are part of my new SAS 9.4 order</td>
<td>In the plan_files directory in the SAS Software Depot</td>
</tr>
</tbody>
</table>

7. Log on to the machine on which you want to add the new SAS 9.4 products 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” on page 8.

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 A4.5  Start Up Commands for the SAS Deployment Wizard

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>setup.exe -record -deploy</td>
</tr>
<tr>
<td>UNIX</td>
<td>setup.sh -record -deploy</td>
</tr>
</tbody>
</table>
Operating System | Command
--- | ---
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” on page 32.

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” on page 240.

   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* 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.

   - customized deployment plan
     
     Choose **Specify the full path to a 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.

Refer to “Overview of Configuration Options by Prompt Level” on page 211 for more information about the SAS Deployment Wizard prompting levels.

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:* 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.
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 on page 153 in the topic, “Install and Configure SAS Interactively.”

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. Click **Finish** to close the deployment wizard.

25. 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*.

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.

27. 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.

28. 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” on page 188.
Note: If you encounter error messages about your SAS license expiring, you might need to perform another procedure to correct this. For more information, refer to the following documents:


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 available at: [http://support.sas.com/documentation/installcenter/en/ikdeploywizug/66034/PDF/default/user.pdf](http://support.sas.com/documentation/installcenter/en/ikdeploywizug/66034/PDF/default/user.pdf).

1. Make a backup of your SAS 9.4 deployment. For more information, see “About the Deployment Backup and Recovery Tool” in SAS Intelligence Platform: System Administration Guide.

2. If you are using your own Transport Layer Security (TLS) certificates, then you must reconfigure your certificate settings.

   For more information, see Chapter 5, “Setting Up Certificates for SAS Deployment,” on page 73.

3. 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.

4. 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.

5. 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” on page 8.

6. 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.

7. In the Choose Language dialog box, select a language, and click OK.

8. In the SAS Deployment Manager, select Update Existing Configuration.
9. In the next page, specify the configuration directory and the level (for example, \texttt{Lev1}) that you want to update.

\textbf{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.

10. 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`.

11. In the next page, enter the user ID and password for an unrestricted administrative user.

12. 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 redeployes your SAS web applications.

When you see a page similar to the following, the SAS Deployment Manager is finished:

13. Click **Next** to go to the Additional Resources page.
14. 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).

15. 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**.
Removing a SAS Configuration

Overview of Removing a SAS Configuration

The following topics are contained in this section:

- “Summary of Steps for Removing a SAS Configuration” on page 276
- “Identify Dependent SAS Products” on page 277
- “Remove a Configuration” on page 279
- “Remove a SAS Deployment Agent Service (Windows Only)” on page 281
- “Remove a SAS Configuration on a Horizontal Middle-Tier Cluster” on page 282

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” on page 191.
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” on page 309.

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” on page 277.

• 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:

1. Determine which products’ configurations to remove.

2. Determine which products depend on the products that you are removing. You will need to remove the configuration for each of these products. For details, see “Identify Dependent SAS Products” on page 277.

3. Remove SAS product configurations in 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 workspace or stored process servers) on machines other than the metadata server machine.
   - e. Remove the metadata server last.

4. 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 their dependent products in a single execution of the SAS Deployment Manager.

In a multiple-machine installations, you should remove middle-tier products first. Then remove products on the SAS server tier. If you are removing the metadata server, you should remove it last.
5. Create a complete backup of your system before removing a configuration. This backup should include a correct backup of the metadata server. (See “About the Deployment Backup and Recovery Tool” in SAS Intelligence Platform: System Administration Guide.) This step is important because it is not possible to undo the removal of a configuration.

6. Read the following list to determine which SAS processes should be stopped or running:
   - Metadata server
     You should also run the metadata server.
   - Object spawner
     You must stop the object spawner if you are removing one of the servers that it runs.
   - Web Infrastructure Platform Data Server
     When removing a SAS configuration on the middle tier, the Web Infrastructure Platform Data Server must be running.

   \textit{Note:} If you are removing a server, you might want to stop the server (or its associated service), although this is not required.

7. When all of the preparatory steps are complete, follow the steps that are described in “Remove a Configuration” on page 279.

\textbf{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.

   \textit{Note:} For information about the order for removing SAS products, see “Overview of Uninstalling the SAS Intelligence Platform” on page 309.

\begin{table}[h]
\centering
\caption{Dependencies in the SAS Intelligence Platform}
\label{table:a4.6}
\begin{tabular}{|l|c|}
\hline
Product & Dependent Products \tabularnewline \hline
SAS BI Report Services & None \tabularnewline \hline
SAS BI Dashboard Configuration Data & None \tabularnewline \hline
\end{tabular}
\end{table}
<table>
<thead>
<tr>
<th>Product</th>
<th>Dependent Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS BI Lineage Scheduling Server</td>
<td>None</td>
</tr>
<tr>
<td>SAS BI Portlets</td>
<td>None</td>
</tr>
<tr>
<td>MySQL Database Server</td>
<td>None</td>
</tr>
<tr>
<td>Platform Process Manager</td>
<td>SAS Web Report Studio</td>
</tr>
<tr>
<td>SAS Application Server Context</td>
<td>All SAS products</td>
</tr>
<tr>
<td>SAS BI Dashboard</td>
<td>SAS Strategy Management Extensions for SAS BI Dashboard</td>
</tr>
<tr>
<td>SAS Foundation Services</td>
<td>SAS Web Infrastructure Platform</td>
</tr>
<tr>
<td>SAS Web Server</td>
<td>SAS Web Application Server</td>
</tr>
<tr>
<td>SAS Web Application Server</td>
<td>All SAS web-based products</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform Data Server</td>
<td>All SAS web-based products</td>
</tr>
<tr>
<td>SAS Stored Process Server</td>
<td>SAS Strategy Management</td>
</tr>
<tr>
<td>SAS Web Infrastructure Platform</td>
<td>Most SAS web-based products</td>
</tr>
<tr>
<td>SAS Enterprise Miner</td>
<td>None</td>
</tr>
<tr>
<td>SAS Flex Application Themes</td>
<td>SAS BI Dashboard</td>
</tr>
<tr>
<td>SAS BI Report Services Workspace</td>
<td>SAS Web Report Studio</td>
</tr>
<tr>
<td></td>
<td>SAS Web Report Viewer</td>
</tr>
<tr>
<td></td>
<td>SAS BI Report Services</td>
</tr>
<tr>
<td>SAS Grid Manager Control Server</td>
<td>SAS Grid Manager Client Utility Configuration</td>
</tr>
<tr>
<td></td>
<td>SAS Grid Manager Node Configuration</td>
</tr>
<tr>
<td>SAS Information Delivery Portal</td>
<td>SAS BI Portlets</td>
</tr>
<tr>
<td></td>
<td>SAS BI Dashboard</td>
</tr>
<tr>
<td></td>
<td>SAS Strategy Management</td>
</tr>
<tr>
<td></td>
<td>SAS Strategy Management Portlets</td>
</tr>
<tr>
<td>SAS object spawner</td>
<td>SAS Workspace Server</td>
</tr>
<tr>
<td></td>
<td>SAS Pooled Workspace Server</td>
</tr>
<tr>
<td></td>
<td>SAS Stored Process Server</td>
</tr>
<tr>
<td></td>
<td>Operating System Services Scheduling Server</td>
</tr>
<tr>
<td>Product</td>
<td>Dependent Products*</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>SAS Pooled Workspace Server</td>
<td>SAS BI Report Services Workspace Configuration</td>
</tr>
<tr>
<td></td>
<td>SAS BI Dashboard</td>
</tr>
<tr>
<td></td>
<td>SAS Decision Services Server Configuration</td>
</tr>
<tr>
<td>SAS Web Report Studio</td>
<td>SAS BI Portlets</td>
</tr>
<tr>
<td></td>
<td>SAS BI Dashboard</td>
</tr>
<tr>
<td></td>
<td>SAS Information Delivery Portal</td>
</tr>
<tr>
<td>SAS Workspace Server</td>
<td>SAS Forecast Server</td>
</tr>
<tr>
<td></td>
<td>SAS Model Manager</td>
</tr>
<tr>
<td></td>
<td>SAS BI Lineage Scheduling Server</td>
</tr>
<tr>
<td></td>
<td>SAS High-Performance Risk Server</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Administrator</td>
</tr>
<tr>
<td></td>
<td>SAS Time Series Studio</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Data Builder</td>
</tr>
<tr>
<td></td>
<td>SAS Visual Analytics Administration</td>
</tr>
<tr>
<td></td>
<td>SAS BI Dashboard</td>
</tr>
</tbody>
</table>

* These products depend on the product in the left column. Therefore, they must be removed if the product in the left column is removed.

When you remove a product's configuration, the SAS Deployment Manager checks to see whether your deployment plan includes any products that depend on that product. If dependent products exist, and if you have not selected those products for removal, then the SAS Deployment Manager prompts you to remove them.

**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” on page 276.

   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 Summary of Steps for Removing a SAS Configuration on page 276.

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” on page 277).

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_YY-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” on page 274.

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” on page 261.

- uninstall the associated software (if you will no longer be using the product on the current machine, or if you will be reinstalling the software on the current machine). For details, see “Overview of Uninstalling the SAS Intelligence Platform” on page 309.

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 dialog box, select a language, and click OK.


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.
2. Unconfigure the products 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” on page 277).

   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” on page 269.

For details about what occurs when you remove a configuration, see “Overview of Removing a SAS Configuration” on page 274.

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” on page 261.
- uninstall the associated software (if you will no longer be using the product on the current machine, or if you will be reinstalling the software on the current machine). For details, see “Overview of Uninstalling the SAS Intelligence Platform” on page 309.
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 dialog box 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.

For more information about how SAS supports languages and locales in general, see *SAS National Language Support (NLS): Reference Guide*. 
Appendix 5

Configuring an Alternate Database for SAS Web Infrastructure Platform Services

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 9.1.9 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, the SAS Deployment Backup and Recovery tool, and certain SAS solutions, such as SAS Visual Analytics, will be PostgreSQL regardless of the database 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

---

**Tested Databases**

The following third-party databases have been tested for use with the SAS 9.4 Web Infrastructure Platform:

- DB2 Version 9.7 FP3
- MySQL 5.5
- Oracle 11g FP2 (11.1.9.6.0)
- PostgreSQL 9.1.9
- SQL Server 2008 R2

---

**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
  - autosize: yes
For example, on Windows, you would enter commands similar to the following:

```sql
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:

```sql
grant dbadm on database to user sharedservices
```

**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:

```sql
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:

```ini
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:

```sql
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,” available at https://dev.mysql.com/doc/refman/5.5/en/identifier-case-sensitivity.html.

• 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 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.

You must install the latest compatible version of the JDBC drivers located in `ORACLE_HOME/product/version/install/jdbc/lib`. 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` 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 you would issue would be similar to the following:

```sql
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:

```sql
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 you would enter would be similar to the following:

```sql
use master
go
create login sharedservices with password = 'password'
go
create user sharedservices for login sharedservices
go
grant all to sharedservices
go
```

**TIP** For more information about how to create a user ID and assign permissions, see your SQL Server documentation.

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 master database
- issue a CREATE DATABASE statement
- perform the query `select 1`

Issue the following GRANT statements on the `SharedServices` database after the SAS Deployment Wizard has created the database and tables:

- If your DBA is going to manage the schema creation and upgrade process manually, the `sharedservices` user needs SELECT, INSERT, DELETE, and UPDATE permissions for the `SharedServices` database. For example:
  ```sql
  grant SELECT on SharedServices to sharedservices
  grant INSERT on SharedServices to sharedservices
  grant DELETE on SharedServices to sharedservices
  grant UPDATE on SharedServices to sharedservices
  ```
- If you want the SAS software to automatically create and update the database and limit the `sharedservices` user access after initial creation, the user requires SELECT, INSERT, DELETE, UPDATE, ALTER TABLE, CREATE TABLE, CREATE INDEX, and DROP. For example:
  ```sql
  grant SELECT on SharedServices to sharedservices
  grant INSERT on SharedServices to sharedservices
  grant DELETE on SharedServices to sharedservices
  grant UPDATE on SharedServices to sharedservices
  grant ALTER TABLE on SharedServices to sharedservices
  grant CREATE TABLE on SharedServices to sharedservices
  grant CREATE INDEX on SharedServices to sharedservices
  grant DROP on SharedServices to sharedservices
  ```
- Because the SAS software is acting as the administrator in this case, it might require other permissions in the future. It might therefore be more straightforward to grant the user all permissions on that particular database. For example:
  ```sql
  grant all on SharedServices to sharedservices
  ```

---

**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 are meant to be used in conjunction with “Install and Configure SAS Interactively” on page 151.

1. Make sure that the alternative database that you are intending to use has been tested. For more information, see “Tested Databases” on page 288.
2. Make sure that you have prepared your database. For more information, see “Preparing to Configure an Alternative Database” on page 288.
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” on page 151.
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” on page 151.

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” on page 171.
Appendix 6
Provisioning SAS on Windows

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.

Our recommendation for automating the process of adding and updating SAS software across your Windows enterprise consists of the following steps:

1. **Provision SAS system requirements on page 296**
2. **Provision SAS on page 302**
Step One: 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

The system requirements document for SAS 9.4 is available at http://support.sas.com/resources/sysreq/.

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.


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, go here: http://support.sas.com/supportos/list.

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 will be different when you attempt the installation.

   - It is a machine that is typical of machines that your end users will be using (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 “Add the System Requirements Commands to Your Provisioning System”.

**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 A6.1 illustrates a sample batch file to install system requirements generated by the deployment wizard.
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 “Provision the System Requirements”.

**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” on page 296.)

   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 “Step Two: Provision SAS”.

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 will run the deployment wizard in quiet mode. The deployment wizard will use 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 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 will be different when you attempt the installation.

- It is a machine that is typical of machines that your end users will be using (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 will 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,” available at http://support.sas.com/kb/37/418.html

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 “Test the Deployment Wizard Response File”.

**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 the following SAS Note: “Problem Note 41966: Using the SYSTEM account with automated installations might result in error messages,” available at [http://support.sas.com/kb/41/966.html](http://support.sas.com/kb/41/966.html). (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 will be different when you attempt the installation.
   - It is a machine that is typical of machines that your end users will be using (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.

   **Note:** The `-nomsupdate` option directs the wizard not to reinstall the system requirements.

5. Provide the information that the deployment wizard prompts you for.

   Verify that the installation and configuration is successful. This run will be interactive and enable 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 “Construct a Quiet Installation Command”.
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 will be different when you attempt the installation.
   - It is a machine that is typical of machines that your end users will be using (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 will deploy SAS on this machine and, in the process, document the command that you used to run the deployment wizard. Later, you will 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 reinstall 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" -wait`. This command causes setup.exe to remain resident.
4. Remember the command that you just issued in step 3, as you will need to add it to your provisioning system later.

5. When the wizard has completed deploying SAS, proceed to “Provision SAS”.

**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:
  
  ```plaintext
  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:
  
  ```plaintext
  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:
  
  ```plaintext
  move C:\Program Files\SASHome\licenses\SAS94_09HDSX_35110889_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 7

Uninstalling the SAS Intelligence Platform

Overview of Uninstalling the SAS Intelligence Platform .......................... 309

Stopping SAS Servers That Are Running ........................................... 310
  Stop SAS Servers That Are Running on Windows .......................... 310
  Stop SAS Servers That Are Running on UNIX ............................. 310

Uninstalling Your SAS Software ......................................................... 310
  Overview of Uninstalling Your SAS Software ............................... 310
  Uninstall SAS Interactively ....................................................... 311
  Uninstall SAS Non-Interactively (Silently) .................................. 313

Uninstalling Third-Party Software ...................................................... 314

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” on page 274.
2. Stop SAS servers that are running.
   See “Stopping SAS Servers That Are Running” on page 310.
3. Uninstall your SAS software.
   See “Uninstalling Your SAS Software” on page 310.
4. Uninstall third-party software.

See “Uninstalling Third-Party Software” on page 314.

---

**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 `Lev1` 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
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” on page 310.

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 dialog box, choose Uninstall SAS Software and click Next.

6. On the Select SAS Products to Uninstall dialog box, all SAS products are selected to be uninstalled. If there are any products that you want to retain, uncheck them. When you are finished, click Next.

The deployment wizard scans your machine to determine whether any pre-existing SAS files are locked or do not have Write permission. If the wizard lists any files in the text box, then while the wizard is running, quit SAS and add Write permission to the files listed. When you are finished, click Next.
The Summary page appears.

7. If there are any products that you want to keep, click **Back** until to 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 (SAS Home).

On Windows:

- Delete your SAS configuration directory (for example, `C:\SAS\Config\Lev1`).
- Delete all SAS Windows Start menu shortcuts for All Users 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 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” on page 191.

- 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. (See “Uninstalling Your SAS Software.”)

The following table shows the main third-party products that are used with the SAS 9.4 Intelligence Platform.

**Table A7.1**  Third-party Software Typically Used with SAS

<table>
<thead>
<tr>
<th>Type of Product</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling servers</td>
<td>• Platform Process Manager</td>
</tr>
</tbody>
</table>
Recommended Reading

Here is the recommended reading list for this title:

- Installation Instructions for SAS 9.4 Electronic Software Delivery for Planning Installations on z/OS.
- Installation Instructions for SAS 9.4 Installation Kit for Planning Cartridge Installations on z/OS.
- Installation Instructions for SAS 9.4 Installation Kit for Planning DVD Installations on z/OS.
- SAS Guide to Software Updates.
- SAS Intelligence Platform: Data Administration Guide.
- SAS Intelligence Platform: Desktop Application Administration Guide.
- SAS Intelligence Platform: Middle-Tier Administration Guide.
- SAS Intelligence Platform: Overview.
- SAS Intelligence Platform: Security Administration Guide.
- SAS Intelligence Platform: System Administration Guide.
- SAS Intelligence Platform: Web Application Administration Guide.
- SAS Web Applications: Tuning for Performance and Scalability.
- SAS offers instructor-led training and self-paced e-learning courses to help you administer the SAS Intelligence Platform. For more information about the courses available, see support.sas.com/admintraining.

For a complete list of SAS publications, go to sas.com/store/books. If you have questions about which titles you need, please contact a SAS Representative:

SAS Books
SAS Campus Drive
Cary, NC 27513-2414
Phone: 1-800-727-0025
Fax: 1-919-677-4444
Email: sasbook@sas.com
Web address: sas.com/store/books
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

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 lifecycle 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.
**Index**

<table>
<thead>
<tr>
<th>A</th>
<th>accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Java Access Bridge 70</td>
</tr>
<tr>
<td></td>
<td>JAWS 70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>See user accounts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>administration tasks 199</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>first-priority setup tasks 200</td>
</tr>
<tr>
<td></td>
<td>ongoing tasks 207</td>
</tr>
<tr>
<td></td>
<td>optional setup tasks 206</td>
</tr>
<tr>
<td></td>
<td>standard setup tasks 205</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A</th>
<th>ARM log information 206</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>for SAS Data Integration Studio batch jobs 206</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>backups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>process for 200</td>
</tr>
<tr>
<td></td>
<td>batch jobs</td>
</tr>
<tr>
<td></td>
<td>ARM log information for 206</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>best practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>folders 209</td>
</tr>
<tr>
<td></td>
<td>system integrity 208</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>change management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>for SAS Data Integration Studio 206</td>
</tr>
<tr>
<td></td>
<td>changing SAS order details 53</td>
</tr>
<tr>
<td></td>
<td>checklists</td>
</tr>
<tr>
<td></td>
<td>pre-installation for groups 17, 18</td>
</tr>
<tr>
<td></td>
<td>pre-installation for port numbers 22</td>
</tr>
<tr>
<td></td>
<td>pre-installation for users 13, 14</td>
</tr>
<tr>
<td></td>
<td>configuration</td>
</tr>
<tr>
<td></td>
<td>information for SAS Deployment Wizard 162</td>
</tr>
<tr>
<td></td>
<td>interactive 151</td>
</tr>
<tr>
<td></td>
<td>logs 233</td>
</tr>
<tr>
<td></td>
<td>modifying for processing servers 206</td>
</tr>
<tr>
<td></td>
<td>new SAS components 244</td>
</tr>
<tr>
<td></td>
<td>removing information or content 274</td>
</tr>
<tr>
<td></td>
<td>securing 200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>configuration directory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>creating for z/OS 19</td>
</tr>
<tr>
<td></td>
<td>protections on UNIX and z/OS 204</td>
</tr>
<tr>
<td></td>
<td>protections on Windows 201</td>
</tr>
<tr>
<td></td>
<td>Configuration Errors.html file 233</td>
</tr>
<tr>
<td></td>
<td>connectivity 205</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D</th>
<th>data sources</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>establishing connectivity to 205</td>
</tr>
<tr>
<td></td>
<td>deleting a SAS order 55</td>
</tr>
<tr>
<td></td>
<td>deployment plans 133</td>
</tr>
<tr>
<td></td>
<td>DeploymentSummary.html file 233</td>
</tr>
<tr>
<td></td>
<td>desktop applications</td>
</tr>
<tr>
<td></td>
<td>Java heap memory for 206</td>
</tr>
<tr>
<td></td>
<td>directory service accounts 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E</th>
<th>encoding 140</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>external user accounts 8</td>
</tr>
<tr>
<td></td>
<td>rights required for 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F</th>
<th>first-priority setup tasks 200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>folders 209</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F</th>
<th>best practices 209</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAS metadata folder structure 205</td>
</tr>
<tr>
<td></td>
<td>Folders tab</td>
</tr>
<tr>
<td></td>
<td>SAS Management Console 209</td>
</tr>
<tr>
<td></td>
<td>full prompt mode installation 196</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G</th>
<th>grid computing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Platform Suite for SAS and 71</td>
</tr>
<tr>
<td></td>
<td>groups</td>
</tr>
<tr>
<td></td>
<td>defining 15</td>
</tr>
<tr>
<td></td>
<td>pre-installation checklist for 17, 18</td>
</tr>
<tr>
<td></td>
<td>sas group (UNIX) 16</td>
</tr>
<tr>
<td></td>
<td>SAS Server Users group 16</td>
</tr>
<tr>
<td></td>
<td>SASGRP group (z/OS) 17</td>
</tr>
<tr>
<td></td>
<td>setting up 5</td>
</tr>
</tbody>
</table>
H
heap memory 206

I
installation
  automating for multiple machines 191
  from third-party software website 68
  full prompt mode 196
  interactive 151
  new SAS components 244
  partial prompt mode 195
  products from Platform Suite for SAS 71
  quiet mode 195
  third-party products 67
  verifying 197
Instructions.html file 232
interactive prompting levels 211
internal user accounts 7

J
Java Access Bridge 70
Java heap memory 206
JAWS 70
jobs
  scheduling 206
JUnit 70

L
language 140
local accounts 12
locale 140
logging 206
  See also ARM log information logs
  configuration 233
LSF Administrator account 11
LSF User account 11

M
managing a SAS deployment 239
  configuring or deploying new components 244
  removing a configuration 274
memory
  Java heap memory 206
metadata
  setting up folder structure 205
  metadata repositories
  metadata server and access to 208
MetadataRepositories subdirectory 208
multicast addresses 21
multiple machine deployments 139
automating SAS installation 191

N
network accounts 12

O
ongoing system administration tasks 207
operating system
  configuration directory protections,
    UNIX and z/OS 204
  configuration directory protections,
    Windows 201
operating system accounts
  See user accounts
optional setup tasks 206

P
partial prompt mode installation 195
passwords
  policies for SAS system accounts 12
performance
  optimizing for metadata server 206
  web applications 206
Platform Grid Management Service
  installing 71
Platform LSF (Load Sharing Facility)
  installing 71
Platform Process Manager
  installing 71
Platform Suite for SAS
  installing products from 71
playing back SAS Deployment Wizard
  response files 194
  full prompt mode 196
  monitoring the wizard 197
  partial prompt mode 195
  quiet mode 195
  verifying the installation 197
ports
  designating 21
  reserving for SAS servers and spawners 22
PowerShell 70
pre-installation checklists
  for groups 17, 18
  for port numbers 22
  for users 13, 14
processing servers
  modifying configuration of 206
Q
quiet mode installation 195

R
recording SAS Deployment Wizard response files 192
region 140
removing a configuration 274, 276
identifying dependent components 277
running the SAS Deployment Manager 279
reports
scheduling 206
required user accounts 5
reserving ports
SAS servers and spawners 22
response files
playing back 194
recording 192
rights
external user accounts 10
root privileges 13
rposmgr subdirectory 208

S
SAS Administrator account 7
SAS Data Integration Studio
ARM log information for jobs 206
change management for 206
SAS Deployment Manager
removing a configuration 274, 279
SAS Deployment Tester 191
SAS Deployment Wizard 133
configuration information 162
creating SAS Software Depots 39
documents and reports 232
installing and configuring SAS 151
interactive prompting levels 211
monitoring during playback 197
options 133, 212
response files 192
SAS Download Manager
creating SAS Software Depots 33
SAS folders
See folders
sas group (UNIX) 16
SAS installation data files
specifying location 157
SAS Installer account 9
SAS Intelligence Platform
deploying 2
software offerings 1
uninstalling 309
SAS Management Console
Folders tab 209
SAS Metadata Server
metadata repository access and optimizing performance and reliability 206
SAS orders
and SAS Software Depots 244
changing order details 53
creating a disc image 58
deleting an order 55
SAS server tier, troubleshooting 234
SAS Server Users group 16
SAS servers
reserving ports for 22
stopping 310
validation 188
SAS software
uninstalling 310
SAS Software Depots 27
and SAS orders 244
benefits 29
best practices for 31
creating with SAS Deployment Wizard 39
creating with SAS Download Manager 33
installing third-party products 68
prerequisites for creating 32
SAS Spawned Servers account 9
SAS system accounts 5
passwords 12
SAS Trusted User account 7
SASGRP group (z/OS) 17
scheduling
Platform Suite for SAS and 71
security
best practices for system integrity 208
configuration directory protections,
UNIX and z/OS 204
configuration directory protections,
Windows 201
first-priority setup tasks 200
optional setup tasks 206
standard setup tasks 205
server logging 206
setuid.sh 13
setup tasks
first-priority 200
optional 206
standard 205
spawners
reserving ports for 22
standard setup tasks 205
stopping SAS servers 310
sudo privileges 13
system administration
ongoing tasks 207
system integrity
  best practices for 208

T
tasks
  See administration tasks
temporary directory
  changing 151
test environment 206
third-party products
  installing 67
  installing from third-party software
    website 68
  installing products from Platform Suite
    for SAS 71
  installing with SAS Software Depot 68
  uninstalling 314
  user accounts for 11
third-party software
  JUnit 70
  PowerShell 70
third-party software website 68
troubleshooting 231
  SAS server tier 234
  SAS web applications 236

U
uninstalling the SAS Intelligence Platform 309
  SAS software 310
  stopping servers 310
  third-party software 314
UNIX
  operating system protections 204
  sas group 16
  user accounts 5
defining 6
directory service accounts 12
  external 8
  for third-party software 11
  internal 7
  local accounts 12
  network accounts 12
  password policies 12
  pre-installation checklist for 13, 14
  SAS system accounts 5
  setting up required accounts 5
  sudo privileges 13
  users
    access management 205
    adding 205

V
validating SAS servers 188

W
web application server
  installing from third-party software
    website 68
web applications
  optimizing performance 206
  troubleshooting 236
Windows
  operating system protections 201
  SAS Server Users group 16

Z
z/OS
  creating a configuration directory 19
  operating system protections 204
  SASGRP group 17
Gain Greater Insight into Your SAS® Software with SAS Books.

Discover all that you need on your journey to knowledge and empowerment.

support.sas.com/bookstore for additional books and resources.